C-147 Registration Package
Javelina Facility Pits
Section 18, T26S, R35E
Lea County, New Mexico

Prepared For

Prepared By

ENVIROTECH
ENGINEERING & CONSULTING, INC.

TYLER JOE WILLIAMS
NEW MEXICO
26482
PROFESSIONAL ENGINEER
2/15/2021

February 2021

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Department
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-147
Revised April 3, 2017

Recycling Facility and/or Recycling Containment

Type of Facility: [X] Recycling Facility [X] Recycling Containment*****

Type of action: [X] Permit [X] Registration
[ ] Modification [ ] Extension
[ ] Closure [ ] Other (explain) _____

*** At the time C-147 is submitted to the division for a Recycling Containment, a copy shall be provided to the surface owner.**

Be advised that approval of this request does not relieve the operator of liability should operations result in pollution of surface water, ground water or the environment. Nor does approval relieve the operator of its responsibility to comply with any other applicable governmental authority's rules, regulations or ordinances.

1.

Operator: Oilfield Water Logistics (For multiple operators attach page with information) OGRID #: _____

Address: 8201 Preston Rd Suite 520 Dallas TX 75225

Facility or well name (include API# if associated with a well): Javelina Facility AST

OCD Permit Number: _____ (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr E1/2 pf NE1/4 Section 18 Township 26 South Range 35 East County: Lea County

Surface Owner: [X] Federal [ ] State [ ] Private [ ] Tribal Trust or Indian Allotment

2.

[X] **Recycling Facility:**

Location of recycling facility (if applicable): Latitude 32.048956° Longitude -103.401212° NAD83

Proposed Use: [ ] Drilling* [X] Completion* [ ] Production* [ ] Plugging *

******The re-use of produced water may NOT be used until fresh water zones are cased and cemented***

[ ] Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

[X] Fluid Storage

[X] Above ground tanks [X] Recycling containment [ ] Activity permitted under 19.15.17 NMAC explain type_____

[ ] Activity permitted under 19.15.36 NMAC explain type:_____ [ ] Other explain _____

[ ] For multiple or additional recycling containments, attach design and location information of each containment

[ ] **Closure Report (required within 60 days of closure completion):** [ ] Recycling Facility Closure Completion Date:_____

3.

[X] **Recycling Containment:**

[ ] Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)

Center of Recycling Containment (if applicable): Latitude _____ Longitude _____ NAD83

[ ] For multiple or additional recycling containments, attach design and location information of each containment

[ ] Lined [ ] Liner type: Thickness _____mil [ ] LLDPE [ ] HDPE [ ] PVC [ ] Other _____

[ ] String-Reinforced

Round AST: 190' Diameter

Liner Seams: [ ] Welded [ ] Factory [ ] Other _____ Volume: 48,000 bbl Dimensions: L_____ x W_____ x D_____

[ ] Recycling Containment Closure Completion Date:_____

4.

Bonding:

☐ Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC **(These containments are limited to only the wells owned or operated by the owners of the containment.)**

☒ Bonding in accordance with 19.15.34.15(A)(1). Amount of bond $ 58,000 **(work on these facilities cannot commence until bonding amounts are approved)**

☒ Attach closure cost estimate and documentation on how the closure cost was calculated.

5.

Fencing:

☐ Four foot height, four strands of barbed wire evenly spaced between one and four feet

☒ Alternate. Please specify 6' Chain Link Fence

6.

Signs:

☒ 12"x 24", 2" lettering, providing Operator's name, site location, and emergency telephone numbers

☐ Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

Justifications and/or demonstrations that the proposed variance will afford reasonable protection against contamination of fresh water, human health, and the environment.

Check the below box only if a variance is requested:

☒ Variance(s): Requests must be submitted to the appropriate division district for consideration of approval. If a Variance is requested, include the variance information on a separate page and attach it to the C-147 as part of the application.

If a Variance is requested, it must be approved prior to implementation.

8.

Siting Criteria for Recycling Containment

Instructions: The applicant must provide attachments that demonstrate compliance for each siting criteria below as part of the application. Potential examples of the siting attachment source material are provided below under each criteria.

General siting

Ground water is less than 50 feet below the bottom of the Recycling Containment. NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☐ Yes ☒ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map	☐ Yes ☒ No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; aerial photo; satellite image	☐ Yes ☒ No
Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application. - NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 500 feet of a wetland. - US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No

9.

Recycling Facility and/or Containment Checklist:

Instructions: Each of the following items must be attached to the application. Indicate, by a check mark in the box, that the documents are attached.

- [X] Design Plan - based upon the appropriate requirements.
- [X] Operating and Maintenance Plan - based upon the appropriate requirements.
- [X] Closure Plan - based upon the appropriate requirements.
- [X] Site Specific Groundwater Data -
- [X] Siting Criteria Compliance Demonstrations –
- [ ] **Certify that notice of the C-147 (only) has been sent to the surface owner(s)**

10.

Operator Application Certification:

I hereby certify that the information and attachments submitted with this application are true, accurate and complete to the best of my knowledge and belief.

Name (Print): Nick Hines Title: COO

Signature: _____ Date: 2/12/2021

e-mail address: nhines@oilfieldwaterlogistics.com Telephone: 214.206.3943

11.

OCD Representative Signature: _____ Approval Date: _____

Title: _____ OCD Permit Number: _____

- [ ] OCD Conditions _____
- [ ] Additional OCD Conditions on Attachment

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Type of Facility: [x] Recycling Facility [x] Recycling Containment*****

Type of action: [x] Permit [x] Registration
[ ] Modification [ ] Extension
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1.

Operator: Oilfield Water Logistics (For multiple operators attach page with information) OGRID #: _____

Address: 8201 Preston Rd. Suite 520 Dallas TX, 75225

Facility or well name (include API# if associated with a well): Javelina Facility North Pit

OCD Permit Number: _____ (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr E1/2 of NE1/4 Section 18 Township 26 South Range 35 East County: Lea County

Surface Owner: [x] Federal [ ] State [ ] Private [ ] Tribal Trust or Indian Allotment

2.

[x] **Recycling Facility:**

Location of recycling facility (if applicable): Latitude 32.048477° Longitude -103.400286° NAD83

Proposed Use: [ ] Drilling* [x] Completion* [ ] Production* [ ] Plugging *

****The re-use of produced water may NOT be used until fresh water zones are cased and cemented***

[ ] Other, ***requires permit for other uses. Describe use, process, testing, volume of produced water and ensure there will be no adverse impact on groundwater or surface water.***

[x] Fluid Storage

[x] Above ground tanks [x] Recycling containment [ ] Activity permitted under 19.15.17 NMAC explain type_____

[ ] Activity permitted under 19.15.36 NMAC explain type:_____ [ ] Other explain _____

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[ ] **Closure Report (required within 60 days of closure completion):** [ ] Recycling Facility Closure Completion Date:_____

3.

[x] **Recycling Containment:**

[ ] Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)

Center of Recycling Containment (if applicable): Latitude _____ Longitude _____ NAD83

[ ] For multiple or additional recycling containments, attach design and location information of each containment

[x] Lined [ ] Liner type: Thickness 60/40 mil [ ] LLDPE [x] HDPE [ ] PVC [ ] Other W/ Leak Detection

[ ] String-Reinforced

Liner Seams: [x] Welded [ ] Factory [ ] Other _____ Volume: 346,000 bbl Dimensions: L 320 x W 565 x D 18

[ ] Recycling Containment Closure Completion Date:_____

4.

Bonding:

☐ Covered under bonding pursuant to 19.15.8 NMAC per 19.15.34.15(A)(2) NMAC **(These containments are limited to only the wells owned or operated by the owners of the containment.)**

☒ Bonding in accordance with 19.15.34.15(A)(1). Amount of bond $ 442,500 **(work on these facilities cannot commence until bonding amounts are approved)**

☒ Attach closure cost estimate and documentation on how the closure cost was calculated.

5.

Fencing:

☐ Four foot height, four strands of barbed wire evenly spaced between one and four feet

☒ Alternate. Please specify 6' Chain Link

6.

Signs:

☒ 12"x 24", 2" lettering, providing Operator's name, site location, and emergency telephone numbers

☐ Signed in compliance with 19.15.16.8 NMAC

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Ground water is less than 50 feet below the bottom of the Recycling Containment. NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☐ Yes ☒ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map	☐ Yes ☒ No
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; visual inspection (certification) of the proposed site	☐ Yes ☒ No
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Name (Print): Nick Hines Title: COO

Signature: Date: 2/12/2021

e-mail address: nhines@oilfieldwaterlogistics.com Telephone: 214.206.3943

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Title: _____ **OCD Permit Number:** _____

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[ ] String-Reinforced

Liner Seams: [x] Welded [ ] Factory [ ] Other _____ Volume: 512,000 bbl Dimensions: L 500' x W 500' x D 18'

[ ] Recycling Containment Closure Completion Date:_____

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Signature: Date: 2/12/2021

e-mail address: nhines@oilfieldwaterlogistics.com Telephone: 214.206.3943

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OCD Representative Signature: _____ Approval Date: _____

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- [ ] OCD Conditions _____
- [ ] Additional OCD Conditions on Attachment

ENVIROTECH
ENGINEERING & CONSULTING, INC.

2500 North Eleventh Street • Enid, OK 73701 • (580) 234-8780 • Fax (580) 237-4302 • www.envirotechconsulting.com

February 5, 2021

Ms. Emily Hernandez
New Mexico EMNRD
Oil conservation Division
811 S. First St.
Artesia, New Mexico 88210

RE: Rule 34 Variance Request –Produced Water Recycling Containment

Ms. Hernandez:

Oilfield Water Logistics (OWL) is requesting a variance to Rule 34 Part 12(A)(4) requiring secondary liners to be 30-mil string reinforced LLDPE. OWL is requesting approval to use 40-mil LLDPE in place of the specified material. Based on our experience, we feel that the requested material will allow us to provide greater environmental protection in our impoundments.

Due to the construction of the 30-mil reinforced LLDPE material, nondestructive QA/QC testing cannot be performed. The proposed 40-mil LLDPE will be seamed in a manner that will allow nondestructive pressure testing of the seams to ensure proper sealing.

The proposed LLDPE is appropriate material for the proposed use in the impoundment, and is compatible with the material that will be stored. This material will provide equal or better environmental protection as the specified 30-mil reinforced LLDPE. Attached with this request is a sample specification sheet for the LLDPE with the proposed material highlighted.

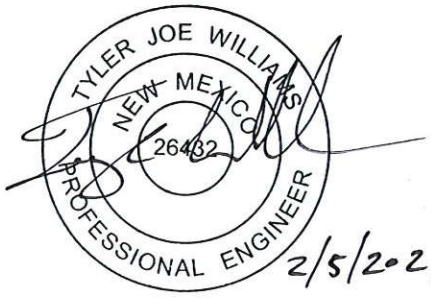
The proposed new liner system cross-section is as follows: prepare subgrade, 12 oz. geotextile, 40-mil LLDPE, single sided geocomposite, 60-mil HDPE (smooth on bottom, textured on slopes). This will replace the cross-section required by the current rule and submitted with the original permit application. It should also be noted that this variance has been granted on past sites.

Should you have any questions or require additional information, please contact me by phone at 580-234-8780 or by email at twilliams@envirotechconsulting.com at your convenience

Thank you for your consideration.
Best regards,

ENVIROTECH ENGINEERING & CONSULTING, INC.

Tyler Williams, P.E.
President and Principal Engineer



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February 5, 2021

Ms. Emily Hernandez
New Mexico EMNRD
Oil conservation Division
811 S. First St.
Artesia, New Mexico 88210

RE: Rule 34 Variance Request –Produced Water Recycling Containment

Ms. Hernandez:

Oilfield Water Logistics (OWL) is requesting a variance to C-147 Fencing requirement for a requiring a fence four foot in height, with four strands of barbed wire evenly spaced between one and four feet. OWL is requesting approval to a chain link fence, six (6) feet in height with a minimum of three (3) strands of barbed wire over the top of the chain link. Based on our experience, we feel that the requested fencing will provide greater security to the facility for excluding animals and unauthorized individual access.

The proposed fencing has been used extensively on similar project throughout, New Mexico and Texas with great success.

Should you have any questions or require additional information, please contact me by phone at 580-234-8780 or by email at twilliams@envirotechconsulting.com at your convenience

Thank you for your consideration.
Best regards,

ENVIROTECH ENGINEERING & CONSULTING, INC.

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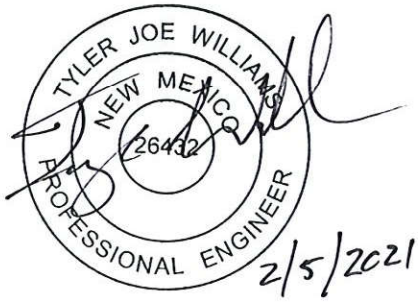

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February 5, 2021

Ms. Emily Hernandez
New Mexico EMNRD
Oil conservation Division
811 S. First St.
Artesia, New Mexico 88210

RE: Rule 34 Variance Request –Produced Water Impoundment Bird Netting

Ms. Hernandez:

Oilfield Water Logistics (OWL) is requesting a variance to Rule 34-Part 12(E) Netting to ensure the recycling facility is protected from wildlife. Based on our experience from previous projects, we believe audible bird deterrents provide equal or better protection when compared to netting. In addition, they require less inspection, maintenance and repair over the life of the facility.

OWL is proposing to use the "Bird-X Mega Blaster Pro" system. A copy of the user's manual is attached to this variance request letter.

This system will replace the netting required by the current rule and submitted with the original permit application.

Should you have any questions or require additional information, please contact me by phone at 580-234-8780 or by email at twilliams@envirotechconsulting.com at your convenience

Thank you for your consideration.
Best regards,

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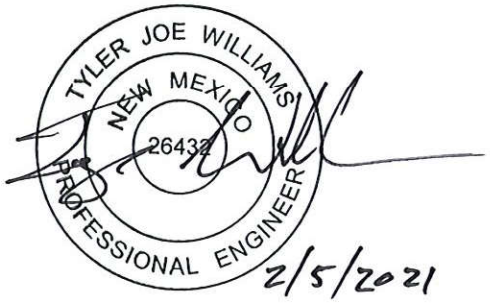
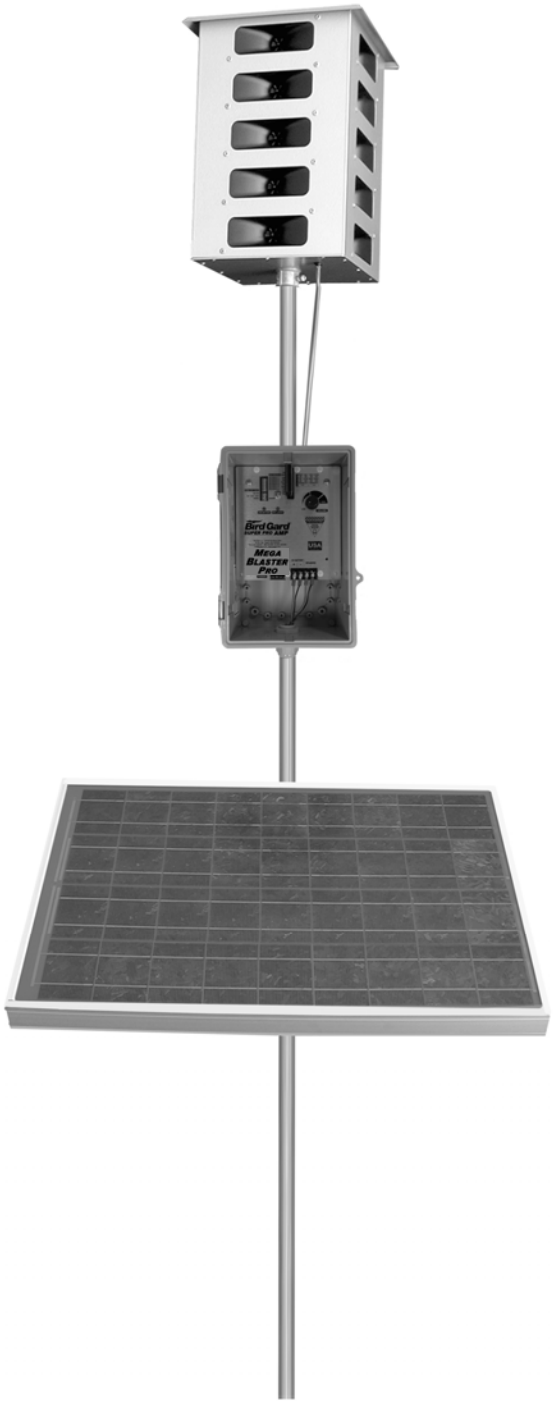


MEGA BLASTER PRO

BIRD-X

User's Manual



Overview

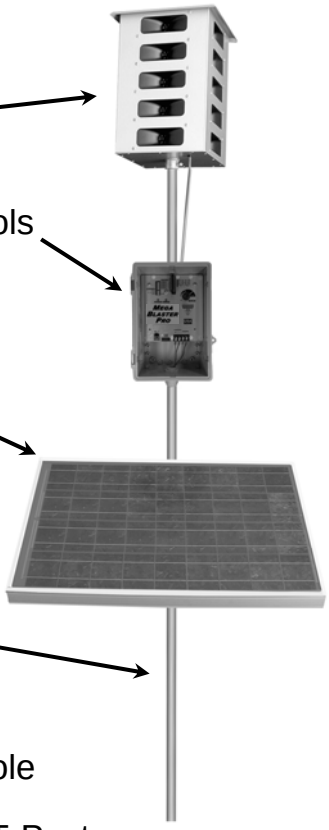
The Bird-X Mega Blaster Pro utilizes the innate power of the natural survival instincts of birds to effectively repel them. Digital recordings of distressed and alarmed birds, along with the sounds made by their natural predators are broadcast through high fidelity weather-resistant speakers over the top of areas. This action triggers a primal fear and flee response. Pest birds soon relocate to where they can feed without feeling threatened.

Your Bird-X Mega Blaster Pro system consists of:

20-Speaker Tower broadcasts the bird sounds

Control Unit produces the bird sounds and contains all operational controls

Solar Panel recharges the 12-volt deep cycle battery



Items needed but <u>not</u> included:

(1) **Mounting Pole** or **Mast** tall enough to raise the 20-Speaker Tower at least 5 feet above the top of the areas, trees or other obstructions

(1) **12-volt Deep Cycle Battery** (RV/Marine) Group 27 or larger wet cell

(1) **T-Post** or similar (Optional) may be needed to support the mounting pole

(1) **Bailing Wire or zip-tie** (Optional) to secure the Mounting Pole to the T-Post

CAUTION: THE MEGA BLASTER PRO IS CAPABLE OF PRODUCING SOUNDS UP TO 125 DECIBELS. PROPER HEARING PROTECTION MUST BE WORN ANYTIME THE UNIT IS TURNED ON.

Bird Control Management Guidelines

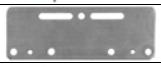
An active bird control management program is a key to successfully repelling pest birds. Bird feeding patterns may take several days or weeks to break. Follow all suggestions for maximum effectiveness. Read all instructions prior to installation.

For best results:

- **It is extremely important to fully protect your entire area from birds.** Any areas not fully protected will allow birds to begin feeding at the fringes of the sound coverage. They will soon become bolder and learn the sounds are nothing to fear. This will cause the effectiveness to diminish. Complete Bird-X product coverage forces birds to leave the area entirely.
- Install the Mega Blaster Pro unit at least two weeks before birds are attracted to your area. It is much easier to keep birds away before they have found a food source than it is to repel them once they have developed a feeding pattern.
- Most birds begin feeding from the perimeter of an area. Place Mega Blaster Pro units so the sound protection covers past the edges of the area.
- Birds will often use tall trees for roosting and observation. If birds are in bordering trees it is necessary to position the units so the sound protection covers the trees as well.
- Mount the 20-Speaker Tower at least five feet above trees, areas and structures for maximum coverage. The higher the better. Sound will disperse or reflect off structures or foliage. Mount control unit out of direct sun, if possible.
- When first installed, run Mega Blaster Pro units at FULL volume and on SHORT time off periods. This ensures maximum “bird stress” and creates a hostile environment.
- Watch for changes in bird activity and adjust the location of your Mega Blaster Pro unit if needed.
- **Check the battery and unit settings often to insure continuous bird control. Be certain that the system is not turned down or has a dead battery. Field hands or harvesters may turn down the volume.**
- Changing settings and switches often helps to prevent bird habituation. Periodically change the switch settings of the eight sounds (turning them ON or OFF). NEVER turn OFF the distress calls of the target birds you are trying to repel and always keep at least one predator bird sound turned ON.
- If different bird species enter the protected area and begin causing damage contact us immediately for an updated Sound Recording Card designed to repel the new invading birds.
- Remember that the Mega Blaster Pro system is a management tool, and should be used as part of your overall bird control strategy, sometimes in conjunction with other bird control techniques and devices.

Be aware that under extreme drought or other adverse conditions, birds will disregard all deterrents and risks in order to survive

Materials List

Item	Qty		Notes
Mega Blaster Pro Control Box	1		
Sound Recording Card	1		Pre-installed in control box
20-Speaker Tower	1		
Control Box Mounting U-Bolts	2		1/4” x 1” x 2”
Control Box Brackets	2		
40-Watt Solar Panel	1		
Solar Panel Mounting Bracket	1		
Solar Panel Mounting U-Bolts	2		1/4” x 1-1/8” x 2”
Control Box Connector Cable	1		2 Wire, 4 ft. Long
Battery Box	1		

Assembly

Note: You will find it easier to pre-assemble the following components prior to installation in the field.

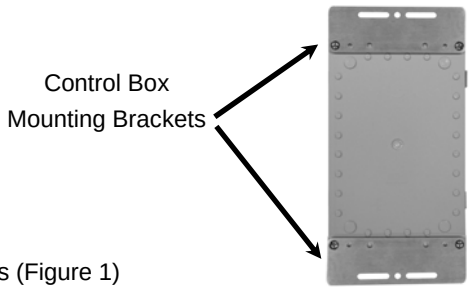


Figure 1

Control Unit

1. Lay the Control Unit face down
2. Attach the two Control Box Mounting Brackets to the back with the included screws (Figure 1)

Solar Panel

3. Install the two Solar Panel Mounting U-Bolts in the Head of the Solar Panel Mounting Bracket (Figure 2)
4. Loosen, but do not remove the Carriage Bolts securing the movable Clamp Plates on the Solar Panel Mount Bracket
5. Lay the solar panel on a flat surface with the glass side down
6. Lay the Mounting Arm across the Solar Panel with the Clamp Plates down. Position the Mounting Arm at an angle so the Clamp Plates slide under the lip of the Solar Panel (Figure 3A)
7. Rotate the Mounting Arm and secure it to the Solar Panel by tightening the Carriage Bolts (Figure 3B)

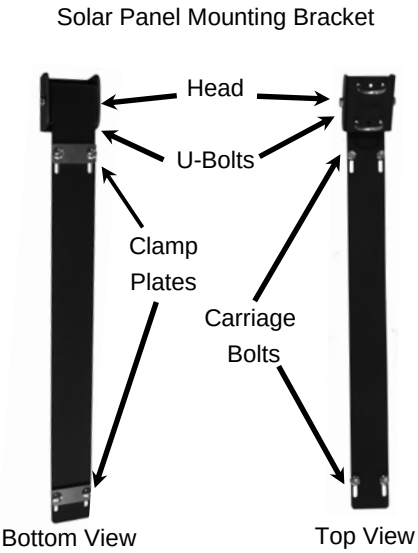


Figure 2

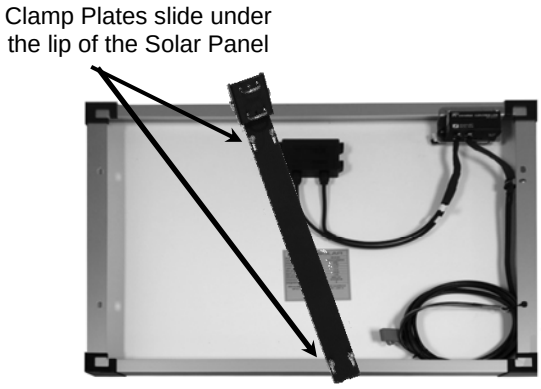


Figure 3A

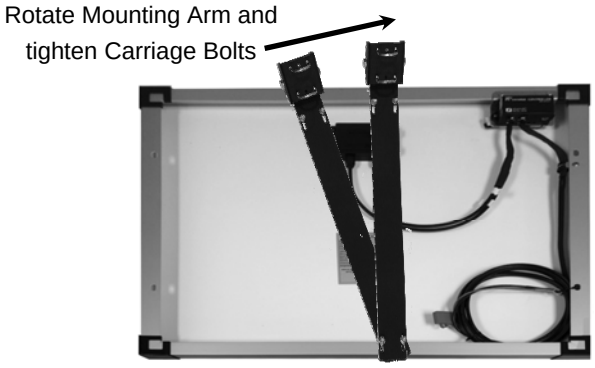


Figure 3B

Placement

Your Mega Blaster Pro will protect an area up to approximately 600 feet in all directions.

Factors to consider when selecting the best location include:

- Birds typically feed from the perimeter of the area and work their way in. Place Mega Blaster Pro units so the sound protection covers all the way to the edges of the area. For larger areas Mega Blaster Pro units should be positioned 400-500 feet inside the area and spaced every 1,200 feet.
- Mount the 20-Speaker Tower at least 5 feet above terrain, areas, trees and other obstacles.
- Placing the Mega Blaster Pro on top of a hill or small rise will give you much better coverage than at the bottom of a valley. The greater the height the further the sounds will travel.
- Wind can blow the sound waves. If the area you need to protect has consistent wind coming from the same direction, position your Mega Blaster Pro more “upwind.”
- Trees surrounding areas provide birds with a safe perch that allows them to fly in, grab food and fly out. It is much more difficult to eliminate bird damage if the birds are able to use the surrounding trees as a staging area for attacks on your areas. Your Mega Blaster Pro unit should be positioned close to any trees bordering your areas. If birds are roosting in the trees at night the TIME OF OPERATION should be set to 24 HOUR.
- Lakes, rivers and wetlands are a favorite resting and hiding place for birds. Your Mega Blaster Pro unit should be placed so the sound thoroughly covers any areas where birds frequent.
- Neighbors, businesses and others may not appreciate hearing the bird sounds. At the limits of the effective range the sounds from your Mega Blaster Pro are at a level people may find annoying. Avoid placing the unit where it becomes a nuisance.

Building a Mounting Pole or Mast

CAUTION: TALL POLES AND MASTS CAN BE HEAVY AND POTENTIALLY DANGEROUS. USE EXTREME CAUTION WHEN CONSTRUCTING OR WORKING AROUND TALL POLES AND MASTS. BIRD-X, INC., ASSUMES NO RESPONSIBILITY FOR DAMAGES OR INJURIES.

Things to consider:

- The 20-Speaker Tower is designed to mount onto a 1 in. (outside diameter) pipe at least 14 in. long. 1 in. conduit works well as it is light, rigid, inexpensive and available in 10 ft. lengths making it ideal for low areas, vineyards and bushes.
- You will want to take down your Mega Blaster Pro unit after harvest and store it in a dry location until the next season.

A suggestion for masts up to 20 feet tall:

1. 3/4 inch Galvanized steel water pipe has a 1 inch outside diameter and is the correct size to fit inside the 20-Speaker Tower. It is often available in 20 ft. lengths from hardware and plumbing supply stores. If these are not available, 10 ft. lengths are common and can be fastened together with a threaded coupler. Assemble the poles on the ground.
2. Slide the 20-Speaker Tower over the pipe and tighten the set screw in the collar at the base.
3. Stand the pole assembly up just inside the drip line of a tree and securely tie the pole to a few heavy branches.
4. Drive a T-Post into the ground at the base of the pole and secure with wire.

For masts taller than 20 feet:

1. Use 20 ft. lengths of galvanized steel water pipe or similar, securely fastened together with threaded reducing couplers.
2. Starting with 3 in. pipe, step the size down with each length of pipe.
3. The last 10 ft. can be 1 in. (O.D.) conduit hose clamped to the final section of galvanized pipe.

A semi-permanent mast support can be made by digging a hole 4 ft. deep and 4 ft. round. In the middle of the hole sink a length of galvanized water pipe large enough that your mast will easily fit inside. Make sure at least 2 ft. of pipe is above ground level. Fill the area around the pipe with packed sand, leaving the last foot filled with concrete to form a cap over the hole. Your mast can be dropped into the galvanized water pipe “receiver” for support. At the end of harvest the mast can be lifted out and positioned on the ground for easy disassembly and storage.

Installation

Note: Foliage, trees, and other obstructions severely reduce the effective range of Mega Blaster Pro units. It is critical that the 20-Speaker Tower is mounted at least 5 feet above all obstructions to achieve the maximum protection.

Mounting Pole or Mast

1. The Mounting Pole or Mast will need to be supported by a T-Post, fence post, tree or other means. The Pole Support should be in place before proceeding.

20-Speaker Tower

2. Lay the 20-Speaker Tower on its side on the ground and cut the zip-tie securing the speaker cables.
3. Slide the 1 in. (outside diameter) Mounting Pole through the Collar at the bottom of the 20-Speaker Tower until it slides over the positioning bolt inside the top of the Tower (Figure 4).
4. Tighten the Set Screw in Collar securely.

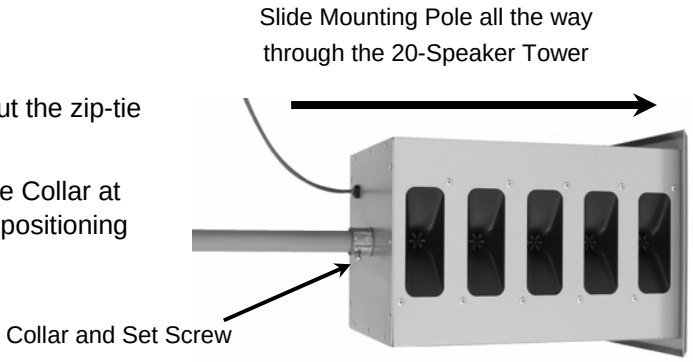


Figure 4

Solar Panel

5. Rest the lower end of the Mounting Pole on the Solar Panel Mounting Bracket approximately three feet from the bottom of the pole with the top of the solar panel facing the 20-Speaker Tower (Figure 5).
6. Lean up the Mounting Pole with the 20-Speaker Tower on top, against the Pole Support and fasten the Mounting Pole to the Pole Support securely with wire or other semi-permanent means.
7. Rotate the solar panel so it receives sunlight.

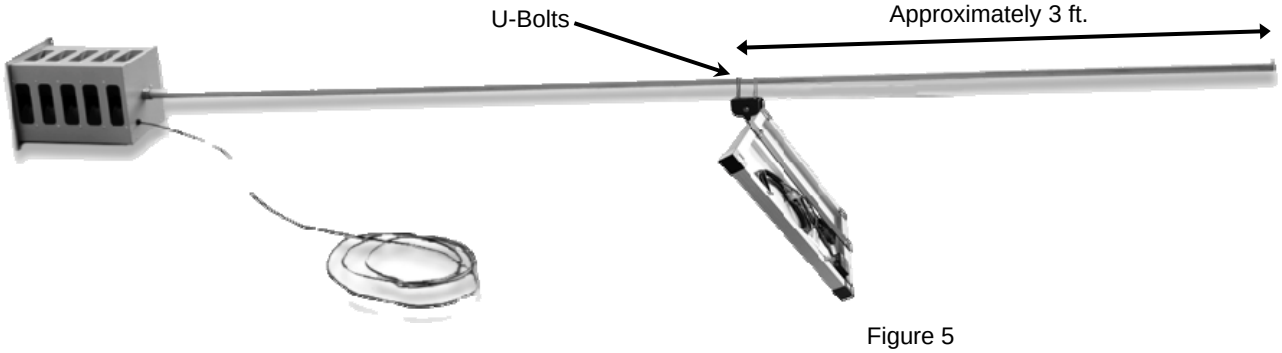


Figure 5

Control Box

8. Attach the Control Box to the Mounting Pole with the U-Bolts.
9. Feed the Speaker Cables through the Cable Strain Relief at the bottom
10. Attach the Speaker Cables from the 20-Speaker Tower to the screws marked “SPEAKER” on the faceplate of the control panel.
11. Locate the Control Box Connector Cable (the grey 2 lead cables) and feed one end through the Cable Strain Relief.
12. Connect the RED wire to the screw marked “+” and the BLACK wire to the screw marked “-” under “12V BATTERY” on the faceplate of the control panel.
13. **MAKE SURE THE POWER SWITCH IS TURNED OFF BEFORE ATTACHING BATTERY.**
14. Connect the other end of the RED wire to the “+” terminal on the 12-volt Deep Cycle battery (not included). Connect the BLACK wire to the “-” terminal on the battery.
15. Hand tighten the Tapered Cinch Nut on the bottom of the Cable Strain Relief to help keep insects and moisture out.

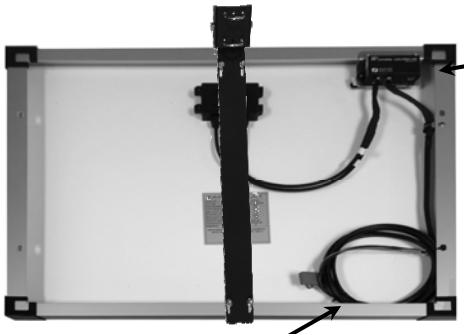
Figure 6

Solar Panel Connections

16. Cut the black zip-ties securing the RED and BLACK wires on the underside of the solar panel. (Figure 7)
17. Connect the RED wire to the “+” terminal on the 12-volt battery and connect the BLACK wire to the “-” terminal on the battery.

NOTE: If you are using a “Sealed Gel” 12-volt battery (instead of a Lead Acid battery) you will need to cut the indicated small BLUE wire on the attached voltage regulator. This prevents Sealed Gel batteries from being overcharged. Failure to cut this wire can result in permanent battery damage. (Figure 8)

Figure 7



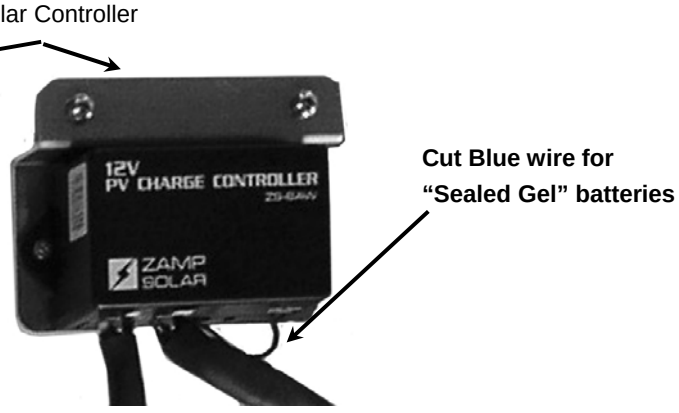


Figure 8

CAUTION: The Mega Blaster Pro is capable of producing sounds up to 125 decibels. Hearing protection must be worn anytime the unit is on!

Settings

Repelling birds requires regular monitoring and active management. Birds are intelligent and highly adaptable so it is important to create and maintain an environment the birds perceive as hostile and dangerous. This is achieved by playing the sounds frequently and at a high volume, otherwise the birds will not be fully repelled and will soon learn to adapt.

Below are the initial settings that should be used when your Mega Blaster Pro is first installed. Please see the "Bird Control Management Guidelines" section for more information.

Recordings

There are eight separate bird sounds contained on the Replaceable Sound Card. The label on the sound card lists each sound with a number corresponding to the eight "RECORDINGS" dip switches to the left of the Sound Card. Initially all RECORDING switches should be turned ON. If the target birds begin returning, periodically change the switch settings for the eight sounds (turning them ON or OFF). ***NOTE:*** **NEVER turn OFF the distress calls of the target birds you are trying to repel and always keep at least one predator bird sound turned ON.**

Mode Settings

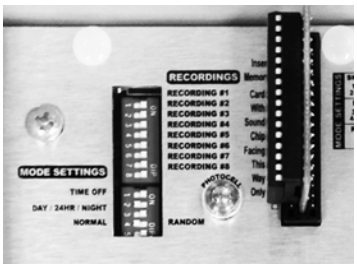
TIME OFF INTERVAL controls the time off periods between each playing of the bird recordings.

Setting	Time Off Duration	Switch #1	Switch #2
SHORT	**17-50 Seconds**	**ON**	**OFF**
MEDIUM	1:00-4:15 Minutes	OFF	ON
LONG	5:00-10:00 Minutes	ON	ON
XLONG	10:00-30:00 Minutes	OFF	OFF

When the Mega Blaster Pro unit is first installed the TIME OFF INTERVAL should be set to SHORT to create the greatest sense of danger and move the birds out of the area the fastest. Once the birds have left the area completely for a week or more you may try increasing the TIME OFF INTERVAL gradually, but you must monitor the birds carefully. Switch back to SHORT at the first sign birds are returning.

TIME OF OPERATION controls when the bird recordings play.

Setting	Switch #3	Switch #4
DAY ONLY	**ON**	**OFF**
24-HOUR	OFF	ON
NIGHT ONLY	ON	ON



Recommended Settings

In most cases birds are only active during the day so the DAY ONLY is recommended. If birds are roosting in bordering trees at night you will need to set the TIME OF OPERATION for 24-HOUR.

RANDOM OPERATION should always be turned **ON**. **VOLUME should be set as high as possible.**

Troubleshooting

Problem	Possible Cause	Solution
No Sound	Volume turned down	Turn volume up
	Dead battery	Charge or replace battery
	Loose battery connection	Verify all battery connections are tight
	All RECORDINGS are turned OFF	Verify all RECORDINGS are switched to ON
	Sound Card not fully seated	Remove sound card and reinstall, making sure it is fully inserted into the socket
	Sound Card is installed backward	Unplug the sound card and reinstall with the label facing to the left
	TIME OF OPERATION set to DAY ONLY without enough light	Change TIME OF OPERATION to 24-HOUR
	Unit was not shut down before the battery was disconnected causing the unit to go into “SAFE MODE”	1. Turn the POWER switch OFF 2. Disconnect the battery 3. Remove the sound card 4. Wait 30 seconds 5. Reinstall sound card 6. Reconnect the battery 7. Turn the POWER switch ON
Was working but stopped	The battery is dead	Connect the battery to a battery charger and see if it will hold a charge. Replace if necessary
	Solar Panel is not getting enough sunlight	Reposition the Solar Panel

Limited Warranty

THIS MEGA BLASTER PRO UNIT IS WARRANTED AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP FOR SIX MONTHS FROM DATE OF PURCHASE (EXTENDED WARRANTY AVAILABLE). BIRD-X WILL REPLACE OR REPAIR, PROVIDED DEFECT OCCURS UNDER NORMAL USE. *RETURNS ACCEPTED ONLY WITH AUTHORIZATION FROM OUR CHICAGO OFFICE.*

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Chicago, IL 60612
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www.Bird-X.com
Info@Bird-X.com

EPA Establishment Number 075130-OR-001

Mega Blaster Pro P/N 655-0065-00 (Rev. 9/2013)

CE

ENVIROTECH
ENGINEERING & CONSULTING, INC.

2500 North Eleventh Street • Enid, OK 73701 • (580) 234-8780 • Fax (580) 237-4302 • www.envirotechconsulting.com

March 22, 2021

Ms. Emily Hernandez
New Mexico EMNRD
Oil conservation Division
811 S. First St.
Artesia, New Mexico 88210

RE: Rule 34 Variance Request –Produced Water Recycling Containment

Ms. Hernandez:

Oilfield Water Logistics (OWL) is requesting a variance to Rule 34 Part 12(A)(2) requiring "a levee with an inside grade no steeper than two horizontal feet to one vertical foot (2H:1V). The levee shall have an outside grade no steeper than three horizontal feet to one vertical foot (3H:1V). OWL is requesting approval to use and Above Ground Storage Tank (AST) as a containment structure at the Javelina Recycle Facility. Based on our experience AST's work well for this purpose, they are structurally sound and easy to maintain.

OWL is proposing to use a Mobile Pond Accessories 48k Bbl AST, a copy of the engineering drawing as well as a load stress simulation are attached.

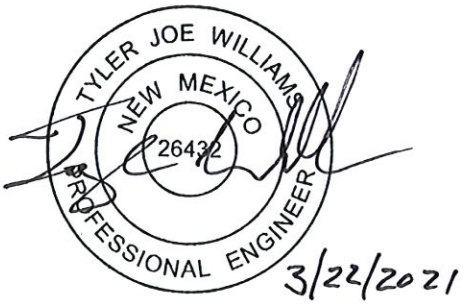
This AST will have vertical walls on both interior and exterior sides and thus requires a variance for use. The AST will, however be double lined like other containments to limit the risk of leakage.

Should you have any questions or require additional information, please contact me by phone at 580-234-8780 or by email at twilliams@envirotechconsulting.com at your convenience

Thank you for your consideration.
Best regards,

ENVIROTECH ENGINEERING & CONSULTING, INC.

Tyler Williams, P.E.
President and Principal Engineer



DYNAMIC ENGINEERING CONSULTANTS, PLLC
7436 FR 2653 South Cumby TX, 75433
Phone: 903-382-3444
Fax: 972-408-0888

Simulation of PM705-0021-4_48k bbl analysis

Date: Saturday, August 25, 2012
Designer: J.W. BURNETT, PE
Study name: SimulationXpress Study
Analysis type: Static

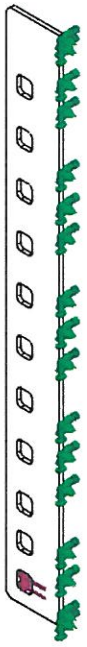
Table of Contents

Description

The following Finite Element Analysis is for the connection plate that connects the steel panels on a 48000 BBL capacity above ground tank.

Assumptions

Model Information



Model name: PM705-0021-4_48k bbl analysis
Current Configuration: Default

Solid Bodies

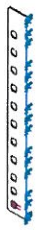
Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified

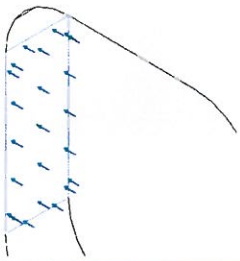
Fillet2 	Solid Body	Mass:497.188 lb Volume:1714.44 in^3 Density:0.29 lb/in^3 Weight:496.851 lbf	\\LAB-PC\Users\LAB\Documents\DEC Project Files\DEC 2012\Pinnacle Fabrication Co\Above Ground Storage Tank Analysis\PM705-0021-4_48k bbl analysis.SLDPRT Aug 25 10:38:52 2012

Material Properties

Model Reference	Properties		Components
	**Name:**	ASTM A572-60	SolidBody 1(Fillet2)(PM705-0021-4_analysis)
	Model type:	Linear Elastic Isotropic	
	Default failure criterion:	Max von Mises Stress	
	Yield strength:	74700 psi	
	Tensile strength:	74700 psi	

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-2		**Entities:** 1 face(s) **Type:** Fixed Geometry

Load name	Load Image	Load Details
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 53040 lbf

Mesh Information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	1.24833 in
Tolerance	0.0624166 in
Mesh Quality	High

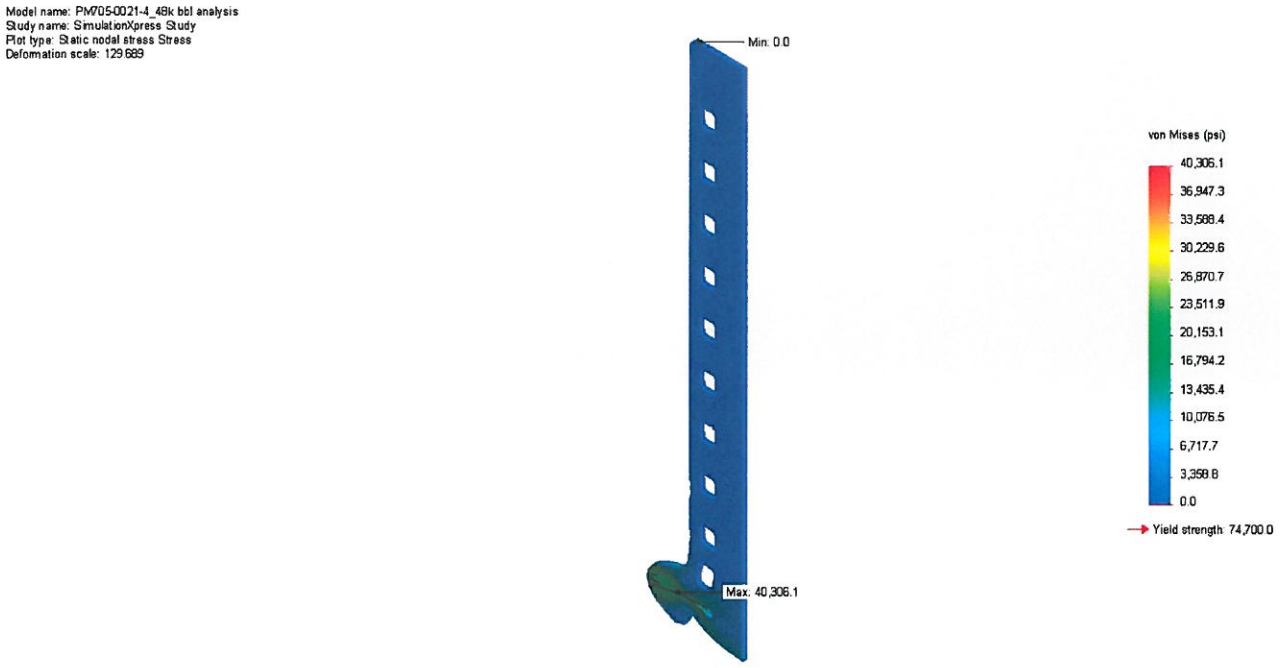
Mesh Information - Details

Total Nodes	16091
Total Elements	7833
Maximum Aspect Ratio	5.7276
% of elements with Aspect Ratio < 3	95.8
% of elements with Aspect Ratio > 10	0
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:06
Computer name:	JW-WS

Model name: PM705-0021-4_48k bbl analysis
Study name: SimulationXpress Study
Mesh type: Solid mesh

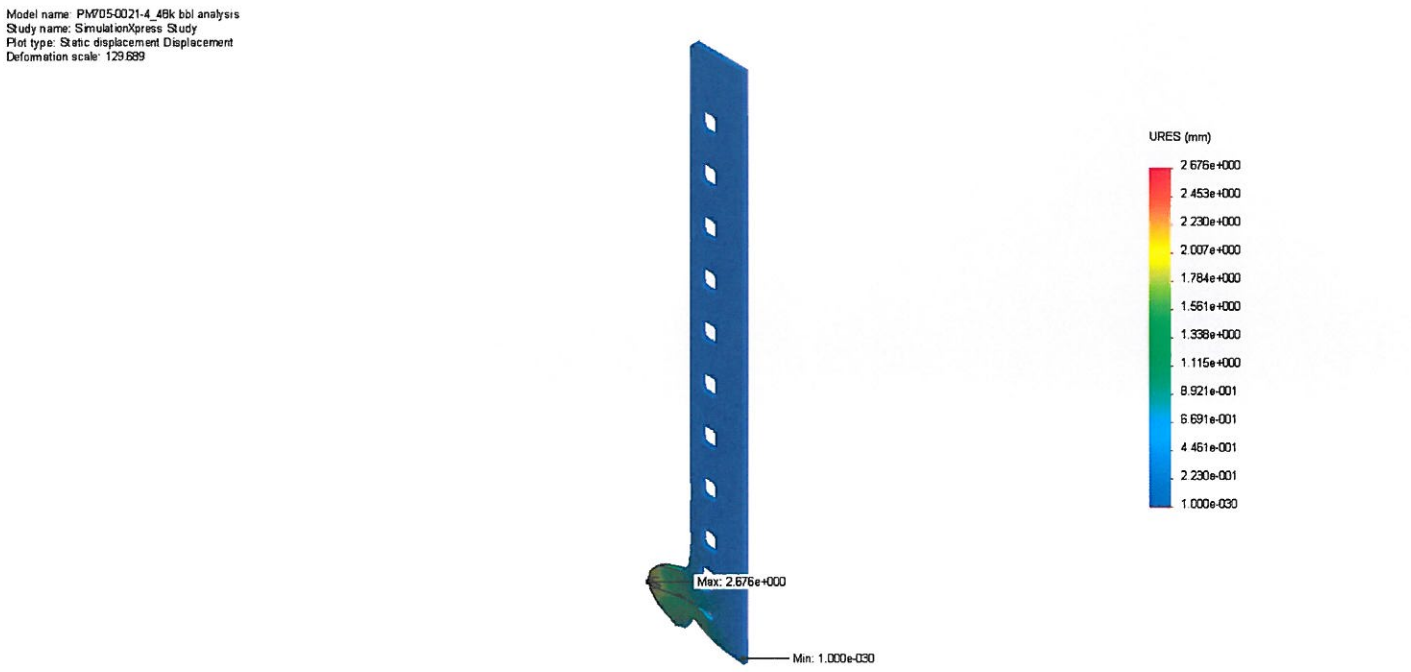
Study Results

Name	Type	Min	Max
Stress	VON: von Mises Stress	0.00065635 psi Node: 13618	40306.1 psi Node: 13531



PM705-0021-4_48k bbl analysis-SimulationXpress Study-Stress-Stress

Name	Type	Min	Max
Displacement	URES: Resultant Displacement	0 mm Node: 219	2.67642 mm Node: 484



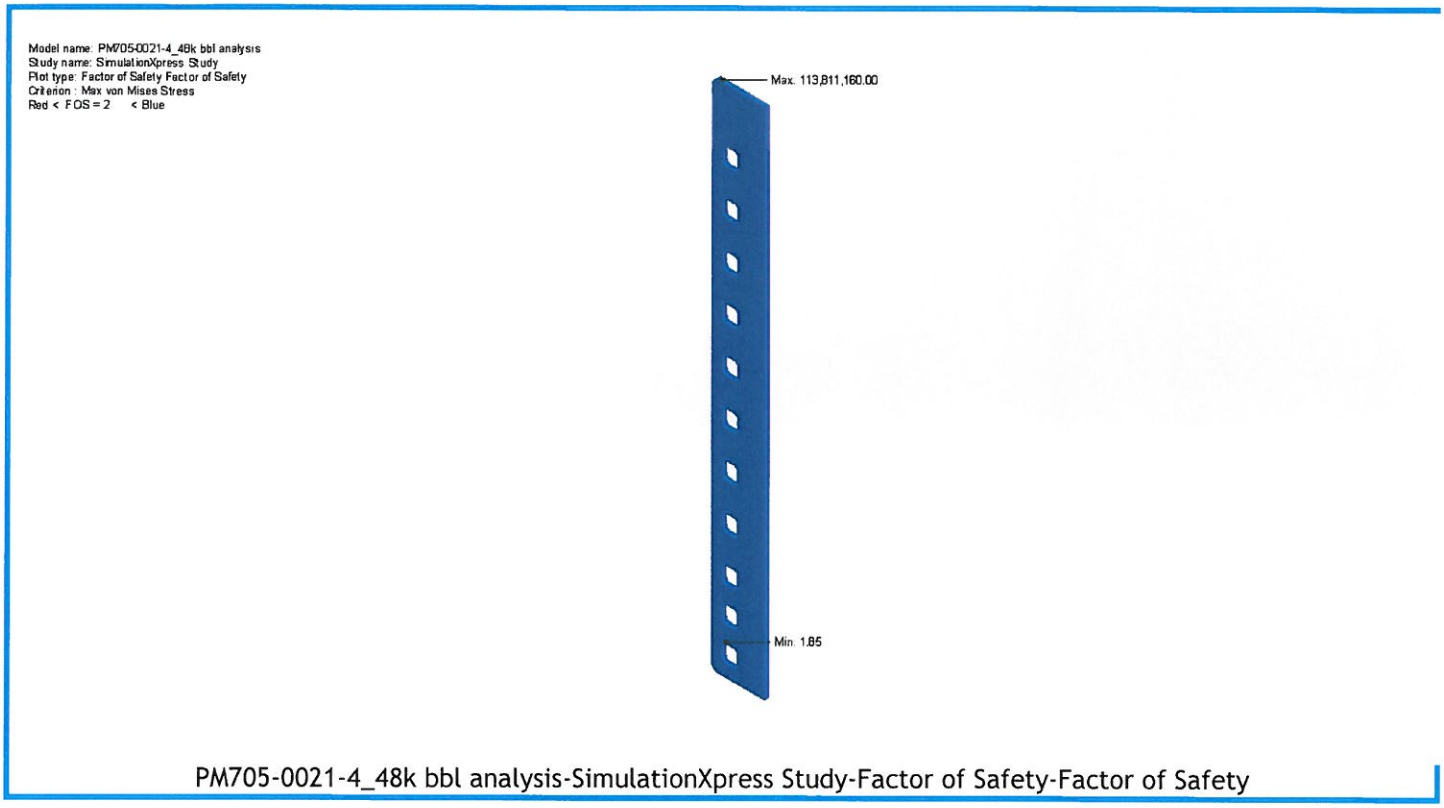
PM705-0021-4_48k bbl analysis-SimulationXpress Study-Displacement-Displacement

Name	Type
Deformation	Deformed Shape

Model name: PM705-0021-4_48k bbl analysis
Study name: SimulationXpress Study
Plot type: Deformed Shape Deformation
Deformation scale: 129.689

PM705-0021-4_48k bbl analysis-SimulationXpress Study-Displacement-Deformation

Name	Type	Min	Max
Factor of Safety	Max von Mises Stress	1.85332 Node: 13531	1.13811e+008 Node: 13618



PM705-0021-4_48k bbl analysis-SimulationXpress Study-Factor of Safety-Factor of Safety

Conclusion

The hydrostatic pressure generated from a head of 12' creates a Tensile (Hoop) load in the bottom 1 foot of the above ground tank approximately equal to 63,648 lbs (Reference Figure 1 below). This equates to 5304 lbs/inch. The shear pin and hole connection at the base of the connection plate supports approximately 10 inches of this load. Therefore, the load on the shear pin and hole equals 53,040 lbs under worst case loading. When this load is applied to the face of the hole as shown in the Finite Element Analysis, the stress generated is 40,306 psi in the plate. The Ultimate tensile strength of the ASTM A572 Grade 60 material is 74,700 psi. The resulting factor of safety for the connection plate under worst case loading = Material Strength/Applied Stress = 1.85

The factor of safety for the ¼" panels at the bottom of the 48K BBL tank equals the Ultimate Tensile Strength of the ASTM A36 material divided by the hoop stress. The Strength of the material is 58000 psi and the Hoop Stress is 21,216 psi. Therefore 58000/21216 = 2.73. The factor of safety for the panels under worst case loading is 2.73. Reference Figure 1 below for details.

48K BBL Tank Panel Analysis												
	Water Depth (ft)	Tank Rad (ft)	Tank Rad (in)	Hyd Pressure (lbs/SF)	Hyd Pressure (lbs/in^2)	Sheet Thickness (in)	Hoop Stress (psi)	Radial Load (lbf)	Factor of Safety	Volume (CF)	Volume (bbl)	Ultimate Tensile Strength (ASTM A 36) (psi)
Top of Panel	1	85	1020	62.4	0.43	0.188	2351	5304	24.67	272238	48484	58000
	2	85	1020	124.8	0.87	0.188	4702	10608	12.33			
	3	85	1020	187.2	1.30	0.188	7053	15912	8.22			
	4	85	1020	249.6	1.73	0.188	9404	21216	6.17			
	5	85	1020	312	2.17	0.188	11755	26520	4.93			
	6	85	1020	374.4	2.60	0.188	14106	31824	4.11			
	7	85	1020	436.8	3.03	0.250	12376	37128	4.69			
	8	85	1020	499.2	3.47	0.250	14144	42432	4.10			
	9	85	1020	561.6	3.90	0.250	15912	47736	3.65			
	10	85	1020	624	4.33	0.250	17680	53040	3.28			
	11	85	1020	686.4	4.77	0.250	19448	58344	2.98			
Bottom of Panel	12	85	1020	748.8	5.20	0.250	21216	63648	2.73			

Figure 1: Hoop Stress vs. Depth of Water for 48K BBL Above Ground Tank

Sincerely,

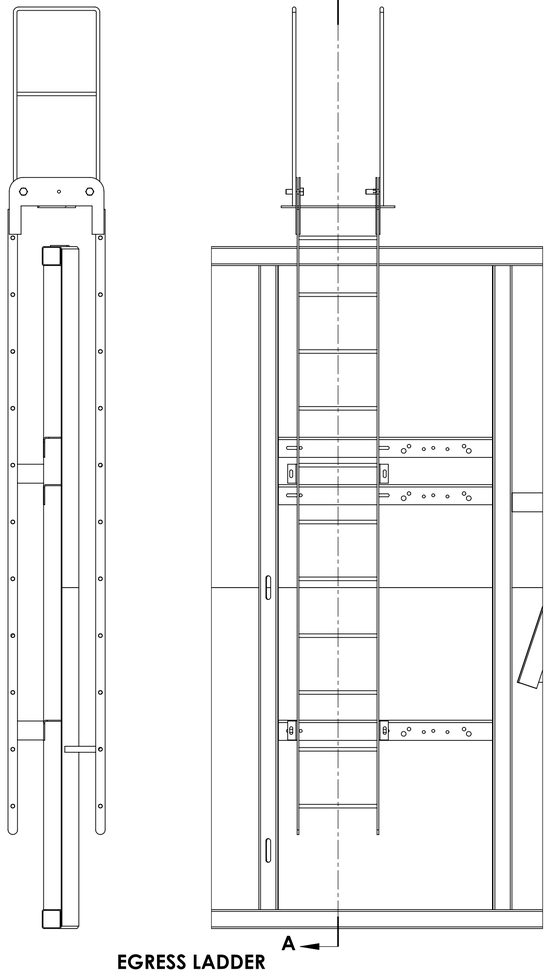
James W. Burnett, PE

Project Engineer

Dynamic Engineering

8/25/2012

STATE OF TEXAS
JAMES W. BURNETT
93832
LICENSED
PROFESSIONAL ENGINEER



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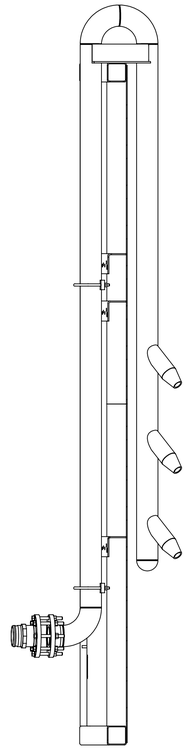

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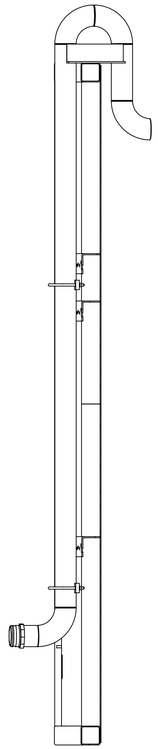

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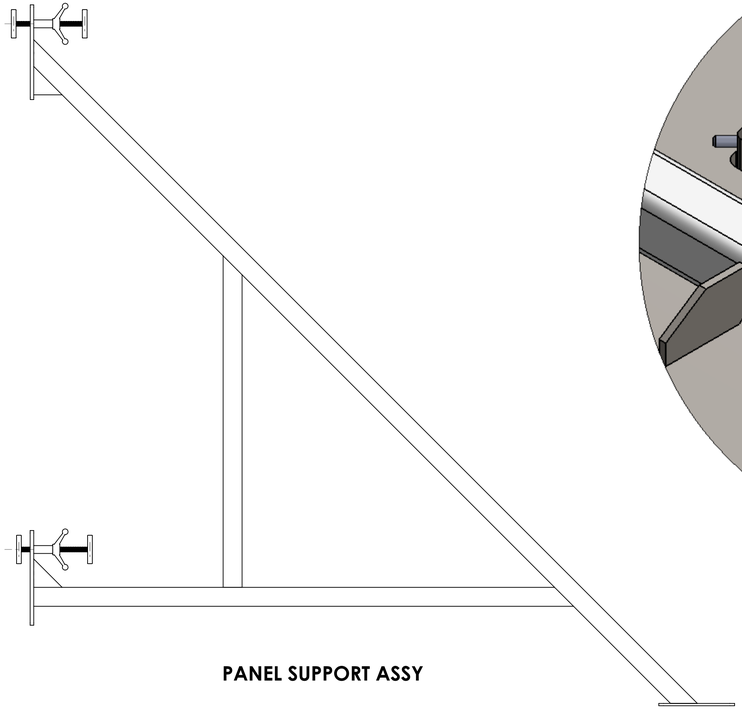
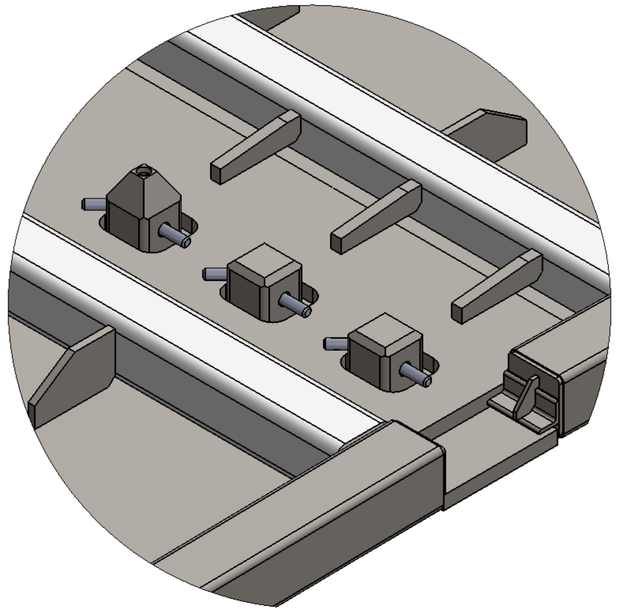
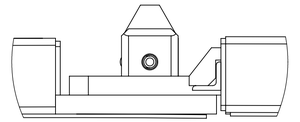


PANEL SUPPORT ASSY





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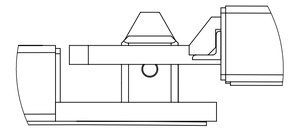

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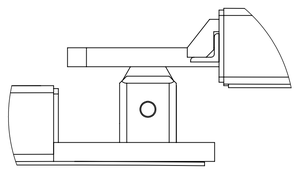
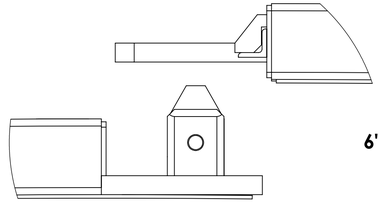
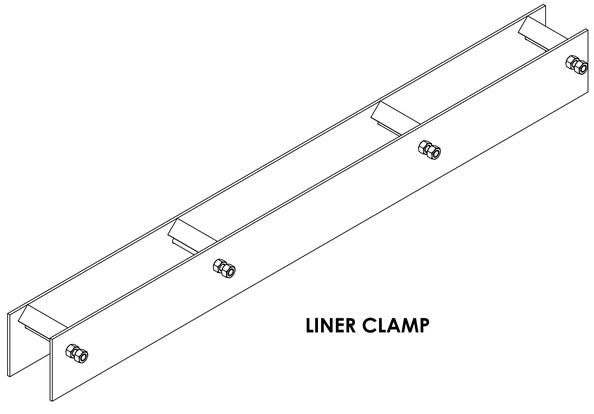


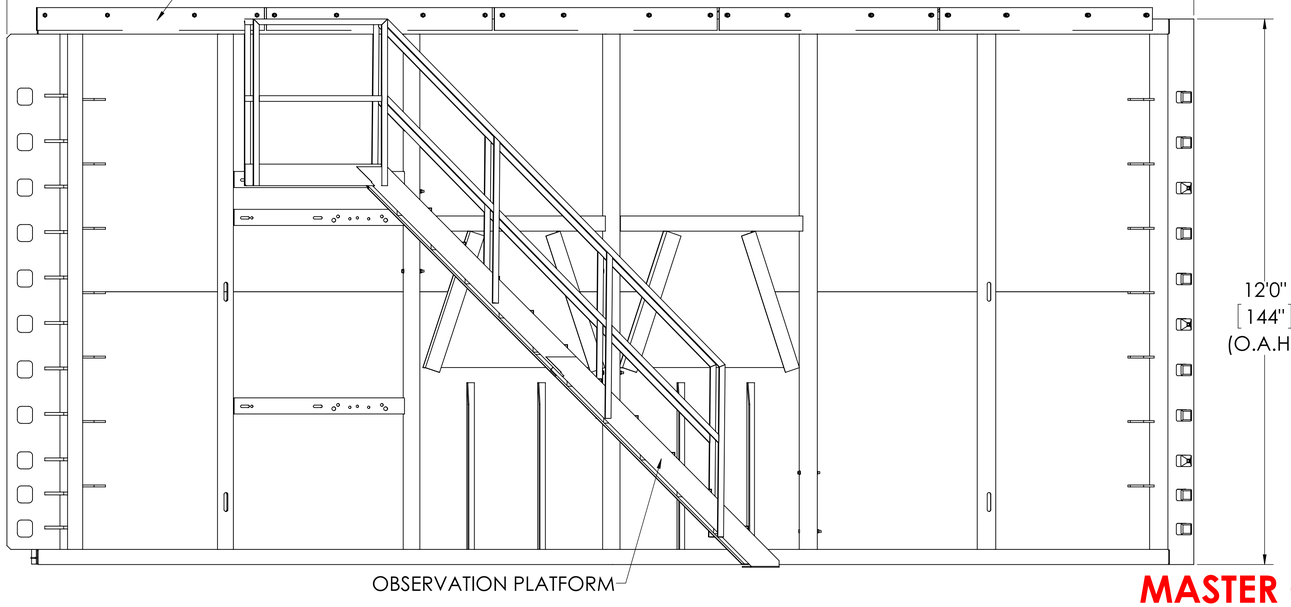
4" APART



6" APART



LINER CLAMP



MOBILE POND ACCESSORIES

MASTER COPY
09-24-2013

TOLERANCES			
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES			
TOLERANCES:			
FRACTIONAL:	± 1/16"		
BEND:	± 1/16"		
ANGULAR: (MACH)	± 0.5°		
ANGULAR: (BEND)	± 0.5°		
HOLE Ø:	-0.001" + 0.005"		
ONE PLACE DECIMAL:	± 0.1"		
TWO PLACE DECIMAL:	± 0.01"		
THREE PLACE DECIMAL:	± 0.003"		
INTERPRET GEOMETRIC TOLERANCING PER: ANSI Y14.5M			
EST. WEIGHT	5807.57		
DO NOT SCALE DRAWING			

	NAME	DATE
DRAWN	J.HALEY	9/24/2013
ENG APPR.		
MFG APPR.		
Q.A.		

MOBILE POND ACCESSORIES

SIZE	DWG. NO.	REV
D	SLS-0017	A
SCALE: 1:24		SHEET 1 OF 1

SLS-0017 REV A

CONTENTS

1. SITE CRITERIA FOR RECYCLING CONTAINMENT

1.1 LOCATION

The Oilfield Water Logistics (OWL) Javelina water impound facility (collectively referred to as the containment), is proposed to be located in Section 18, Township 26 South, Range 34 East of Lea County, New Mexico.

1.2 DISTANCE TO GROUNDWATER

1.2.1 HYDROLOGY

According to information reviewed from the Bureau of Land Management (BLM) Carlsbad Field Office, the proposed Containment location is not located within a mapped major aquifer system. Major aquifers in the area include the Capitan Reef Complex, Pecos River Basin Alluvial, and High Plains Aquifer. Available groundwater within the area of the proposed Containment is noted to be within the Carlsbad Groundwater Basin, by the New Mexico Office of the State Engineer (OSE). The Carlsbad Basin contains two major water-bearing features including shallower alluvial aquifer systems and a deeper "artesian" carbonate system.

The section containing the proposed pit and all adjoining sections were searched for the documented presence of groundwater wells. The search was conducted for Sections 7, 8, 17, 18, 19, and 20 of Township 26 South, Range 34 East and for Sections 12, 13, and 24 of Township 24 South, Range 33 East of Lea County, New Mexico. The search of OSE records did not identify any water wells located within these sections. The nearest well to the site, OSE POD id C-03795-POD1, is located approximately 4.8 miles east of the site. This well has a total depth of 496 feet below ground surface, and a recorded depth to groundwater of 250 feet.

Documentation of the OSE database search of the above listed sections is contained herein as Appendix A. A map showing the location of OSE groundwater well relative to the site location is presented in Figure 1, and a map of Declared Groundwater Basins presenting the area of mapped basin systems from the New Mexico State Office of the Engineer is presented as Figure 1A.

The New Mexico Oil and Gas Division (NMOCD) requires that groundwater (freshwater as defined by NMOCD rules) at the location be greater than 50-feet below the containment bottom. Figure 1 is an aerial map that demonstrates the following to meet these criteria:

1. The location of the proposed containment shown on an aerial photograph with surface elevation (taken from the United States Geologic Survey (USGS) Crow Mesa East 7.5 Minute Series Topographic Map).
2. Location of area water wells (as plotted in the Office of the State Engineers (OSE) WATERS database). It should be noted, OSE wells can be mis-located as older wells are plotted in the

center of the quarter, quarter, quarter section, township, and range. Note – only wells labeled as domestic or irrigation are plotted.

3. The total depth of the groundwater well closest to the site and depth to water is plotted on the map.

The OSE database contained no records for wells located in the section containing the proposed containment area or in surrounding sections. One well, located approximately 4.8 miles from the site contained groundwater at a depth of 270 feet below ground surface. In addition, groundwater was not encountered on the site during the onsite borings (reaching a maximum depth of 75 feet below ground surface). Therefore, the area of the proposed pit achieves the required 50-feet of separation between the bottom of the containment and groundwater.

1.2.2 GEOLOGY

A geological map for the vicinity of the site was obtained from the New Mexico Bureau of Land Management, Carlsbad Field Office and was used to review the geologic setting for the proposed containment location. Based on the review of the geologic map, the containment location lies within the Halocene to Pleistocene age Eolian and Piedmont alluvial deposits. These deposits consist of interbedded wind-deposited sands and alluvial deposits.

Area stratigraphy to a depth of 75 feet below ground surface (bgs) was obtained from geotechnical borings conducted on the site by COZ Engineering LLC on January 28, 2021. The boring logs recorded silty sands with varying amounts of gravel and carbonate inundations.

Figure 2 is reproduction of the USGS Andrews Place New Mexico-Texas 7.5-Minute Series geologic map. Figure 2 shows the following:

1. Location of the proposed Containment
2. Geologic setting of the Containment

1.3 DISTANCE TO MUNICIPAL BOUNDARIES AND FRESH WATER FIELDS

Figure 3 demonstrates that the location is not located within incorporated municipal boundaries or within a defined municipal fresh water field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3. Figure 3 illustrates the following:

1. The closest municipality to the site is Jal, New Mexico located approximately 13 miles northeast of the containment location. In addition, the municipalities of Eunice, New Mexico is located approximately 32 miles northeast, Carlsbad, NM is located approximately 54 miles northwest of the site, and Loving, NM located approximately 40 miles west of the site.
2. The closest municipal well field is located approximately 60 miles west-northwest of the containment location (City of Carlsbad Sheeps Draw Well Field) serving the community of Carlsbad, New Mexico.

1.4 DISTANCE TO SUBSURFACE MINES

According to the New Mexico Mining and Minerals Division the nearest mines to the site are surface mines including caliche pits and stone aggregate. The site location is not within an area overlying a subsurface mine. Figure 4 illustrates the following.

1. The nearest registered mine to the containment location is a caliche pit mine located approximately 1.5 miles to the south (Figure 4). There are no subsurface mines within the vicinity of the containment location.

1.5 DISTANCE TO HIGH OR CRITIAL KARST AREAS (UNSTABLE AREAS)

Figure 5 shows the location of the temporary containments with respect to BLM Karst areas.

1. The proposed Containment is located within a "low" potential karst area.
2. The nearest "high" or "critical" karst area is located approximately 15 miles west of the site.
3. No evidence of solution voids were observed during the site inspection.

1.6 DISTANCE TO 100-YEAR FLOODPLAIN

The Federal Emergency Management Agency (FEMA) Flood Insurance maps were reviewed for the location of the site. The site is located on FEMA map panel number 35025C2075D, which was noted as "not printed." The FEMA map panel has not been printed because the entire area of the panel, including the containment location, was defined as "Zone D." Figure 6 demonstrates the area of the site is not located within a 100-year Floodplain.

1. The site is located within "Zone D." Zone D is described as areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted for this area.

1.7 DISTANCE TO SURFACE WATER

Figure 7 is reproduction of the USGS Andrews Place 7.5-Minute Series topographic map that demonstrates the site location is not within 300-feet of a continuously flowing watercourse or other significant watercourse, or within 200-feet of a lakebed, sinkhole, or playa lake (as measured from the ordinary high-water mark). Figure 7 demonstrates the following:

1. No continuously flowing watercourses or other water bodies defined by NMOCD
2. The closest surface water body is an intermittent stream located approximately 1,400 feet east of the proposed containment.

1.8 DISTANCE TO PERMANENT RESIDENCES OR STRUCTURES

Figure 8 is reproduction of the USGS Andrews Place New Mexico-Texas 7.5-Minute Series topographic map that demonstrates the site location is not within 1,000-feet of an occupied permanent residence, school, hospital, institution, church, or other permanent structure in existence at the time of initial application. The nearest structures to the site location appear to be oil field tank batteries.

1.9 DISTANCE TO NON-PUBLIC WATER SUPPLY

The site is not located within 500-horizontal feet of a private, domestic fresh water well or spring that less than five households use for domestic or stock watering purposes. In addition, the site is not located within 1,000-feet of any other fresh water well or spring, as documented at the time of this application. Figure 1 illustrates the following.

1. Figure 1 shows the location of area water wells, active or plugged, relative to the proposed site location.
2. There are no known domestic water wells located within 1,000-feet of the proposed site location.
3. No springs were identified within the mapping area (refer to Figure 7).

1.10 DISTANCE TO WETLANDS

The U.S Fish and Wildlife National Wetlands Inventory maps were reviewed for the area of the site. Figure 9 demonstrates the site is not located within an area of a mapped wetland, however a wetland labeled “streambed” is located approximately 1,400 feet east of the proposed location.

1. The nearest designated wetlands to the site include a streambed with a wetland code R4SBJ(Riverine, Intermittent, Streambed, Intermittently Flooded). National Wetlands Inventory mapped wetlands are not located within 500 feet of the proposed pit locations.

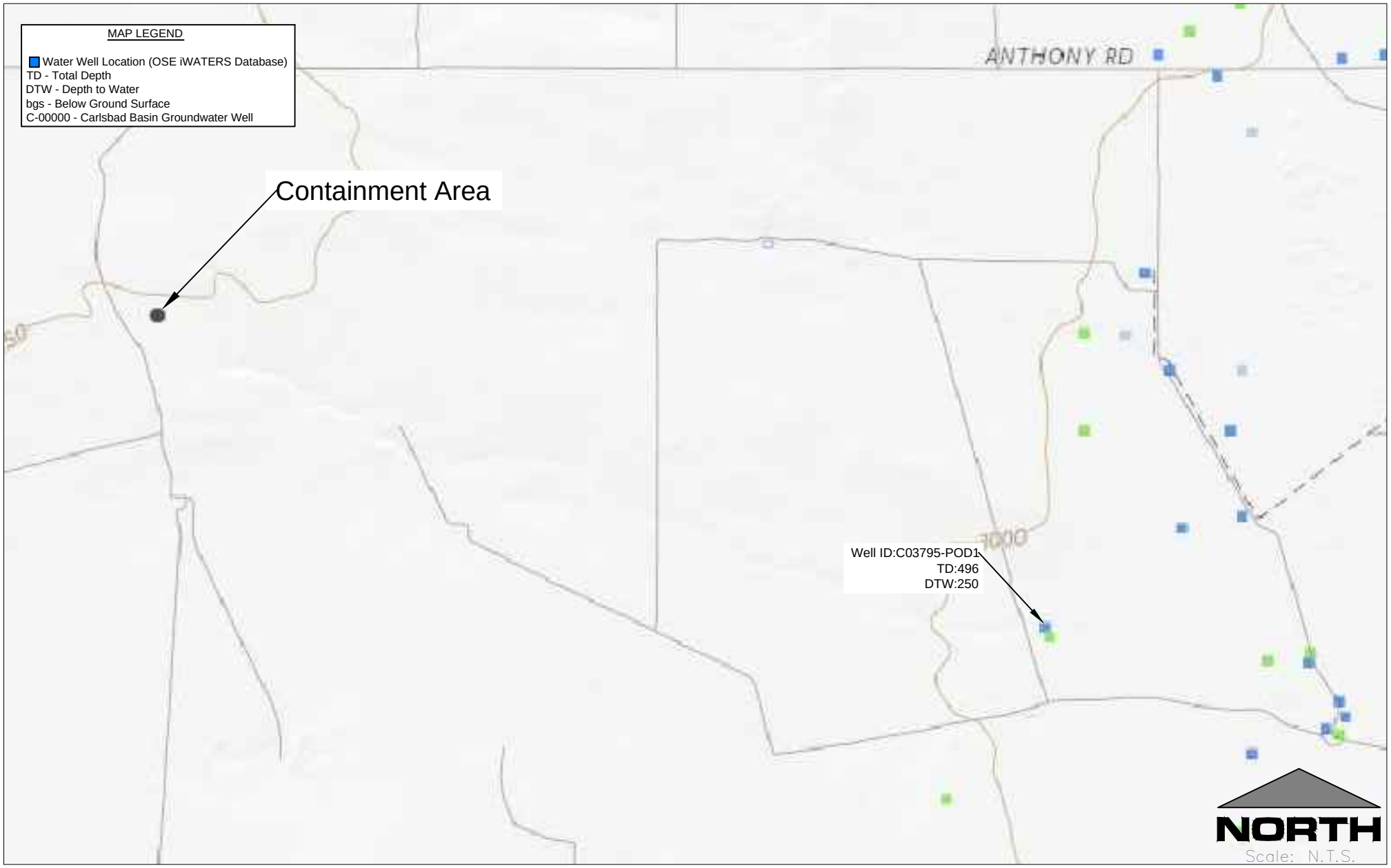


FIGURE – 1

Oilfield Water Logistics

OSE Groundwater Well Location Map

Project No. 020053-00

Javelina Pond Site Suitability Study

S18, T24S, R34E, Lea County, NM

ENVIROTECH ENGINEERING & CONSULTING, INC

2500 North 11th Street -, Enid, Oklahoma 73701
Phone (580) 234-8780, Fax (580) 237-4302
C.A. #1960 - Expiration Data: 6-30-2020
www.envirotechconsulting.com

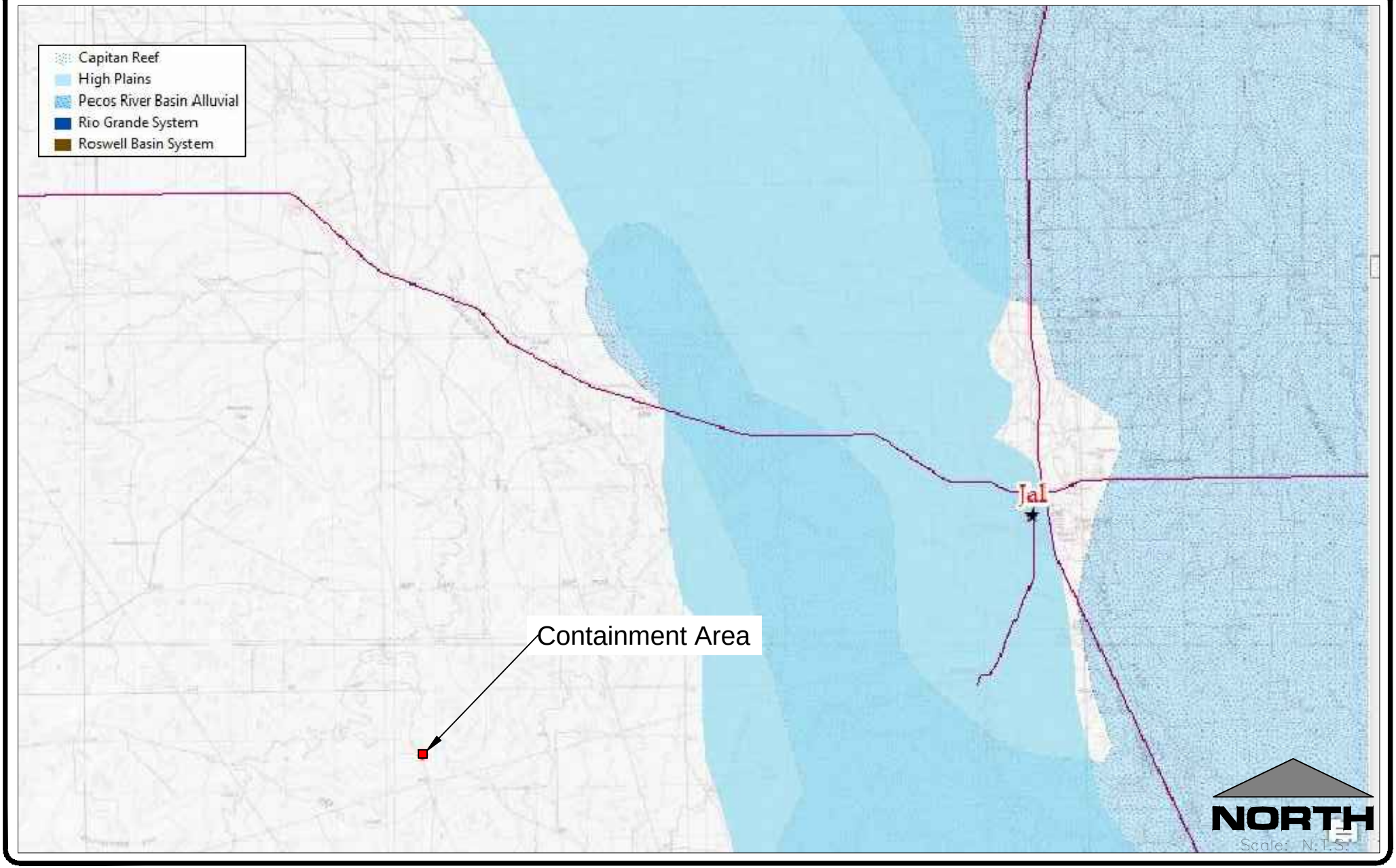


FIGURE – 1

Oilfield Water Logistics

Figure 1A - Bureau of Land Managemen Aquifer Map

Project No. 020318-00

Javelina Pond Site Suitability Study
S18, T24S, R34E, Lea County, NM

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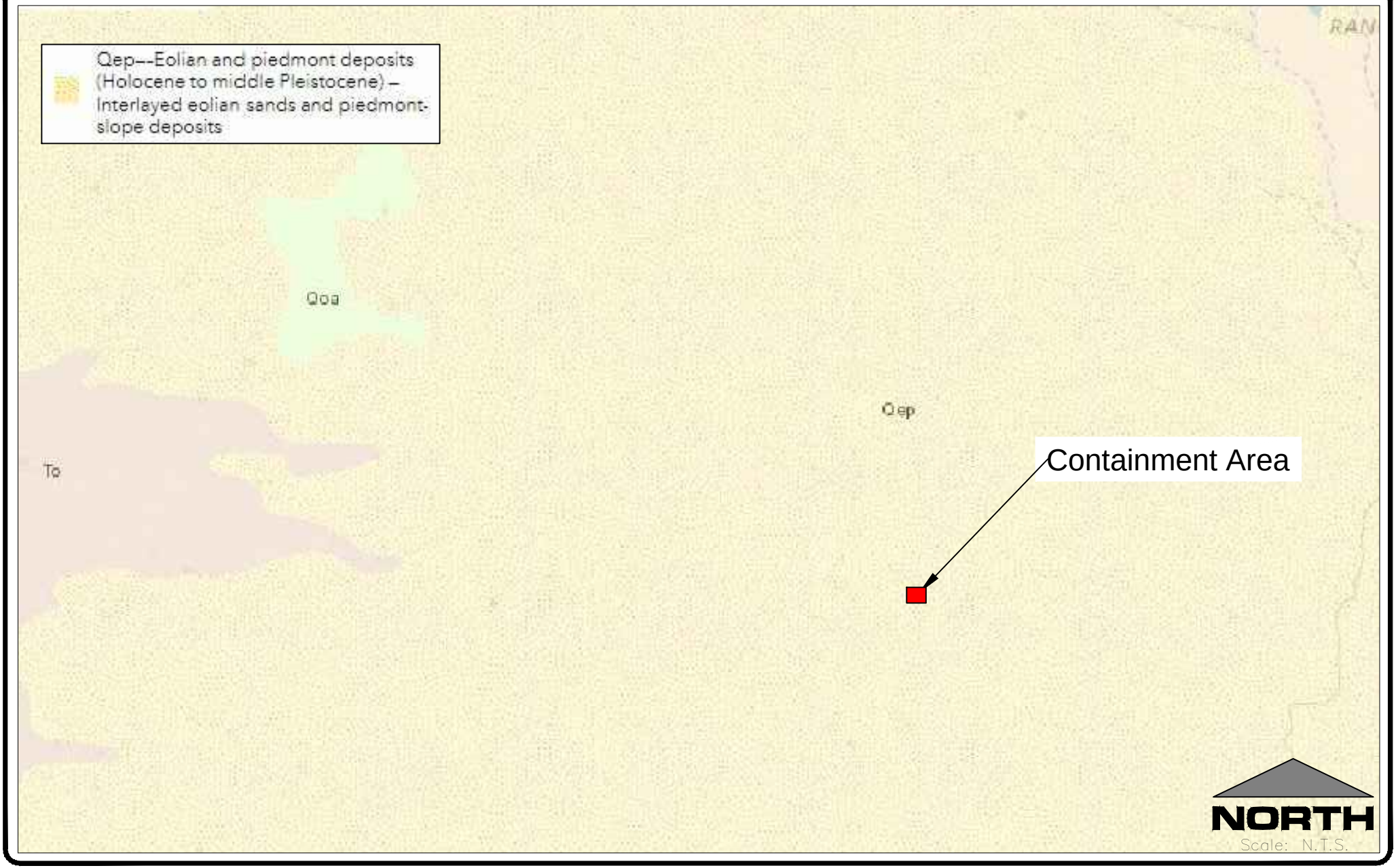

FIGURE – 1

Oilfield Water Logistics

Figure 2 - Geologic Map

Project No. 020318-00

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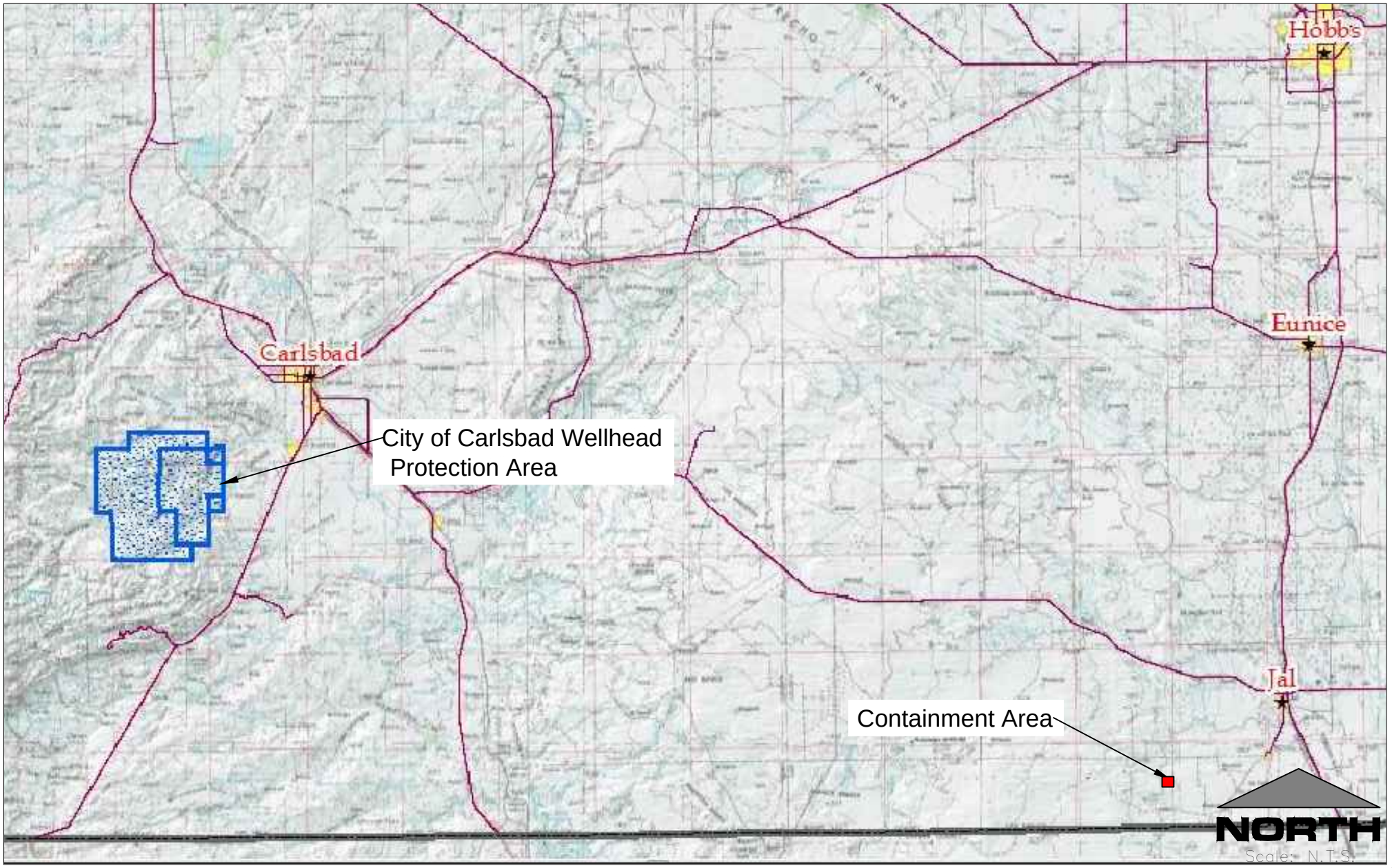

FIGURE – 1

Oilfield Water Logistics

Figure 3 - Distance from Municipalities and Freshwater Fields

Project No. 020318-00

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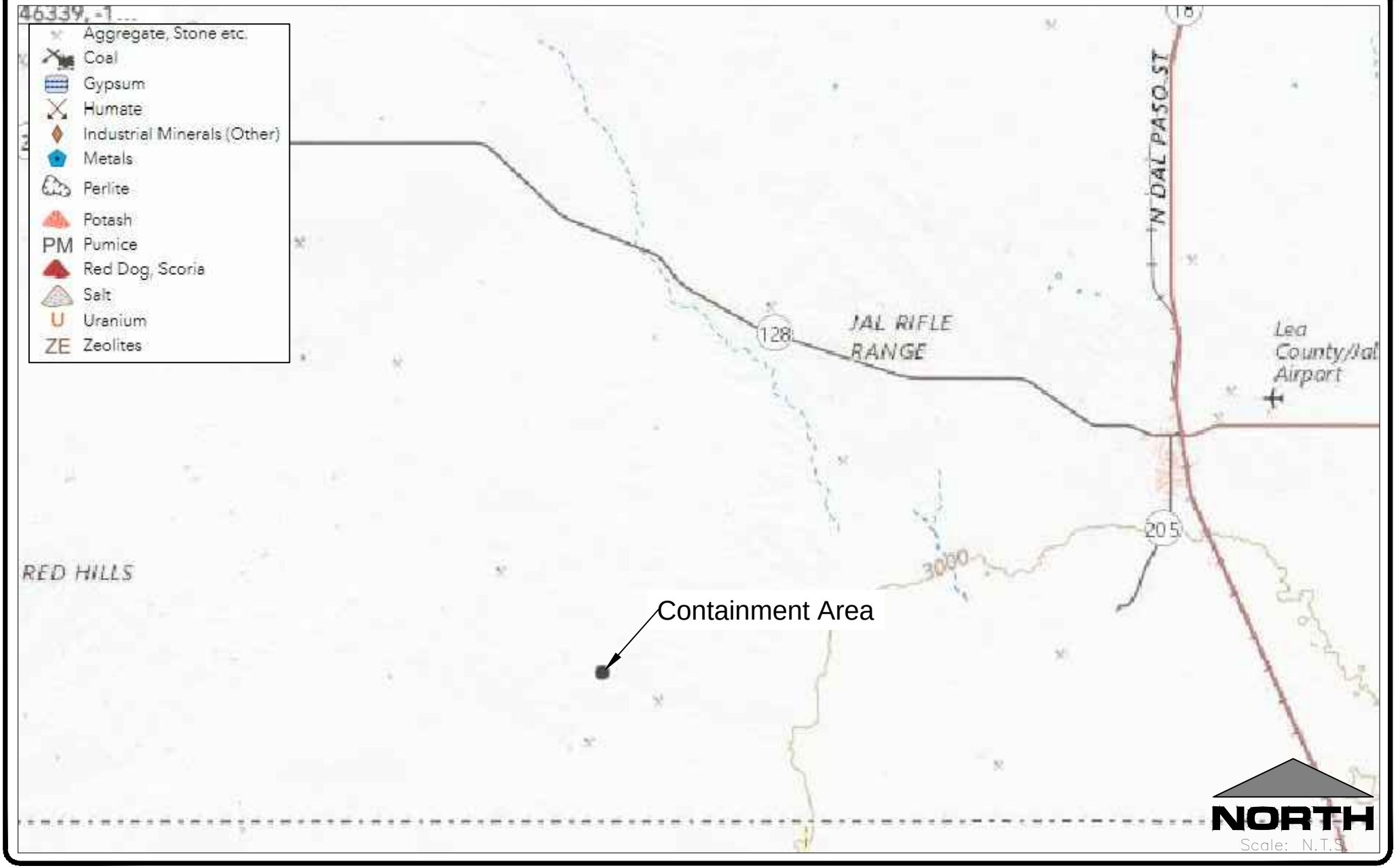

FIGURE – 1

Oilfield Water Logistics

Figure 4 - Location of Registered Mines

Project No. 020318-00

Javelina Pond Site Suitability Study

S18, T24S, R34E, Lea County, NM

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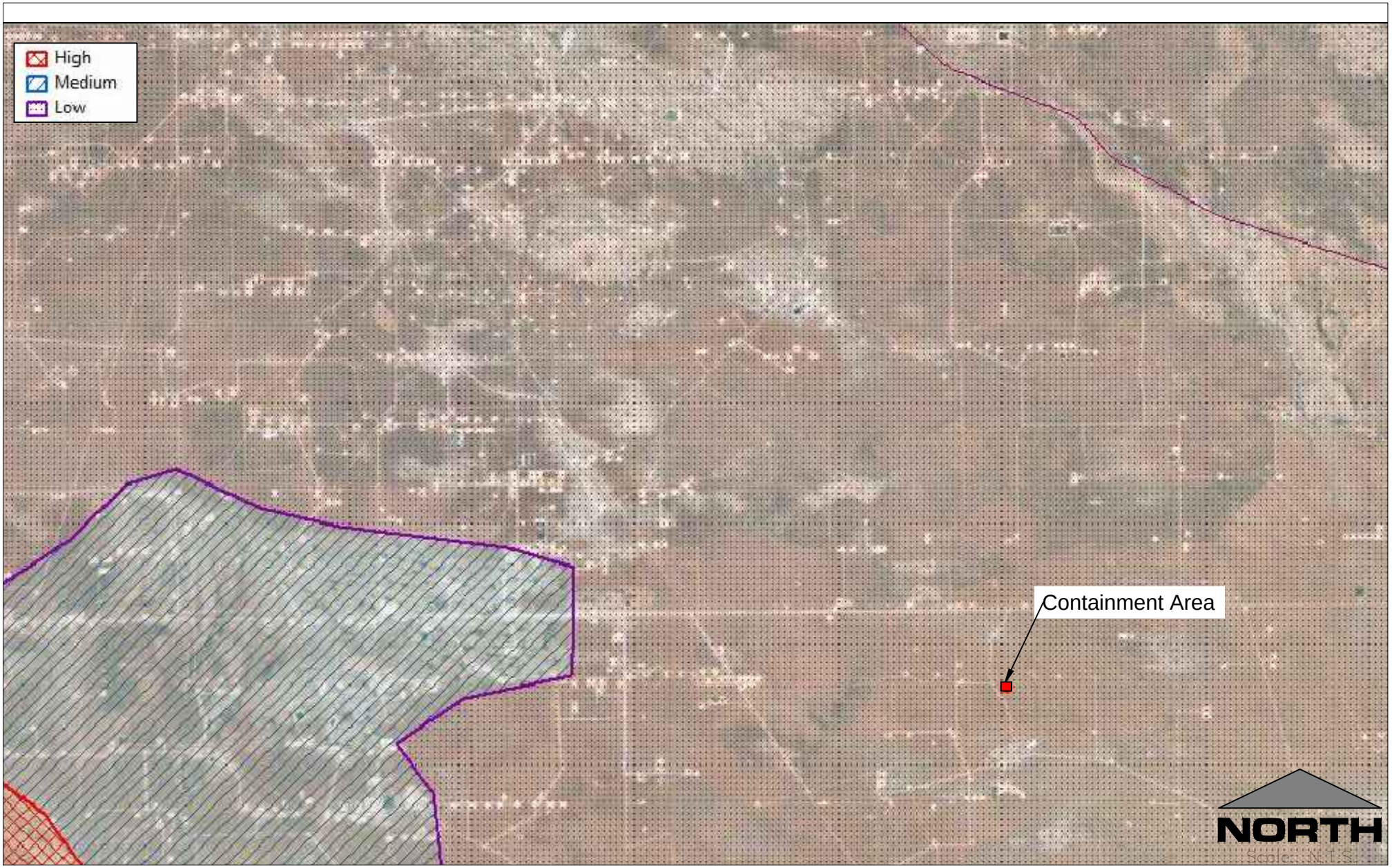

FIGURE – 1

Oilfield Water Logistics

Figure 5 - Karst Location Map

Project No. 020318-00

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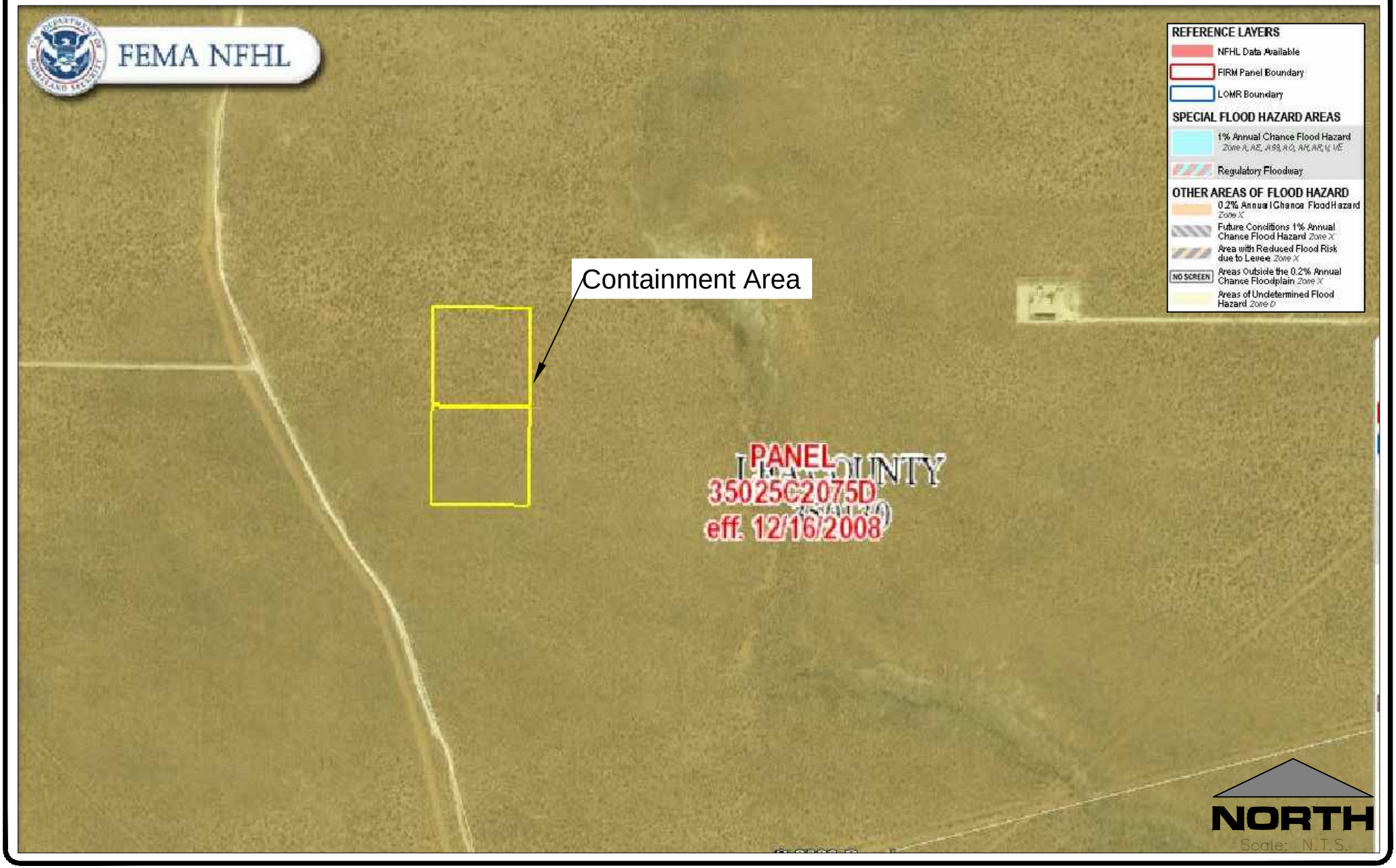

FIGURE – 1

Oilfield Water Logistics

Figure 6 - FEMA Map

Project No. 020318-00

Javelina Pond Site Suitability Study
S18, T24S, R34E, Lea County, NM

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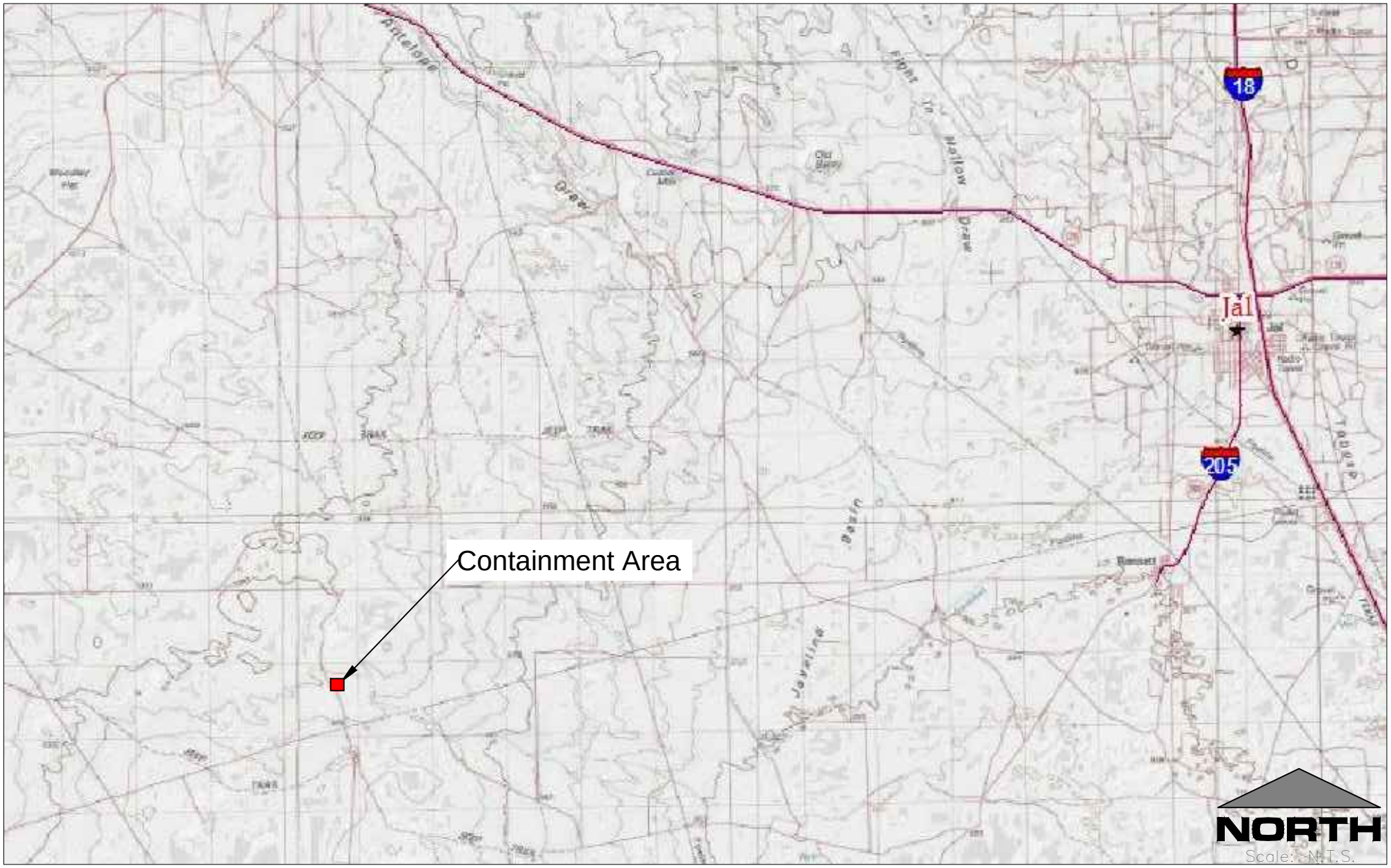

FIGURE – 7

Oilfield Water Logistics

Figure 7- Distance from Municipalities, Surface Waters, and Structures

Project No. 020318-00

Javelina Pond Site Suitability Study

S18, T24S, R34E, Lea County, NM

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APPENDIX A
GEOTECH REPORT

COZ Engineering, LLC

GEOTECHNICAL ENGINEERING REPORT

LEA COUNTY JAVELINA RECYCLING FACILITY

LEA COUNTY, NEW MEXICO
Project No. 422106
January 31, 2021

Prepared for:

ENVIROTECH ENGINEERING & CONSULTING, INC.
Enid, Oklahoma

Prepared by:

COZ ENGINEERING, LLC
Las Cruces, New Mexico

COZ Engineering, LLC

PO Box 13331
Las Cruces, New Mexico 88013
Cell: 575.642.7671
Email: thecoz42@gmail.com

January 31, 2021

Envirotech Engineering & Consulting, Inc.
2500 North Eleventh Street
Enid, OK 73701

Attn. Tyler Williams, PE
P: 580.234.8780
E: twilliams@envirotechconsulting.com

Re: Geotechnical Engineering Report
Lea County Javelina Recycling Facility
Lea County, New Mexico
COZ Report No. 422106

Dear Mr. Williams:

The following is a geotechnical engineering report for the proposed Lea County Recycling Facility in Lea County, New Mexico. Recommendations for earthwork, construction, embankments and other geotechnical considerations are presented in the report.

Thank you for the opportunity to provide this geotechnical engineering report. If you have any questions or concerns, please contact me at (575)-642-7671.

Sincerely,
COZ Engineering, LLC

Dan Cosper, P.E.

Appendix:

Site Plan
Boring Logs
Laboratory Results

Site Investigation:

A subsurface investigation was performed for the proposed Lea County Javelina Recycling Facility to be located at Lat.: 32.048219° Long.: -103.391014° in Lea County, New Mexico (about 12 miles southwest of Jal, New Mexico). Six (6) test borings were advanced within the proposed facility near client requested locations. The borings were terminated at depths of 20 and 75 feet below ground surface (bgs).

Site Conditions:

The project area contained sparse to dense creosote bush, mesquite and native grasses at the time of the field exploration. Soils investigated at this site were comprised of silty sand with varying amounts of gravel and carbonate indurations from the surface to the total explored depths of about 20 and 75 feet bgs.

The groundwater table was not encountered during the field investigation.

Planned Construction:

Based on the information provided, the project will include the construction of a mud recycling facility.

Site Grading:

Areas for planned construction should be clear of debris, vegetation and any oversized or deleterious material prior to grading operations. Fill construction shall not be allowed on

surfaces that contain vegetation or rocks larger than four inches in greatest dimension. No fill shall be placed that contains vegetative material as decomposition of that material can cause voids and possibly result in surface settlement. Voids in the soil matrix created or encountered during grading operations shall be backfilled with compacted fill material.

Positive drainage away from embankments should be provided throughout the life of the project. Areas adjacent to embankments that could retain water should be sealed or eliminated.

Soil Improvements:

Subgrade preparation (beneath embankments and engineered fills) should consist of scarifying the native soil surface a minimum thickness of 10 inches, moisture conditioning (+/- 2% of optimum moisture content per ASTM D-698) and compaction to a minimum of 95% of standard Proctor density (per ASTM D-698). Engineered fill materials should be placed in 10-inch maximum lifts, moisture conditioned to within 2% of optimum moisture content (per ASTM D-698) and compacted to a minimum of 95% of standard Proctor density (per ASTM D-698).

Fill Material:

Engineered fill material for this project should meet the following gradation criteria:

Sieve	% Passing
4″	100
¾	70-100
#4	50-100
#200	50 max.

The plasticity index of the minus #40 sieve portion should not exceed ten (10). On-site soils meet the above specifications.

Excavation of Embankment Areas:

Difficult excavations due to very dense cemented soils will require particular attention in the design and construction.

The soils below the new embankments should be scarified ten inches, moisture conditioned and compacted. The interior/exterior width of subgrade preparation should extend to the intersection of the slopes of the embankment fill. Once the subgrade preparation has been observed and approved by the geotechnical engineer, embankment fill operations can initiate.

Embankment Placement:

Once the subgrade has been prepared, on-site embankment material stockpiles should be moisture conditioned in preparation for lift placement. The embankments should be constructed as a unit from the bottom elevation to the rim elevation.

The distal slopes of the embankments should be overbuilt and cut to final grade to provide compaction to these edges of the embankments. The embankments should be constructed in strict accordance with the project plans and specifications.

Seismic Site Classification:

The seismic site classification is based upon the soil profile in the upper 100 feet as defined by the weighted average of standard penetration blow-counts or shear wave velocity in accordance with Section 20.4 of the ASCE 7 and the International Building Code (IBC). Based upon my field investigation, it is my opinion that the Seismic Site Classification is **C ("Very Dense Soil or Soft Rock")**. The maximum depth of the borings advanced at the site was 75 feet. Therefore, soil properties below the maximum boring depth to 100 feet were estimated based on my experience with the general area. Deeper borings or geophysical testing would be required to confirm the conditions below the current boring depth.

Testing and Inspection:

It is recommended that all site grading operations be inspected by a geotechnical engineer. The inspecting engineer should be responsible for immediately reporting any site or soil conditions that vary significantly from this report.

The testing of materials should be made at the following:

1) One (1) soil density every 5,000 square feet of prepared subgrade and embankment fill areas (ASTM D-1556, ASTM D-2167, or ASTM D-2922, ASTM D-3017).

2) One (1) sieve analysis and plasticity index per material used according to ASTM D-422 and ASTM D-4318.

3) One (1) proctor per each type of material used according to ASTM D-698.

Report Limitations:

The conclusions, recommendations and opinions presented herein are:

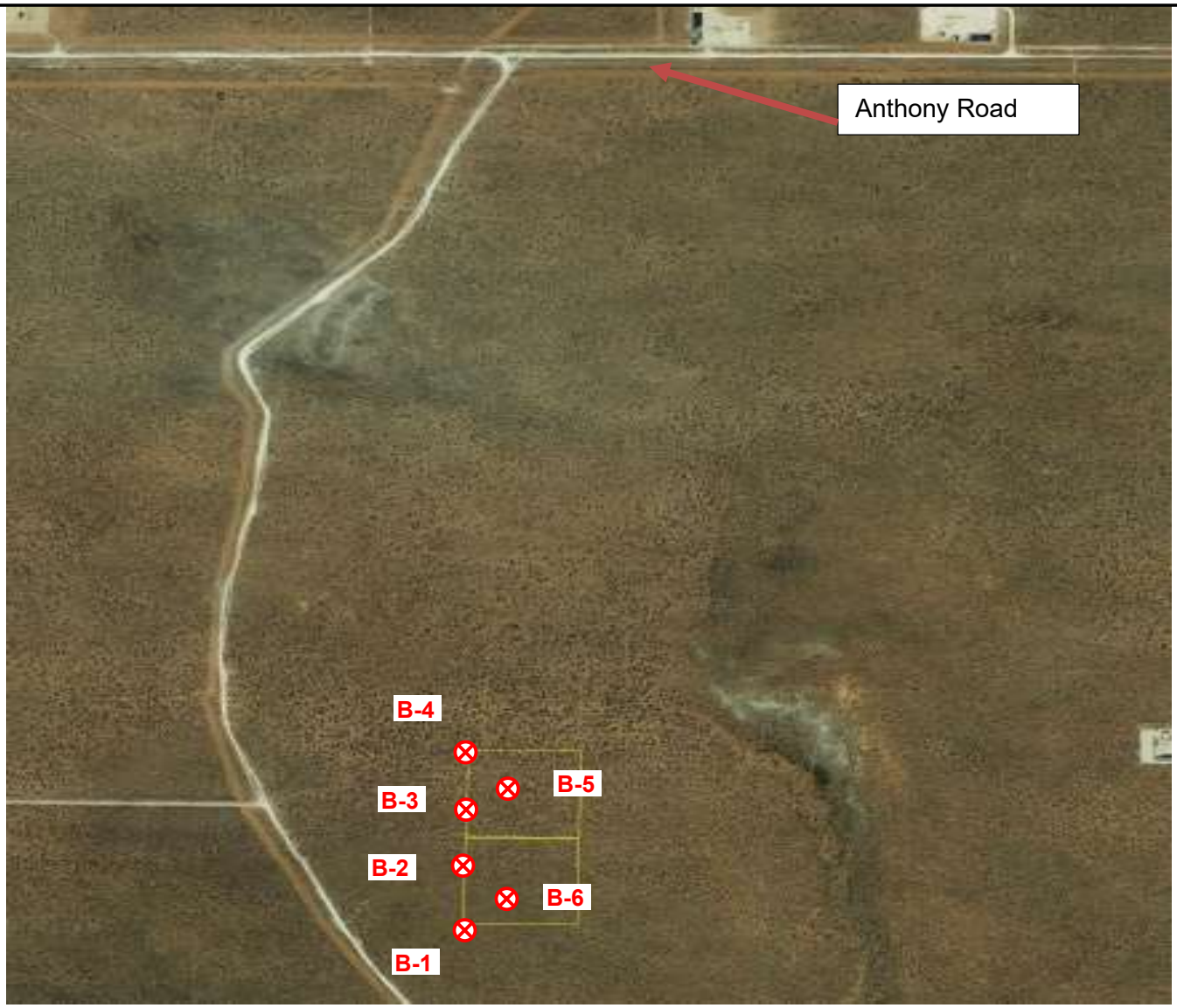
1) Based upon evaluation and interpretation of the findings of the field and laboratory program.

2) Based upon an interpolation of soil conditions between and beyond the explorations.

3) Subject to confirmation of the conditions encountered during construction.

4) Based upon the assumption that sufficient observation and testing will be provided during construction.

There is no other warranty, either express or implied. Any person using this report for bidding or construction purposes should perform such independent investigation as he deems necessary to satisfy himself as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project. If conditions are encountered during construction that appear to differ from those indicated in this report, I should be notified immediately.



N

⊗ Approximate Boring Location

Project Manager: DC Drawn by: DC Checked by: DC Approved by: DC	Project No. 422106 Scale: AS SHOWN File Name: Figures Date: 1-29-21	COZ Engineering, LLC PO Box 13331 Las Cruces, NM 88013	BORING LOCATION PLAN Lea County Javelina Recycling Facility Lat.: 32.050201° Long.: -103.402125° Lea County, NM	Exhibit 1

Project: **Lea County Recycling Facility**

Project Location: **Anthony Road, Lea County, NM**

Project Number: **422106**

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled **1-28-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **See boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: red brown, dry, dense				
	5		1	9\12\28				5.3	35.5		NP
	10		2	18\28\23			white to light red brown, carbonate indurations, very dense				
	15		3	9\13\16			red brown, medium dense				
	20		4	11\16\24			dense				
							Bottom of Boring				
	25										
	30										

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Project: **Lea County Recycling Facility** Project Location: **Anthony Road, Lea County, NM** Project Number: **422106**	Log of Boring B-2 **Sheet 1 of 1**

Date(s) Drilled **1-28-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **See boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: red brown, dry, medium dense				
	5		1	7\7\7							
	10		2	12\18\21			white to light red brown, dense, carbonate indurated	4.5	23.8		NP
	15		3	23\19\20							
	20		4	6\12\14			red brown, medium dense				
							Bottom of Boring				
	25										
	30										

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Project: **Lea County Recycling Facility** Project Location: **Anthony Road, Lea County, NM** Project Number: **422106**	Log of Boring B-3 **Sheet 1 of 1**

Date(s) Drilled **1-28-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **See boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: red brown to white, dry, dense, carbonate indurated				
	5		1	12\15\16				5.9	28.7		NP
	10		2	28\45\50			white, very dense, carbonate cemented				
	15		3	1\2\2			red brown, loose				
	20		4	5\5\6			medium dense				
							Bottom of Boring				
	25										
	30										

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Project: **Lea County Recycling Facility** Project Location: **Anthony Road, Lea County, NM** Project Number: **422106**	Log of Boring B-4 **Sheet 1 of 1**

Date(s) Drilled **1-28-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **21.5 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s) **SPT**	Hammer Data
Borehole Backfill **cuttings**	Location **See boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: red brown to white, dry, very dense, carbonate indurations				
	5		1	17\27\32							
	10		2	20\24\40			white, carbonate cemented	7.1	34.4		NP
	15		3	8\13\18			red brown, dense				
	20		4	9\15\17							
							Bottom of Boring				
	25										
	30										

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Project: **Lea County Recycling Facility** Project Location: **Anthony Road, Lea County, NM** Project Number: **422106**	Log of Boring B-5 **Sheet 1 of 3**

Date(s) Drilled **1-28-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **75 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **See boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: red brown to white, dry, carbonate indurated				
	5										
	10										
	15										
	20										
	25										
	30										

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Project: **Lea County Recycling Facility**

Project Location: **Anthony Road, Lea County, NM**

Project Number: **422106**

Log of Boring B-5

Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	30				SM		SILTY SAND: red brown to white, dry, carbonate indurated				
	35										
	40										
	45										
	50										
	55										
	60										
	65										

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Project: **Lea County Recycling Facility**
Project Location: **Anthony Road, Lea County, NM**
Project Number: **422106**

Log of Boring B-5
Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	65				SM		SILTY SAND: red brown to white, dry, carbonate indurated				
	70										
	75						Total Depth 75'. Groundwater not encountered.				
	80										
	85										
	90										
	95										
	100										

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Project: **Lea County Recycling Facility** Project Location: **Anthony Road, Lea County, NM** Project Number: **422106**	Log of Boring B-6 **Sheet 1 of 3**

Date(s) Drilled **1-28-21**	Logged By **JS**	Checked By **COZ**
Drilling Method **hollow-stem auger**	Drill Bit Size/Type	Total Depth of Borehole **75 feet bgs**
Drill Rig Type **CME-75**	Drilling Contractor **Southlands**	Approximate Surface Elevation
Groundwater Level and Date Measured **not encountered**	Sampling Method(s)	Hammer Data
Borehole Backfill **cuttings**	Location **See boring plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	0				SM		SILTY SAND: red brown to white, dry, carbonate indurated				
	5										
	10										
	15										
	20										
	25										
	30										

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Project: **Lea County Recycling Facility**
Project Location: **Anthony Road, Lea County, NM**
Project Number: **422106**

Log of Boring B-6
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	30				SM		SILTY SAND: red brown to white, dry, carbonate indurated				
	35										
	40										
	45										
	50										
	55										
	60										
	65										

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Project: **Lea County Recycling Facility**
Project Location: **Anthony Road, Lea County, NM**
Project Number: **422106**

Log of Boring B-6
Sheet 3 of 3

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines	LL, %	PI, %
	65				SM		SILTY SAND: red brown to white, dry, carbonate indurated				
	70										
	75						Total Depth 75'. Groundwater not encountered				
	80										
	85										
	90										
	95										
	100										

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Project: **Lea County Recycling Facility**
Project Location: **Anthony Road, Lea County, NM**
Project Number: **422106**

Key to Log of Boring
Sheet 1 of 1

1 Elevation (feet)	2 Depth (feet)	3 Sample Type	4 Sample Number	5 Sampling Resistance, blows/ft	6 Material Type	7 Graphic Log	8 MATERIAL DESCRIPTION	9 Water Content, %	10 Percent Fines	11 LL, %	12 PI, %

COLUMN DESCRIPTIONS

1. Elevation (feet): Elevation (MSL, feet).
2. Depth (feet): Depth in feet below the ground surface.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. Sample Number: Sample identification number.
5. Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
6. Material Type: Type of material encountered.
7. Graphic Log: Graphic depiction of the subsurface material encountered.
8. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
9. Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
10. Percent Fines: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.
11. LL, %: Liquid Limit, expressed as a water content.
12. PI, %: Plasticity Index, expressed as a water content.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Silty SAND (SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Auger sampler
- Bulk Sample
- 3-inch-OD California w/ brass rings
- CME Sampler
- Grab Sample
- 2.5-inch-OD Modified California w/ brass liners
- Pitcher Sample
- 2-inch-OD unlined split spoon (SPT)
- Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting)
- Minor change in material properties within a stratum
- Inferred/gradational contact between strata
- Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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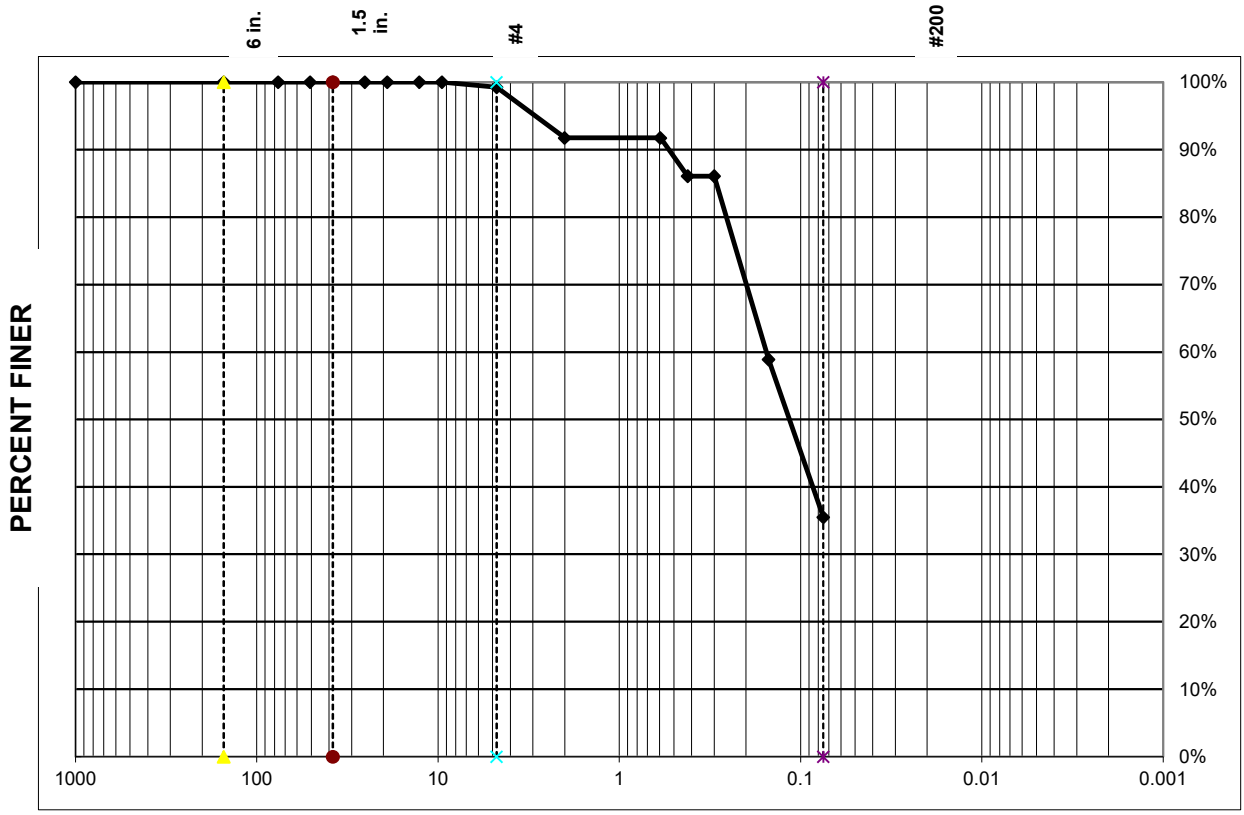
Figure B-1

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

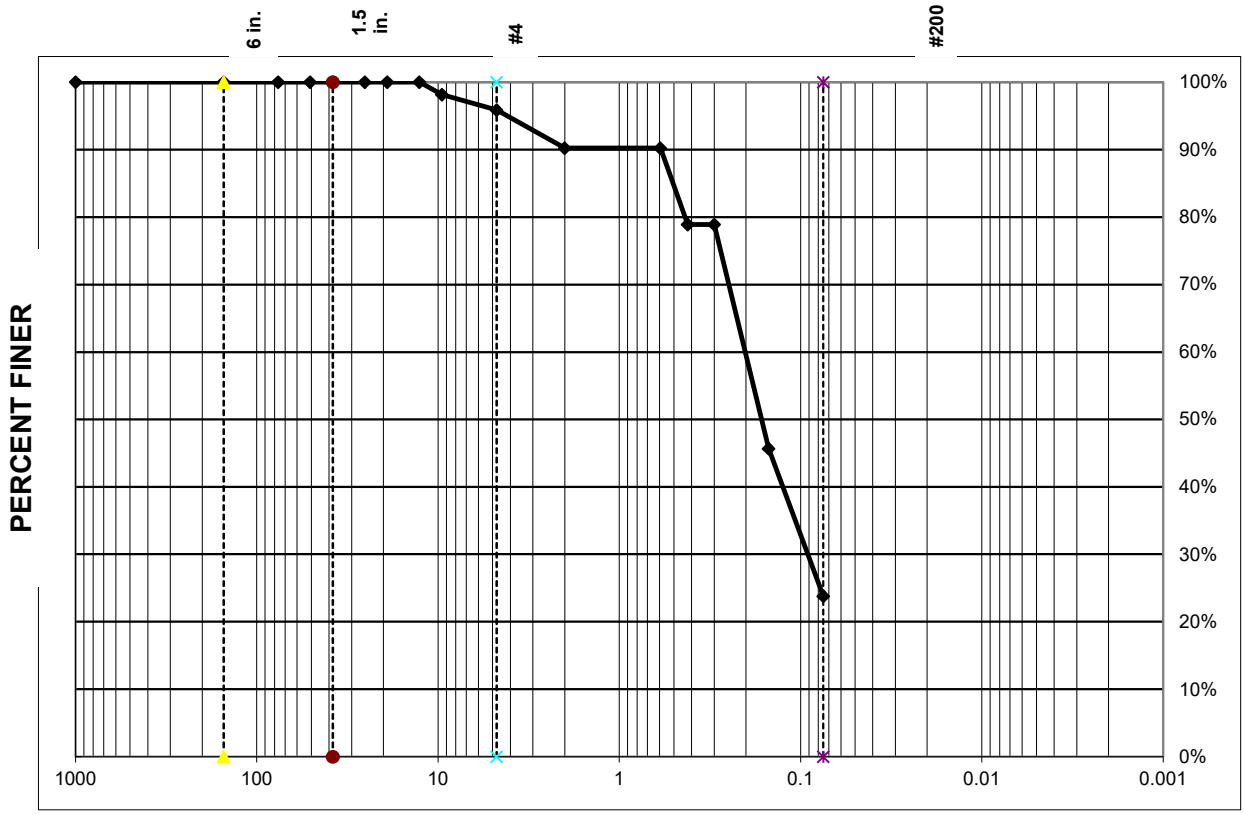
Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	99%	92%	86%	59%	35.5%
Specification								

% GRAVEL =	1%	**D_{85} =** 0.3	**D_{15} =**
% SAND =	64%	**D_{60} =** 0.2	**D_{10} =**
% SILT & CLAY =	35%	**D_{50} =** 0.1	**C_U =**
		D_{30} =	**C_C =**

Sample Date: 1/27/21
Project No.: 422106
Project Name: Lea County Recycling Facility
Report Date: 1/29/21
Sample Location: B-1 at 5'
Liquid Limit: NV **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand

COZ Engineering, LLC
PO Box 13331
Las Cruces, NM 88013
(575) 642-7671

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	98%	96%	90%	79%	46%	23.8%
Specification								

% GRAVEL =	4%		**D_{85} =** 0.5	**D_{15} =**	
% SAND =	72%		**D_{60} =** 0.2	**D_{10} =**	
% SILT & CLAY =	24%		**D_{50} =** 0.2	**C_U =**	
			D_{30} = 0.1	**C_C =**	

Sample Date: 1/27/21
Project No.: 422106
Project Name: Lea County Recycling Facility
Report Date: 1/29/21
Sample Location: B-2 at 10'
Liquid Limit: NV **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand

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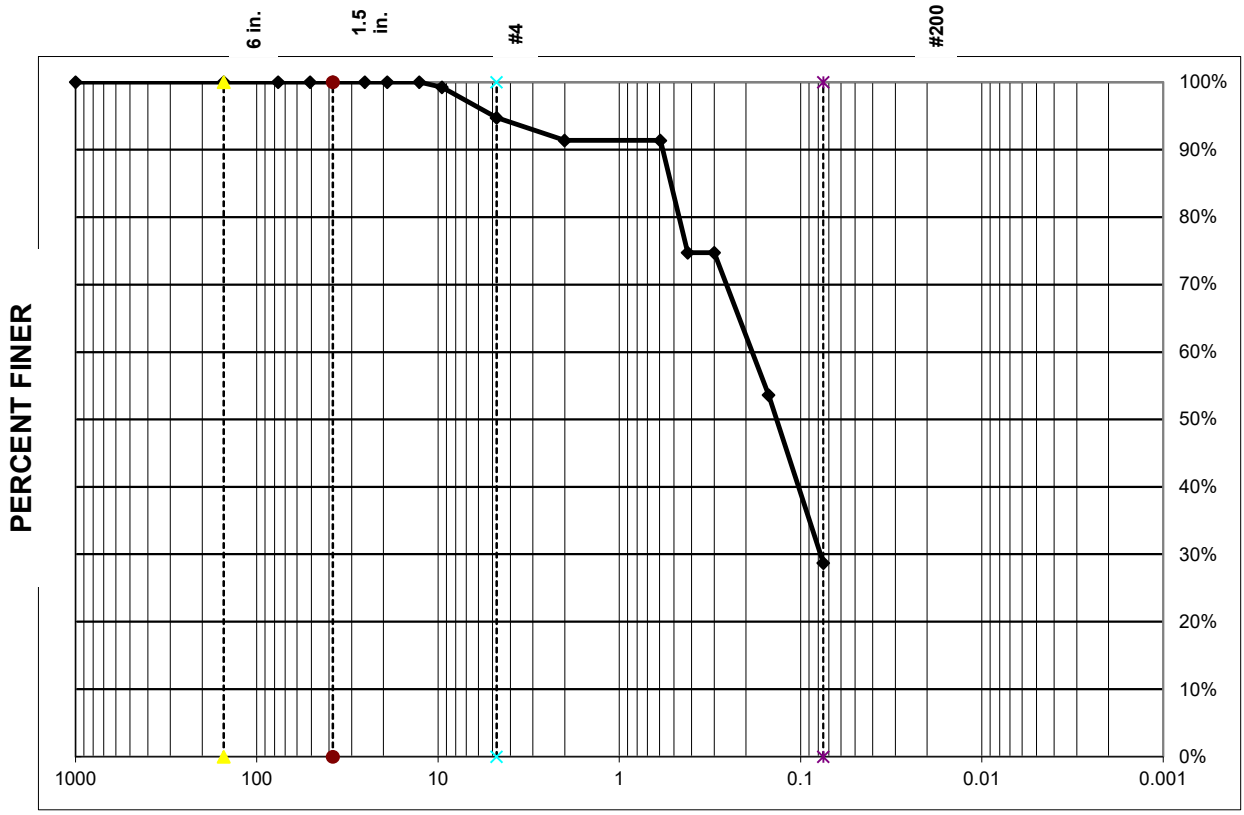
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	99%	95%	91%	75%	54%	28.7%
Specification								

% GRAVEL =	5%	**D_{85} =** 0.5	**D_{15} =**
% SAND =	66%	**D_{60} =** 0.2	**D_{10} =**
% SILT & CLAY =	29%	**D_{50} =** 0.1	**C_U =**
		D_{30} = 0.1	**C_C =**

Sample Date: 1/27/21
Project No.: 422106
Project Name: Lea County Recycling Facility
Report Date: 1/29/21
Sample Location: B-3 at 5'
Liquid Limit: NV **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand

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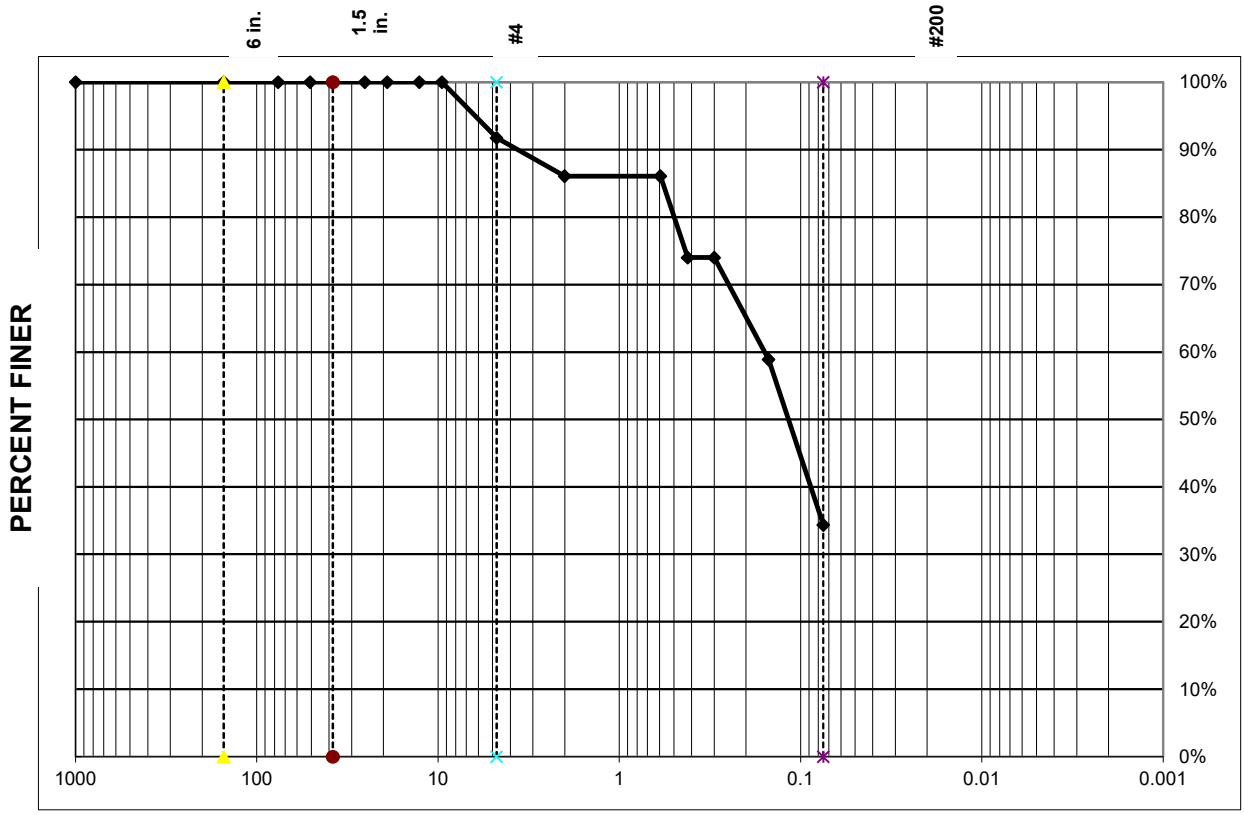
GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY (ASTM C136)

Sieve Size	1 1/2"	3/4"	3/8"	#4	#10	#40	#100	#200
% Passing (Cumulative)	100%	100%	100%	92%	86%	74%	59%	34.4%
Specification								

% GRAVEL =	8%		**D_{85} =** 0.6	**D_{15} =**	
% SAND =	57%		**D_{60} =** 0.2	**D_{10} =**	
% SILT & CLAY =	34%		**D_{50} =** 0.1	**C_U =**	
			D_{30} =	**C_C =**	

Sample Date: 1/27/21
Project No.: 422106
Project Name: Lea County Recycling Facility
Report Date: 1/29/21
Sample Location: B-4 at 10'
Liquid Limit: NV **Plasticity Index:** NP
USCS Classification: SM
Material Description: Silty Sand

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APPENDIX B

ENGINEERING DRAWINGS

Javelina Recycle Facility

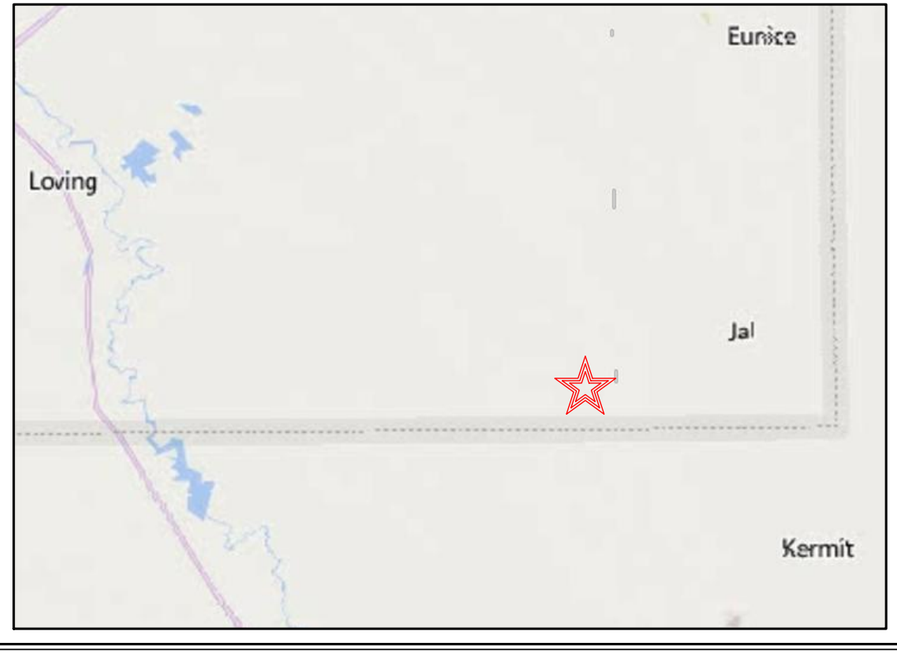
Section 18 - Township 26 South, Range 35 East Lea County, New Mexico

OILFIELD WATER LOGISTICS

Index to Drawings
11" X17"

Sheet No.	Description
1.	Cover Sheet
2.	Project Location Plan
3.	Capacity Tables
4.	Site Plan
5.	Cross Sections
6.	Cross Sections
7.	Sump Plan & Details
8.	Miscellaneous Details
9.	Fence Details
10.	AST Details

Lat: 32.048372° , Long: -103.403305°



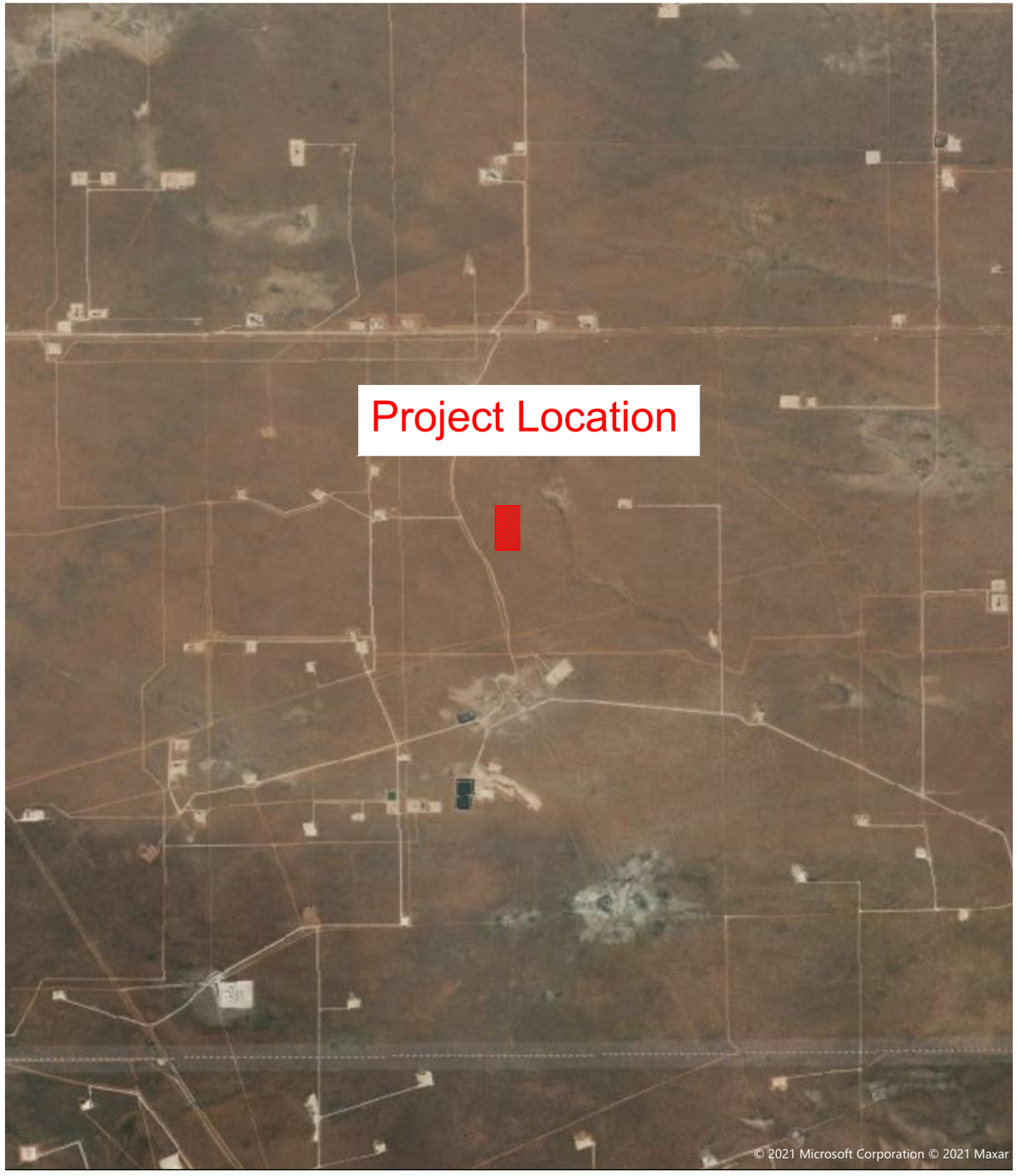
nm811 Professional Resources for Damage Prevention

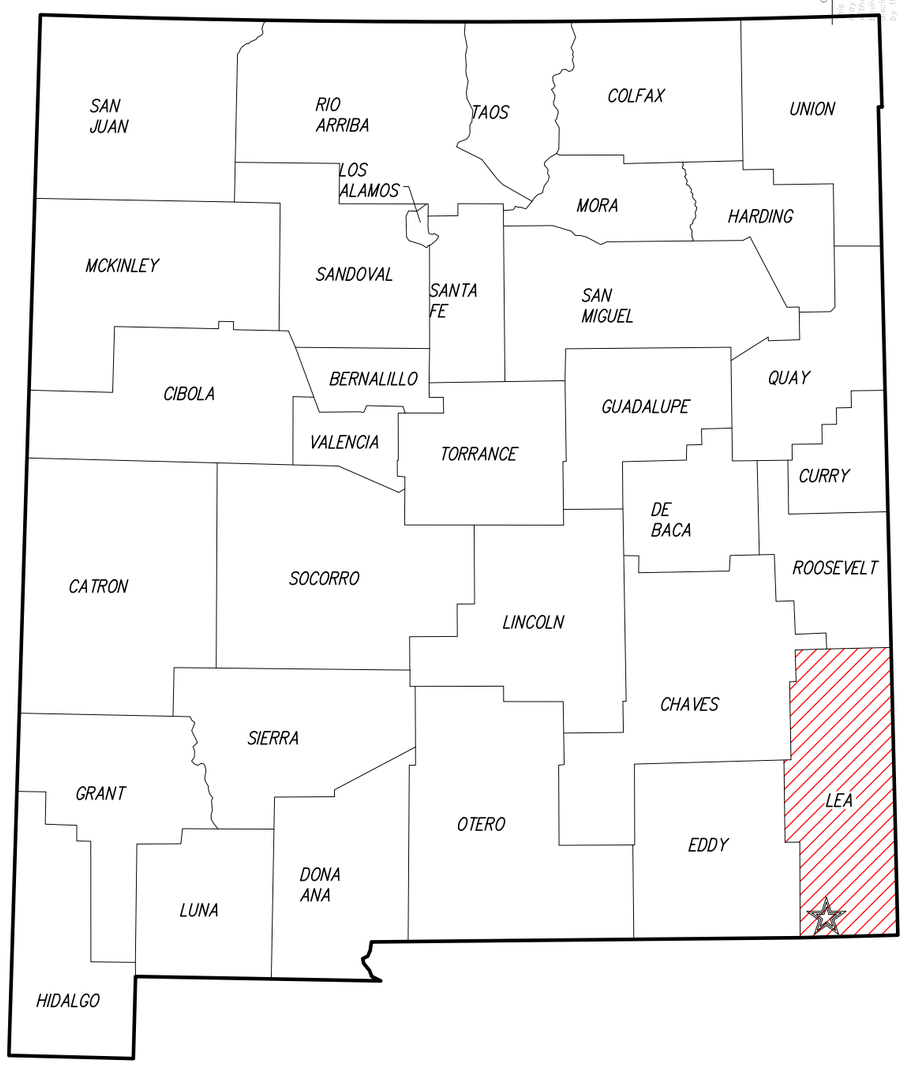
Contacts

OilField Water Logistics - Tucker Martin - tamrtin@oilfieldwaterlogistics.com

Envirotech Engineering - Tyler Williams 580-234-8780
(Design Engineer)

ENVIROTECH ENGINEERING & CONSULTING , INC.





ENVIROTECH
ENGINEERING & CONSULTING, INC.
2100 North 11th Street - Enid, Oklahoma 73701
Phone (580) 234-8780 Fax (580) 237-4302
C.A. #1850 - Expiration Date: 6-30-2022
www.envirotechconsulting.com

Project Location Plan

Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 24 South, Range 35 East
Lea County New Mexico

Date:	January, 2022
Scale:	N.T.S.
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked by:	T. Williams
Project No.	420161

Sheet 02 of 10

Owner	Oilfield Water Logistics		
Site Name	Javelina North Pit		
	Top FB	Bottom	Max Liq. Level
Lagoon Feature			
Sides lope Ratio	3		3
Maximum Depth (ft)	18.00		15.00
Lagoon Top Width (ft)	320	212	296.0
Lagoon Top Length (ft)	565	457	541.0
Maximum Total Vol (ft^3)	2,464,164		1,945,335
Maximum Total Vol (bbls)	438,856		346,455

Lagoon Liq Depth	Storage	Surface Area	Remaining Stor Vol	Gallons Storage	BBLS Storage	Percent of Total Volume	Vol in lagoon	Vol in Lagoon	Vol in Lagoon	Percent Total Vol
ft	ft	ac	ft3	gal	bbls	%	ft^3	bbls	ac-ft	%
18.00	0.0	4.15	-	-	-	0.0%	2,464,164	438,856	56.57	100%
17.5	0.5	4.09	48,945	366,110	8,717	2.0%	2,374,426	422,874	54.51	96%
17.0	1.0	4.03	98,903	739,794	17,614	4.0%	2,286,007	407,127	52.48	93%
16.5	1.5	3.97	149,882	1,121,119	26,693	6.1%	2,198,897	391,613	50.48	89%
16.0	2.0	3.91	201,892	1,510,152	35,956	8.2%	2,113,088	376,331	48.51	86%
15.5	2.5	3.85	254,941	1,906,961	45,404	10.3%	2,028,570	361,279	46.57	82%
15.0	3.0	3.79	309,039	2,311,612	55,038	12.5%	1,945,335	346,455	44.66	79%
14.5	3.5	3.73	364,194	2,724,173	64,861	14.8%	1,863,373	331,858	42.78	76%
14.0	4.0	3.68	420,416	3,144,712	74,874	17.1%	1,782,676	317,486	40.92	72%
13.5	4.5	3.62	477,713	3,573,295	85,078	19.4%	1,703,234	303,338	39.10	69%
13.0	5.0	3.56	536,095	4,009,991	95,476	21.8%	1,625,039	289,412	37.31	66%
12.5	5.5	3.51	595,570	4,454,865	106,068	24.2%	1,548,081	275,706	35.54	63%
12.0	6.0	3.45	656,148	4,907,987	116,857	26.6%	1,472,352	262,219	33.80	60%
11.5	6.5	3.39	717,837	5,369,423	127,843	29.1%	1,397,842	248,949	32.09	57%
11.0	7.0	3.34	780,647	5,839,240	139,030	31.7%	1,324,543	235,895	30.41	54%
10.5	7.5	3.28	844,586	6,317,505	150,417	34.3%	1,252,445	223,055	28.75	51%
10.0	8.0	3.23	909,664	6,804,287	162,007	36.9%	1,181,540	210,427	27.12	48%
9.5	8.5	3.17	975,889	7,299,652	173,801	39.6%	1,111,818	198,010	25.52	45%
9.0	9.0	3.12	1,043,271	7,803,667	185,802	42.3%	1,043,271	185,802	23.95	42%
8.5	9.5	3.07	1,111,818	8,316,401	198,010	45.1%	975,889	173,801	22.40	40%
8.0	10.0	3.01	1,181,540	8,837,919	210,427	47.9%	909,664	162,007	20.88	37%
7.5	10.5	2.96	1,252,445	9,368,290	223,055	50.8%	844,586	150,417	19.39	34%
7.0	11.0	2.91	1,324,543	9,907,582	235,895	53.8%	780,647	139,030	17.92	32%
6.5	11.5	2.86	1,397,842	10,455,860	248,949	56.7%	717,837	127,843	16.48	29%
6.0	12.0	2.81	1,472,352	11,013,193	262,219	59.8%	656,148	116,857	15.06	27%
5.5	12.5	2.76	1,548,081	11,579,648	275,706	62.8%	595,570	106,068	13.67	24%
5.0	13.0	2.71	1,625,039	12,155,292	289,412	65.9%	536,095	95,476	12.31	22%
4.5	13.5	2.66	1,703,234	12,740,192	303,338	69.1%	477,713	85,078	10.97	19%
4.0	14.0	2.61	1,782,676	13,334,416	317,486	72.3%	420,416	74,874	9.65	17%
3.5	14.5	2.56	1,863,373	13,938,032	331,858	75.6%	364,194	64,861	8.36	15%
3.0	15.0	2.51	1,945,335	14,551,106	346,455	78.9%	309,039	55,038	7.09	13%
2.5	15.5	2.46	2,028,570	15,173,705	361,279	82.3%	254,941	45,404	5.85	10%

Owner	Oilfield Water Logistics		
Site Name	Javelina South Pit		
	Top FB	Bottom	Max Liq. Level
Lagoon Feature			
Sides lope Ratio	3		3
Maximum Depth (ft)	18.00		15.00
Lagoon Top Width (ft)	500	392	476.0
Lagoon Top Length (ft)	500	392	476.0
Maximum Total Vol (ft^3)	3,597,984		2,874,660
Maximum Total Vol (bbls)	640,784		511,963

Lagoon Liq Depth	Storage	Surface Area	Remaining Stor Vol	Gallons Storage	BBLS Storage	Percent of Total Volume	Vol in lagoon	Vol in Lagoon	Vol in Lagoon	Percent Total Vol
ft	ft	ac	ft3	gal	bbls	%	ft^3	bbls	ac-ft	%
18.00	0.0	5.74	-	-	-	0.0%	3,597,984	640,784	82.60	100%
17.5	0.5	5.67	77,422	579,113	13,788	2.2%	3,473,733	618,655	79.75	97%
17.0	1.0	5.60	156,028	1,167,089	27,788	4.3%	3,350,972	596,792	76.93	93%
16.5	1.5	5.53	235,829	1,763,997	42,000	6.6%	3,229,694	575,193	74.14	90%
16.0	2.0	5.47	316,832	2,369,903	56,426	8.8%	3,109,888	553,856	71.39	86%
15.5	2.5	5.40	399,048	2,984,875	71,068	11.1%	2,991,547	532,780	68.68	83%
15.0	3.0	5.33	482,484	3,608,980	85,928	13.4%	2,874,660	511,963	65.99	80%
14.5	3.5	5.27	567,151	4,242,286	101,007	15.8%	2,759,220	491,404	63.34	77%
14.0	4.0	5.20	653,056	4,884,859	116,306	18.2%	2,645,216	471,100	60.73	74%
13.5	4.5	5.14	740,210	5,536,767	131,828	20.6%	2,532,641	451,051	58.14	70%
13.0	5.0	5.07	828,620	6,198,078	147,573	23.0%	2,421,484	431,255	55.59	67%
12.5	5.5	5.01	918,297	6,868,858	163,544	25.5%	2,311,738	411,709	53.07	64%
12.0	6.0	4.94	1,009,248	7,549,175	179,742	28.1%	2,203,392	392,414	50.58	61%
11.5	6.5	4.88	1,101,484	8,239,097	196,169	30.6%	2,096,439	373,366	48.13	58%
11.0	7.0	4.82	1,195,012	8,938,690	212,826	33.2%	1,990,868	354,564	45.70	55%
10.5	7.5	4.75	1,289,843	9,648,022	229,715	35.8%	1,886,672	336,007	43.31	52%
10.0	8.0	4.69	1,385,984	10,367,160	246,837	38.5%	1,783,840	317,693	40.95	50%
9.5	8.5	4.63	1,483,446	11,096,172	264,195	41.2%	1,682,365	299,621	38.62	47%
9.0	9.0	4.57	1,582,236	11,835,125	281,789	44.0%	1,582,236	281,789	36.32	44%
8.5	9.5	4.51	1,682,365	12,584,086	299,621	46.8%	1,483,446	264,195	34.06	41%
8.0	10.0	4.44	1,783,840	13,343,123	317,693	49.6%	1,385,984	246,837	31.82	39%
7.5	10.5	4.38	1,886,672	14,112,303	336,007	52.4%	1,289,843	229,715	29.61	36%
7.0	11.0	4.32	1,990,868	14,891,693	354,564	55.3%	1,195,012	212,826	27.43	33%
6.5	11.5	4.26	2,096,439	15,681,360	373,366	58.3%	1,101,484	196,169	25.29	31%
6.0	12.0	4.21	2,203,392	16,481,372	392,414	61.2%	1,009,248	179,742	23.17	28%
5.5	12.5	4.15	2,311,738	17,291,797	411,709	64.3%	918,297	163,544	21.08	26%
5.0	13.0	4.09	2,421,484	18,112,700	431,255	67.3%	828,620	147,573	19.02	23%
4.5	13.5	4.03	2,532,641	18,944,151	451,051	70.4%	740,210	131,828	16.99	21%
4.0	14.0	3.97	2,645,216	19,786,216	471,100	73.5%	653,056	116,306	14.99	18%
3.5	14.5	3.92	2,759,220	20,638,962	491,404	76.7%	567,151	101,007	13.02	16%
3.0	15.0	3.86	2,874,660	21,502,457	511,963	79.9%	482,484	85,928	11.08	13%
2.5	15.5	3.80	2,991,547	22,376,768	532,780	83.1%	399,048	71,068	9.16	11%

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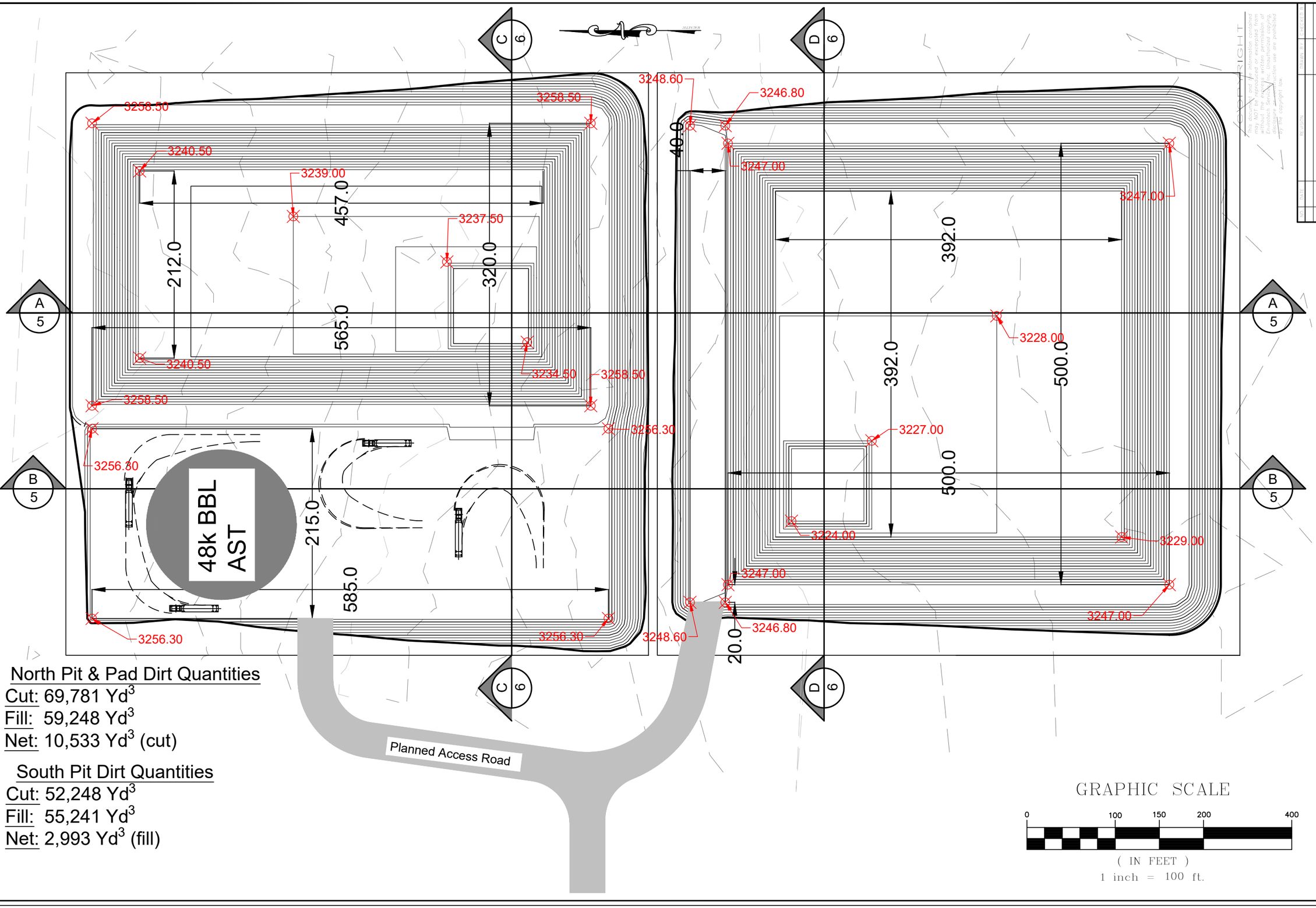
Pit Capacity Tables

Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 26 South, Range 35 East
Lea County New Mexico

Date: January 2022
Scale: —
Designed by: M. Rohrer
Drawn by: M. Rohrer
Checked By: T. Williams
Project No.: 020140

Sheet 03 of 10



North Pit & Pad Dirt Quantities

Cut: 69,781 Yd^3
Fill: 59,248 Yd^3
Net: 10,533 Yd^3 (cut)

South Pit Dirt Quantities

Cut: 52,248 Yd^3
Fill: 55,241 Yd^3
Net: 2,993 Yd^3 (fill)

GRAPHIC SCALE

0 100 150 200 400

(IN FEET)
1 inch = 100 ft.

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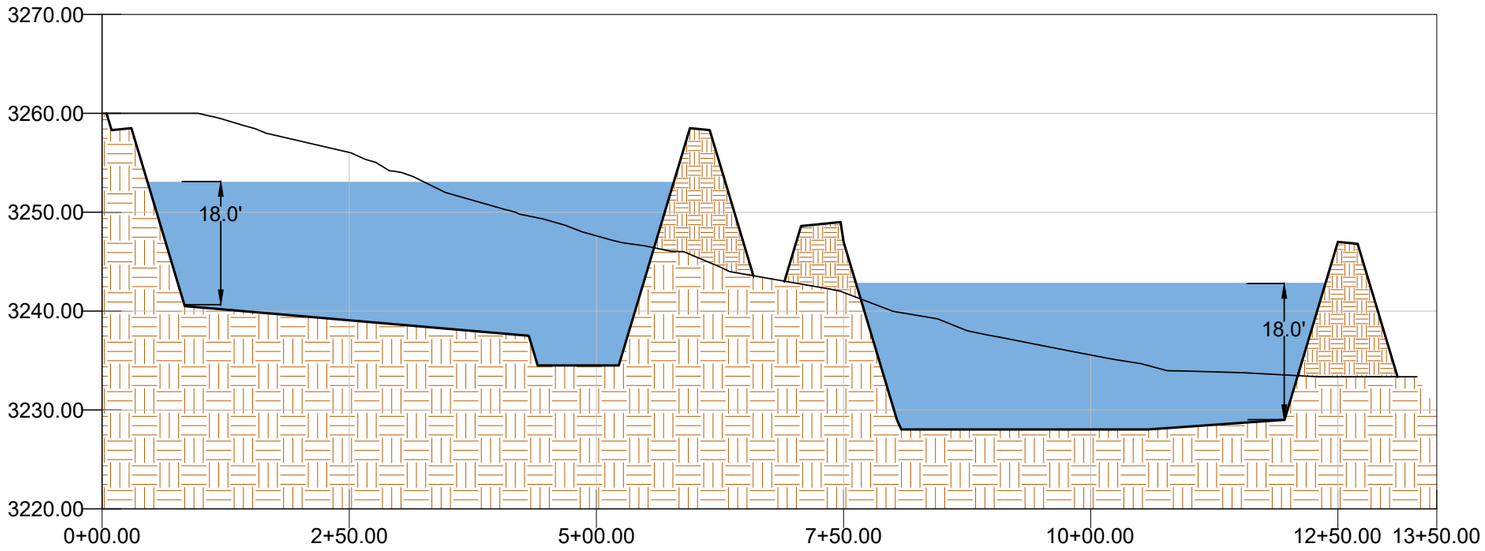
Site Plan

Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 24 South, Range 35 East
Lea County New Mexico

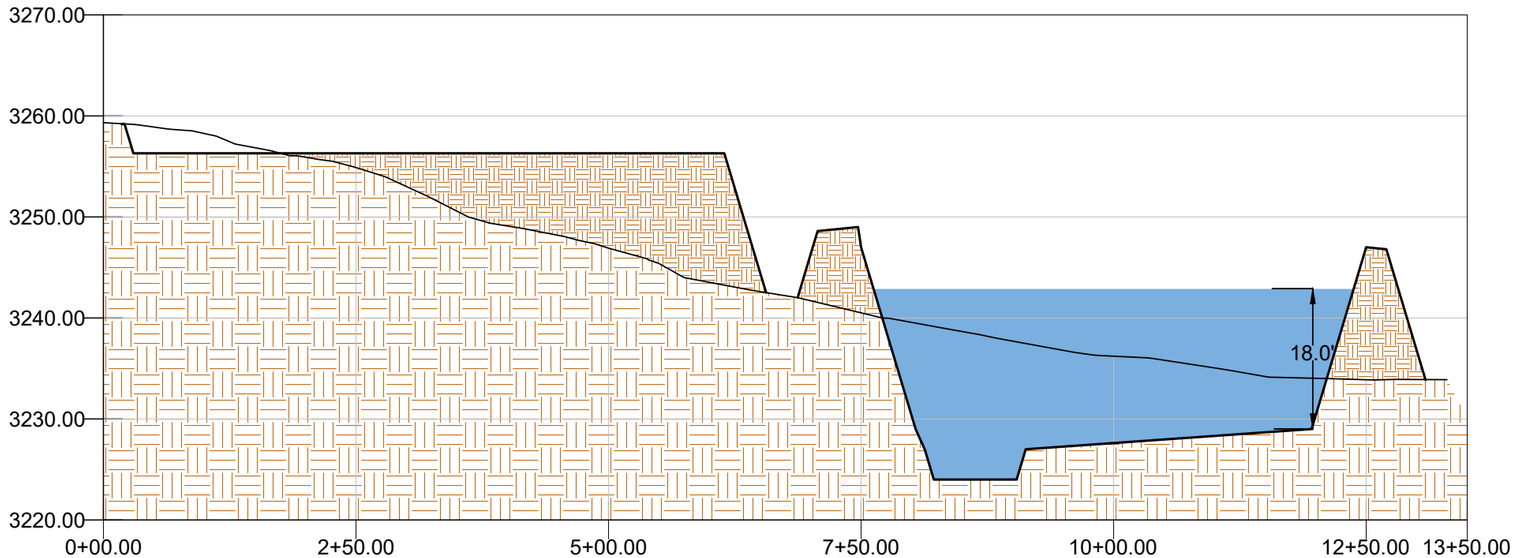
Date: January 2022
Scale: 1" = 100'
Designed By: M. Rose
Drawn By: M. Rose
Checked By: T. Williams
Project No.: 2021064

Sheet 04 of 10

Cross Section A-A



Cross Section B-B



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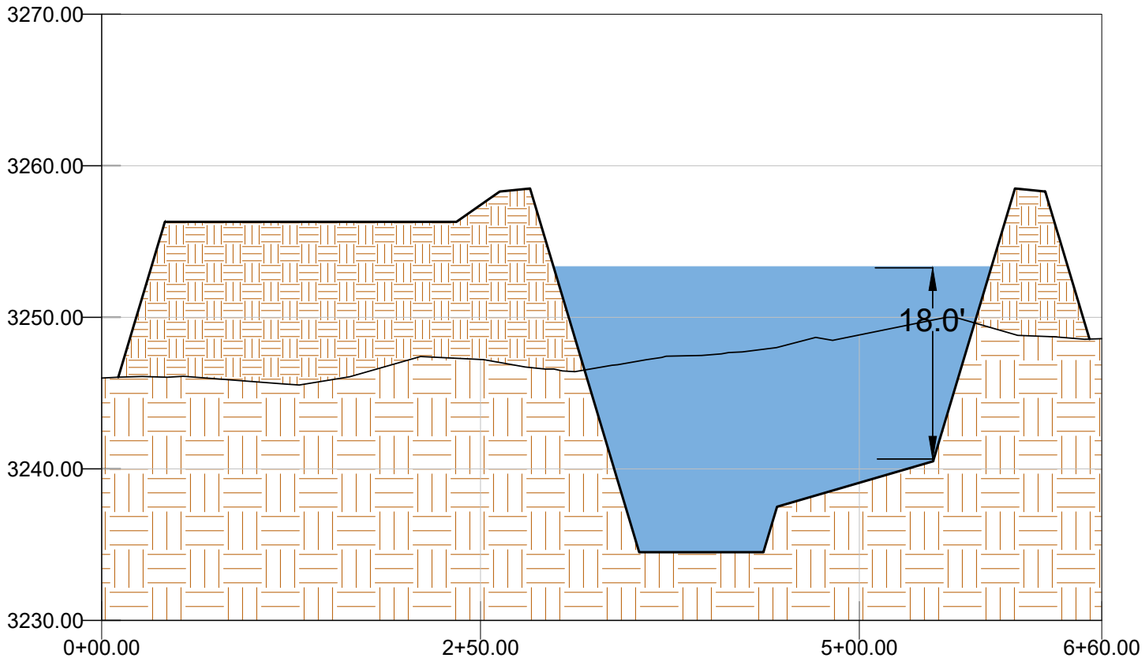
Cross Sections

Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 26 South, Range 35 East
Lea County New Mexico

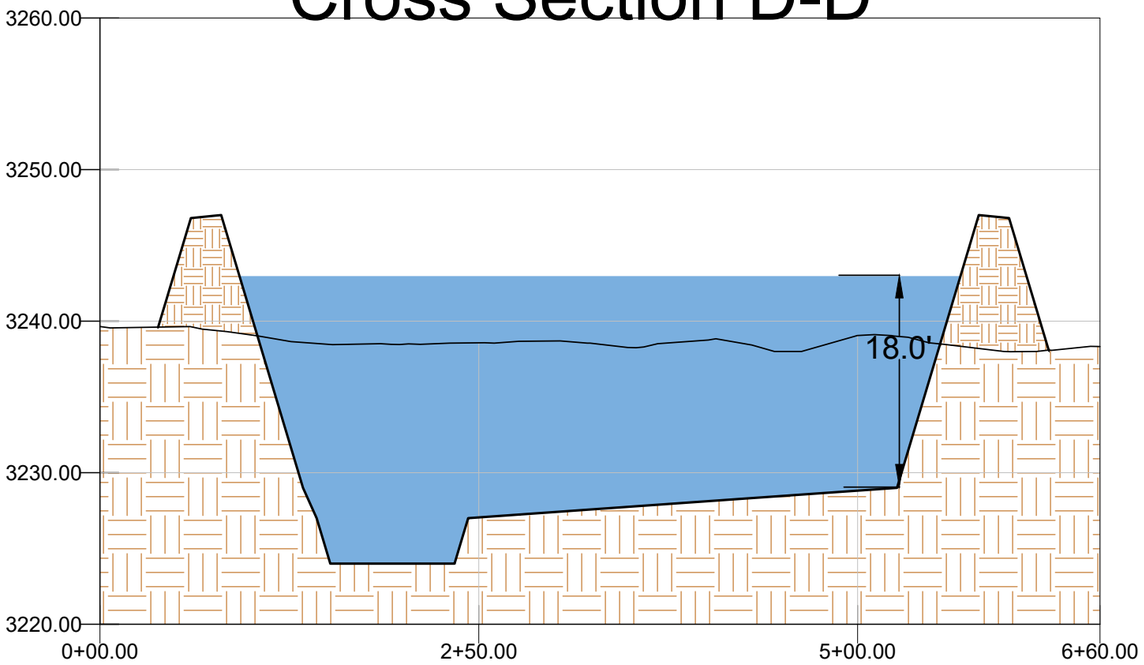
Date: January 2022
Scale: — NTS
Designed by: — M. Rorke
Drawn by: — M. Rorke
Checked By: — T. Williams
Project No. — 2021184

Sheet 05 of 10

Cross Section C-C



Cross Section D-D



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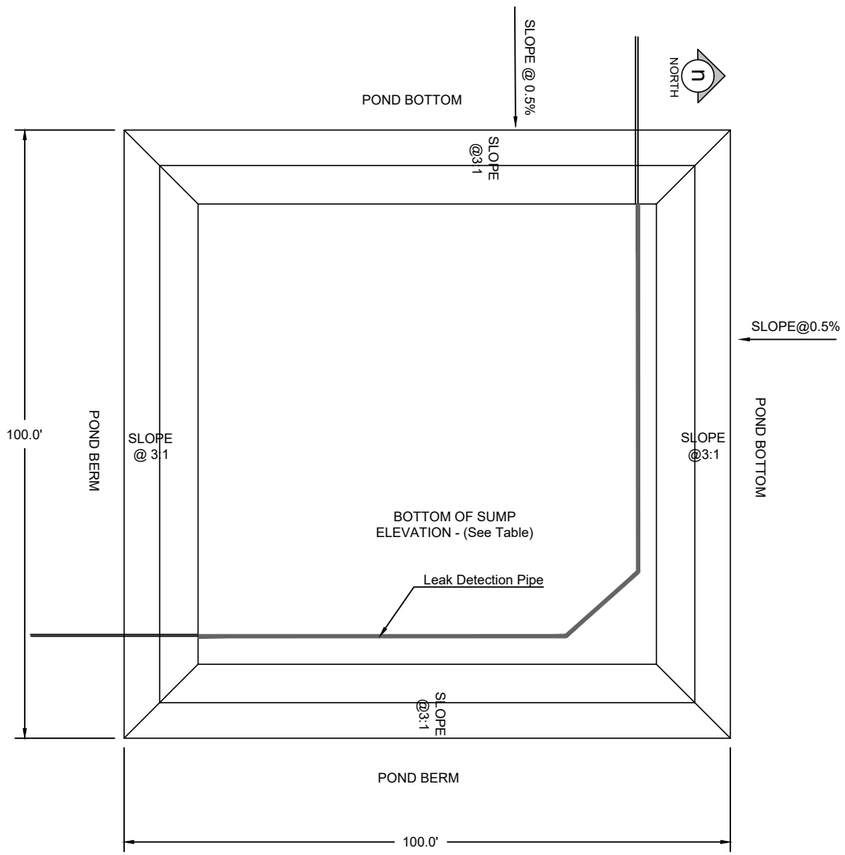
Cross Sections

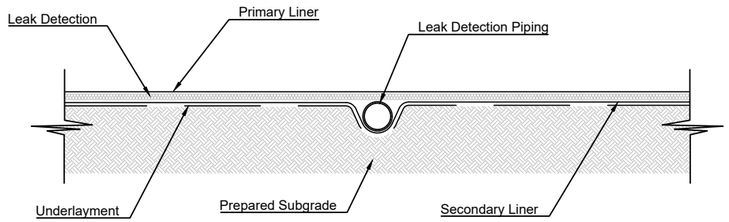
Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 26 South, Range 35 East
Lea County New Mexico

Date: January 2022
Scale: —
Designed By: M. Rake
Drawn By: M. Rake
Checked By: T. Williams
Project No. 2021084

Sheet 06 of 10



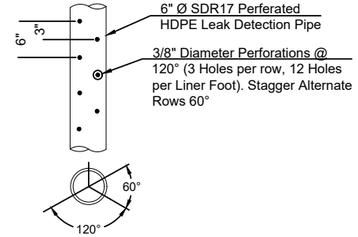
POND SUMP PLAN VIEW (4 / 5 | 6)
Not to Scale



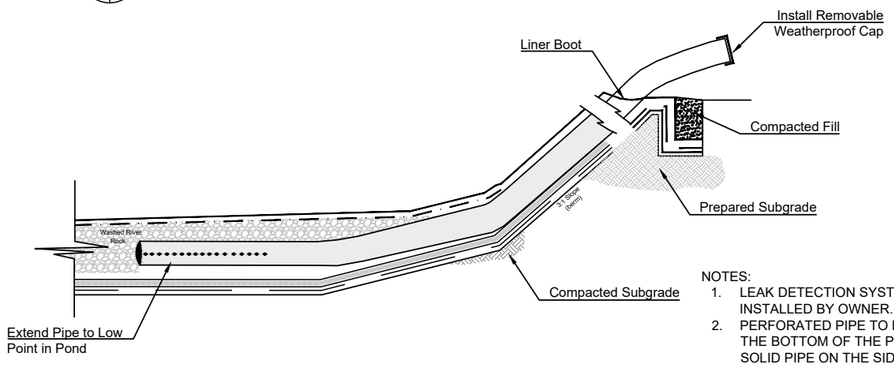
LEAK DETECTION PIPE DETAIL (4)
Not to Scale

REFERENCE TABLE

DETAIL	DESCRIPTION
PRIMARY LINER	60 mil HDPE TEXTURED LINER
SECONDARY LINER	40 mil LLDPE LINER
UNDERLAYMENT	8 oz. / 200 mil SINGLE SIDE COMPOSITE / 12 oz. GEOTEXTILE
LEAK DETECTION PIPING	6-in 0 SDR17 PREFERATED HDPE PIPE
SUMP	3090.08-ft ELEVATION W/ 3:1 SLOPE



PERFORATED PIPE DETAIL (4)
Not to Scale



LEAK DETECTION/SAMPLING SYSTEM DETAIL (4)
Not to Scale

NOTES:
1. LEAK DETECTION SYSTEM TO BE INSTALLED BY OWNER.
2. PERFORATED PIPE TO BE ALONG THE BOTTOM OF THE POND. SOLID PIPE ON THE SIDE SLOPE.
3. CONSTRUCT COMPACTED SUBGRADE TO 95% STANDARD PROCTOR AS PER ASTM D-698.
4. EXTEND 60 MIL. RUB SHEET 1.0-FT PAST TOP OF SHOULDER OF SUMP.
5. WASH RIVER ROCK SHALL BE 3/8" MIN. & 3/4" MAX.

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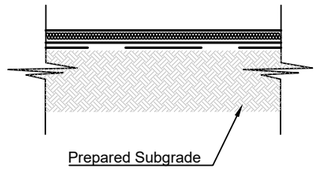
Sump Plan & Details

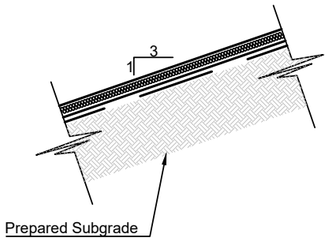
Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 24 South, Range 35 East
Lea County New Mexico

Date: January 2022
Scale: N.T.S.
Designed by: M. Ratke
Drawn by: M. Ratke
Checked By: T. Williams
Project No.: 2020124.0

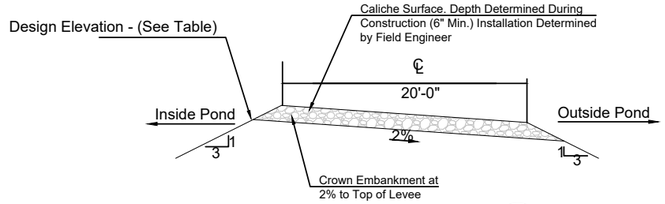
Sheet 07 of 10



LINER SYSTEM FLOOR DETAIL (1 / 4 | 8)
Not to Scale



LINER SYSTEM SIDE SLOPE DETAIL (2 / 4 | 8)
Not to Scale



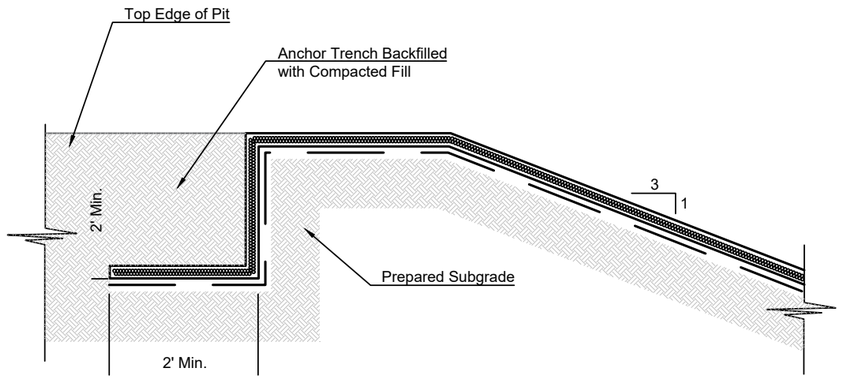
TYPICAL CREST DETAIL (3 / 4 | 8)
Not to Scale

GENERAL NOTES:

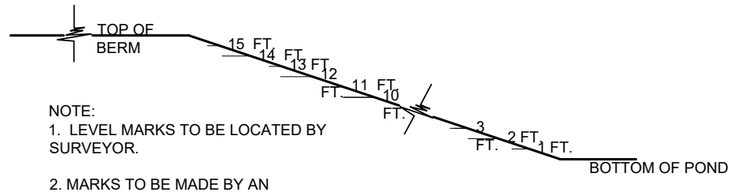
1. PREPARED SUBGRADE MEANS COMPACTED SMOOTH SUBGRADE FREE OF ROCK, ROOTS, WOOD DEBRIS, CONCRETE RUBBLE AND ANY SHARP OBJECTS THAT MIGHT PUNCTURE THE HDPE LINER.
2. ALL INTERIOR SLOPES AND TOP OF BERMS TO BE SMOOTH DRUM ROLLED.
3. ALL EMBANKMENT SLOPES SHALL HAVE A RATIO OF 3:1, COMPACTED EARTH EMBANKMENTS TO BE CONSTRUCTED WITH 12 INCH (MAXIMUM LOOSE LIFTS, COMPACTED TO 95% STANDARD PROCTOR DENSITY.
4. PERFORM GEOTECHNICAL ANALYSIS ON EXISTING SOIL TO CONFIRM SOIL IS SUITABLE FOR USE IN THE LEVEE.
5. ALL BOTTOM OF PITS SHALL SLOPE TO THE SUMP @ 0.5%.

REFERENCE TABLE

DETAIL	DESCRIPTION
PRIMARY LINER	60 mil HDPE TEXTURED LINER
SECONDARY LINER	40 mil LLDPE LINER
UNDERLAYMENT	8 oz. / 200 mil SINGLE SIDE COMPOSITE / 12 oz. GEOTEXTILE
SUMP	3090.08-ft ELEVATION W/ 3:1 SLOPE
BERM (ROAD CREST)	2% SLOPE OF CROWN EMBANKMENT DESIGN ELEV. 3109.5-ft
PIT	3095.5-ft ELEVATION



ANCHOR TRENCH DETAIL (5 / 4 | 8)
Not to Scale



NOTE:
1. LEVEL MARKS TO BE LOCATED BY SURVEYOR.

2. MARKS TO BE MADE BY AN EXTRUSION WELDER USING BLACK FILAMENT (OR WHITE FILAMENT ON BLACK LINER).

3. MARKS SHOULD REFERENCE LOWEST POINT ON BERM.

WATER LEVEL MARKS (4 / 4 | 8)
Not to Scale

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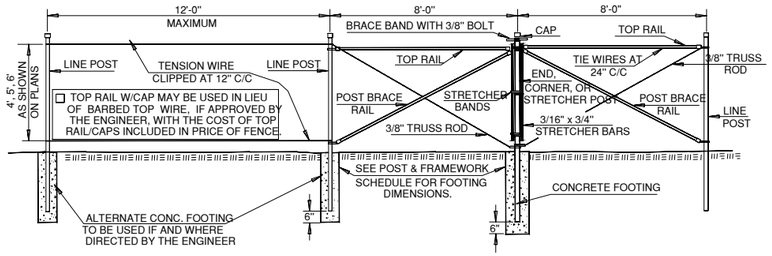
Miscellaneous Details

Javelina Recycle Facility
Oilfield Water Logistics
Section 18, Township 24 South, Range 35 East
Lea County New Mexico

Date: January 2021
Scale: N.T.S.
Designed by: M. Ratke
Drawn by: M. Ratke
Checked By: T. Williams
Project No.: 0201014

Sheet 08 of 10

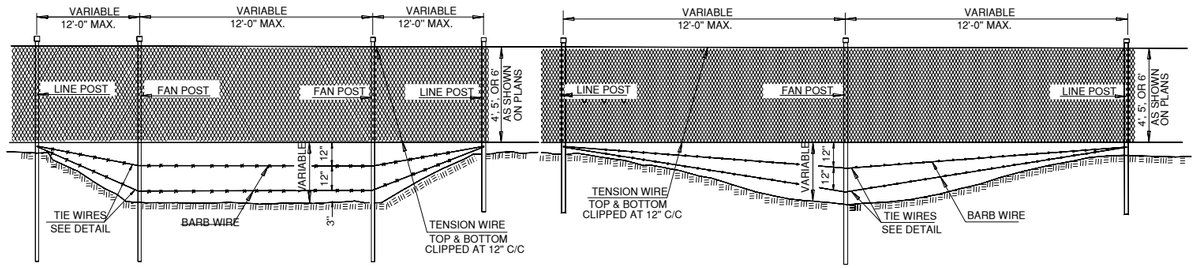


TYPICAL LINE POST DETAIL

NOTE: LINE POSTS MAY BE DRIVEN OR EARTH EMBEDED SEE SPECIFICATIONS

END, CORNER, & STRETCHER DETAILS

USE STRETCHER DETAILS AT ALL CORNERS, BENDS IN R/W, ON HILLTOPS, IN VALLEYS OR DEEP DEPRESSIONS, AND AT 500' MAXIMUM SPACING. (REQUIRES CONCRETE FOOTING)



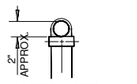
FAN DETAILS

NOT IN CURRENT DESIGN. INCLUDED IN PLAN SET IN THE EVENT A DRAINAGE FAN IS NEEDED

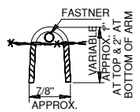
BARRIER FENCE

Not to Scale

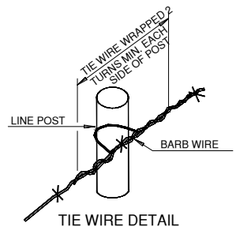
4 | 9



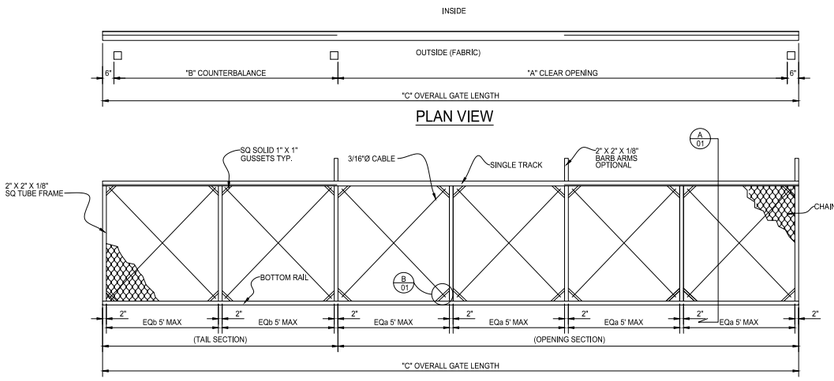
ALTERNATE POST CAP DETAIL (W/TOP RAIL)



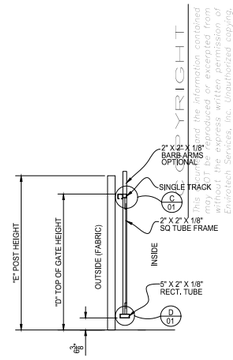
SECTION A-A



TIE WIRE DETAIL



ELEVATION VIEW ALUMINUM CANTILEVER GATE OUTSIDE LOOKING IN



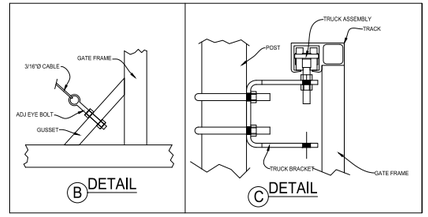
A SECTION

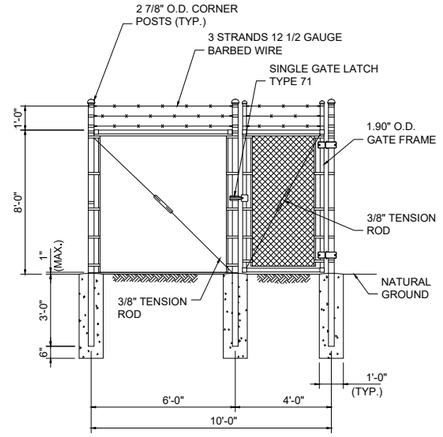
DOUBLE HUNG GATE DETAIL

Not to Scale

4 | 9

CRITICAL DIMENSIONS			
	DESCRIPTION	FORMULA	DIMENSION
"A"	CLEAR OPENING	A	24
"B"	COUNTERBALANCE	A/2	12
"C"	OVERALL GATE LENGTH	A + B + 12"	37
"D"	TOP OF GATE HEIGHT	D	6
"E"	POST HEIGHT	E	6.5
ADJOINING FENCE HEIGHT			
BARB ARMS REQUIRED		YES	
GATE STORAGE IN OPEN POSITION (OUTSIDE LOOKING IN)			





MAN GATE DETAIL

Not to Scale

4 | 9

POST & FRAMEWORK SCHEDULE															
		LINE POST				END, CORNER, OR STRETCHER POSTS		GATE POSTS ○			TOP RAIL OR POST BRACE RAIL		GATE FRAMES		
								6' WIDE & LESS	OVER 6' TO 12' WIDE	OVER 12' TO 18' WIDE			GATES UP TO 6' WIDE	GATES OVER 6' TO 12'	GATES OVER 12' TO 18'
SHAPE		○	C	C	I	○	▲	○	○	○	○	▭	○	○	○
NOMENCLATURE		1.5" PIPE	ROLL FORMED HEAVY "C"	ROLL FORMED STAND. "C"	"H" RAIL	2" PIPE	ROLL FORMED	2.5" PIPE	3.5" PIPE	5.0" PIPE	1 1/4" PIPE	ROLL FORMED	1 1/4" PIPE	1 1/2" PIPE	1 1/2" PIPE
DIMENSIONS		1.9" O.D. 1.6" I.D. 0.145" THK	2.25" x 1.7" 0.121" THK	1.875" x 1.625" 0.105" THK	2.25" x 1.7" 0.125" THK	2.38" O.D. 2.07" I.D. 0.154" THK	3.5" x 3.5" 0.128" THK	2.88" O.D. 2.47" I.D. 0.203" THK	4.0" O.D. 3.55" I.D. 0.226" THK	5.563" O.D. 5.047" I.D. 0.258" THK	1.66" O.D. 1.44"I.D. 0.11" THK	1.625" x 1.25" 0.075" THK	1.66" O.D. 1.44" I.D. 0.11" THK	1.9" O.D. 1.67" I.D. 0.114" THK	1.9" O.D. 1.61" I.D. 0.145" THK
CRITICAL AXIS SEC. MODULUS		.326 IN.^{3}	.506 IN.^{3}	.368 IN.^{3}	.661 IN.^{3}	.561 IN.^{3}	1.00 IN.^{3}	1.06 IN.^{3}	2.39 IN.^{3}	▼ 5.45 IN.^{3}	◐ 0.195 IN.^{3}	0.165 IN.^{3}	◐ 0.195 IN.^{3}	◐ 0.270 IN.^{3}	▼ 0.326 IN.^{3}
WEIGHT		2.72 LBS./LIN. FT.	2.64 LBS./LIN. FT.	1.85 LBS./LIN. FT.	3.26 LBS./LIN. FT.	3.65 LBS./LIN. FT.	4.85 LBS./LIN. FT.	5.79 LBS./LIN. FT.	9.11 LBS./LIN. FT.	14.62 LBS./LIN. FT.	1.81 LBS./LIN. FT.	1.35 LBS./LIN. FT.	1.81 LBS./LIN. FT.	2.17 LBS./LIN. FT.	2.72 LBS./LIN. FT.
LENGTH FOR GIVEN FENCE FAB. HT.	4	6'-10" W/CONC. FOOTING; 7'- 4" WHEN DRIVEN.				7'-4" W/CONC. FOOTING				7'-10"					
	5	8'- 1" W/CONC. FOOTING; 8'- 7" WHEN DRIVEN.				8'-7" W/CONC. FOOTING				9'- 1"					
	6	9'- 4" W/CONC. FOOTING; 9'-10" WHEN DRIVEN.				9'-10" W/CONC. FOOTING				10'- 4"					
EMBEDMENT FOR GIVEN FENCE FAB. HT.	4	24" IN CONC. FOOTING; 30" WHEN DRIVEN.				30" IN CONC. FOOTING				36"					
	5	27" IN CONC. FOOTING; 33" WHEN DRIVEN.				33" IN CONC. FOOTING				39"					
	6	30" IN CONC. FOOTING; 36" WHEN DRIVEN.				36" IN CONC. FOOTING				42"					
FOOTING DIM. IN EARTH		9" DIA. 36" DEEP				9" DIA.	14" DIA.	12" DIA.	16" DIA.	18" DIA.					
FOOTING DIM. IN ROCK		4" DIA. 9" DEEP				4" DIA. 9" DIA.	6" DIA. 16" DIA.	5" DIA. 12" DIA.	6" DIA. 16" DIA.	8" DIA. 24" DIA.					

○ MAXIMUM WIDTH OF SINGLE SWING GATE TO BE 18 FT.; OPENING MAY BE UP TO 36 FT. WIDE

DIAMETERS AS SHOWN ARE MINIMUM VALUES. DEPTHS FOR ROCK ARE MINIMUMS. DEPTHS SHOWN FOR CONCRETE FOOTINGS IN EARTH ARE MINIMUM FOR 6 FT. HIGH FENCE, AND MAY BE REDUCED 3 IN. FOR EACH FOOT OF FENCE HEIGHT LESS THAN 6 FT. HIGH.

▲ WIRE FABRIC TO BE WOVEN INTO LOCK LOOPS FOR THE ENTIRE WIDTH OF THE FABRIC.

▼ SECTION MODULUS AS SHOWN IS BASED UPON ASTM A53, AND AASHTO M181. SEE SPECIFICATIONS FOR SUBSTITUTION FORMULA ON CLASS 2 COLD FORMED STEEL PIPE.

◐ SECTION MODULUS AS SHOWN IS BASED UPON ASTM A 501 AND AASHTO M 181. SEE SPECIFICATIONS FOR SUBSTITUTION FORMULA ON CLASS 2 COLD FORMED STEEL PIPE.

ENVIROTECH
ENGINEERING & CONSULTING, INC.
2510 North 11th Street - Enid, Oklahoma 73701
Phone (580) 234-9780 Fax (580) 237-4302
C.A. #1850 - Expiration Date: 6-30-2022
www.envirotechconsulting.com

Fence Details

Javeling Recycle Facility

Oilfield Water Logistics

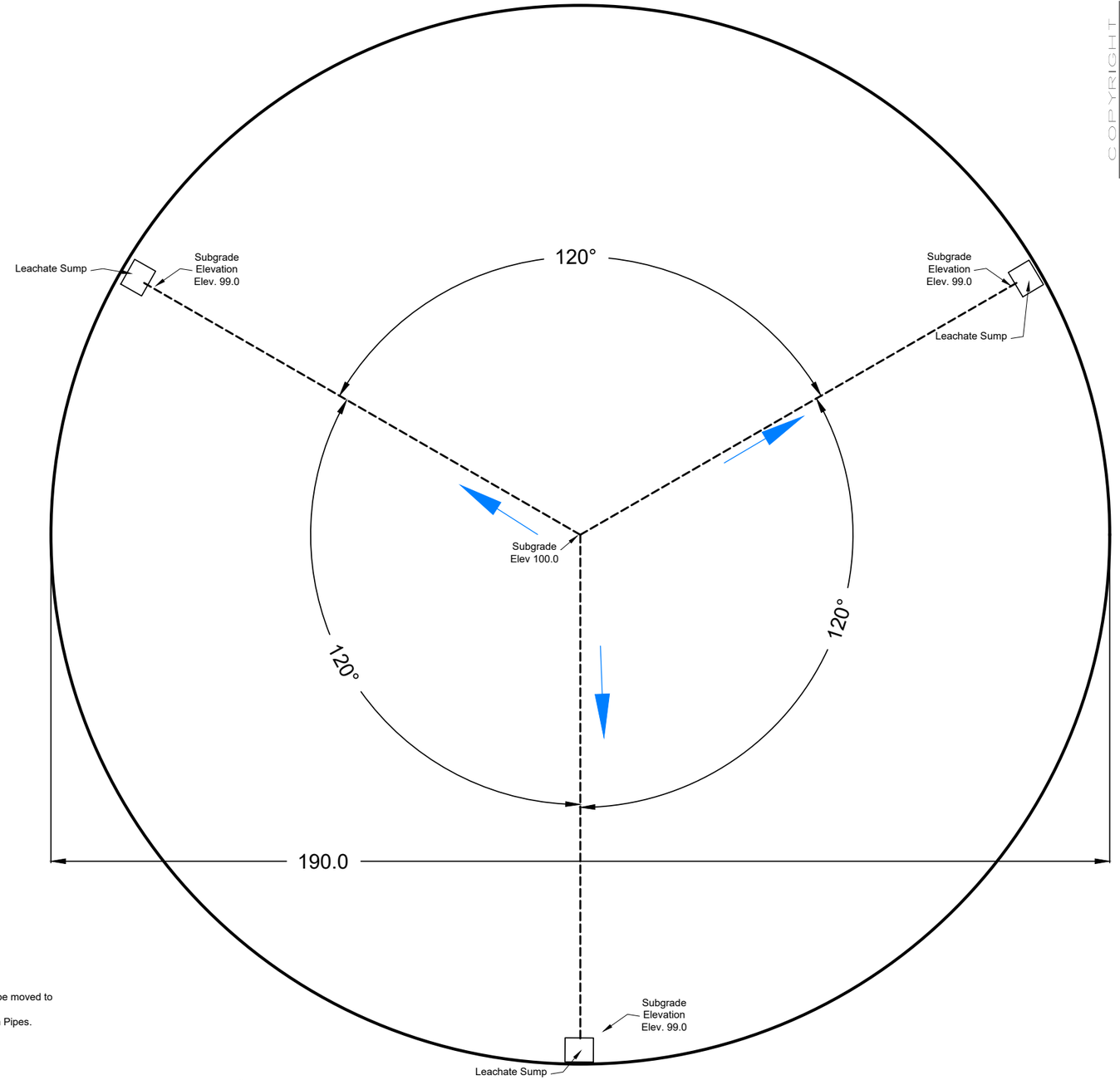
Section 18, Township 24 South, Range 35 East
Lea County, New Mexico

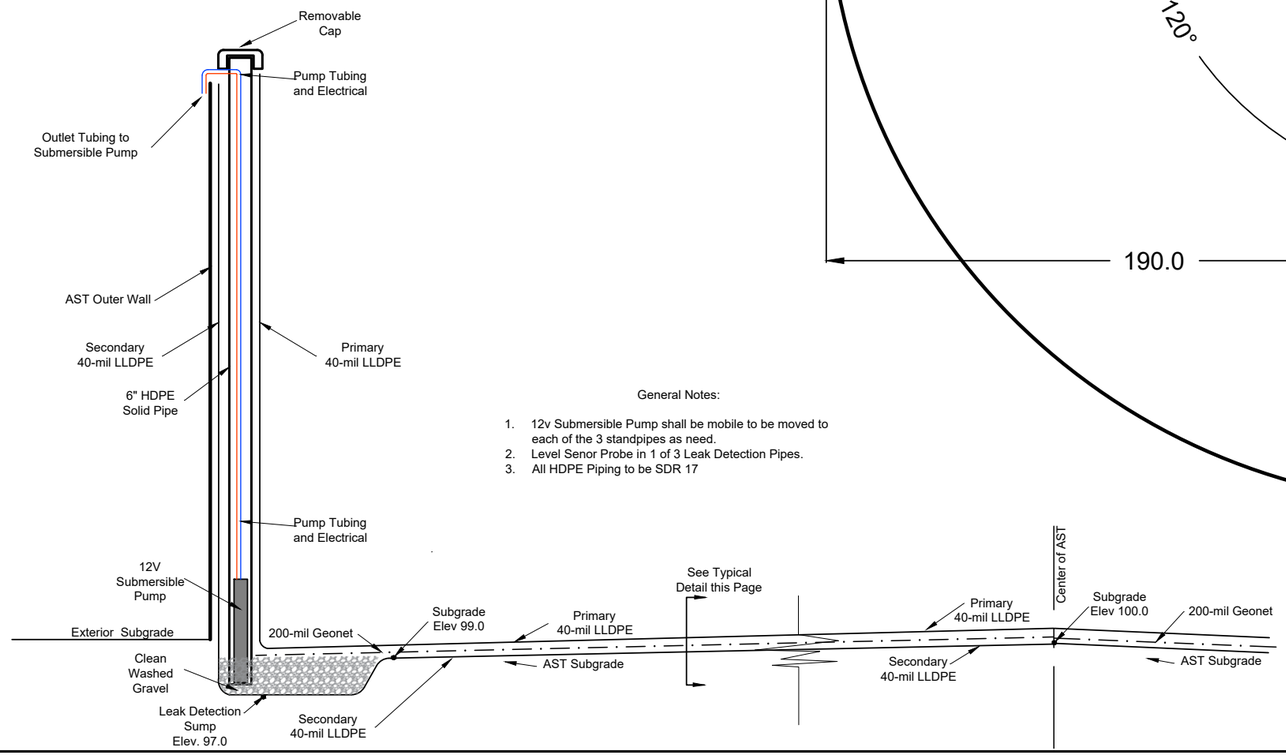
Date: January 2021
Scale: —
Designed by: M. Ratke
Drawn by: M. Ratke
Checked By: T. Williams
Project No.: 0001843

Sheet 09 of 10

Utilize Leak Detection System below for Influent and Effluent AST's
(AST 1, AST 2, AST 3 and AST 4)

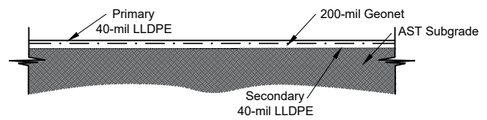
Leachate Flow Direction





General Notes:

1. 12v Submersible Pump shall be mobile to be moved to each of the 3 standpipes as need.
2. Level Senor Probe in 1 of 3 Leak Detection Pipes.
3. All HDPE Piping to be SDR 17



NO.	DESCRIPTION	BY	DATE

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AST Details

Javeling Recycle Facility

Oilfield Water Logistics
Section 18, Township 24 South, Range 35 East
Lea County New Mexico

Date:	January 2021
Scale:	—
Designed by:	M. Ratke
Drawn by:	M. Ratke
Checked By:	T. Williams
Project No.	2020184

Sheet 10 of 10

APPENDIX C

DESIGN & CONSTRUCTION PLAN

Oilfield Water Logistics (OWL) is proposing to construct two (2) storage pits in the E/2 NE/4 of Section 18, Township 26 South, Range 35 East, Lea County, New Mexico. The Javelina Facility North shall consist of one basin with a total operational volume of approximately 246,000-bbl as well as an AST with a volume of approximately 48,000-bbl, and the Javelina Facility South shall consist of one basin with a total operation volume of approximately 512,000-bbl.

OPERATION AND MAINTENANCE PROCEDURES

Applicable mandates in Rule 34 are underlined. This plan addresses construction of lined earthen containments as well as an AST. *Appendix B* presents Engineering Design Plans. *Appendix D* provides liner and geotextile specifications.

Field conditions may create the need for minor modification of the containment design (e.g. changing the length, width, or depth.)

Dike Protection and Structural Integrity

Design elements are addressed in the section of this submission containing the foundation recommendations. The recommendations are based on site-specific data. The operator, engineer, and selected contractor will review the recommendations prior to beginning the earthwork and adhere to the specific recommendations.

The design and operation provide for the confinement of produced water to prevent releases and to prevent overtopping due to wave action or rainfall. Additionally, the design prevents run-on of surface water as the containment is surrounded by an above-grade levee (berm) and diversion ditch to prevent run-on of surface water.

Stockpile Topsoil

Where topsoil is present, prior to constructing containment, the operator will strip and stockpile the topsoil for use as the final cover or fill at the time of closure. The topsoil will be stockpiled adjacent to perimeter fence surrounding the containment or incorporated into the levee.

Signage

The design calls for an upright sign no less than 12-in by 24-in with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The sign is posted in a manner and location such that a person can easily read the legend. The sign will provide the following information:

1. The operator's name,
2. The location of the site by quarter-quarter or unit letter, section, township and range, and
3. Emergency telephone numbers.

Fencing

The design provides for a fence to enclose the Recycling Containment in a manner that deters unauthorized wildlife and human access. The design calls for a 6-ft tall chain link and barbed wire fence around the containment to exclude wildlife (see detail on last page of engineering design). This fence provides greater wildlife (and human) deterrence than the minimum required barbed wire fence with four strands evenly spaced in the interval between one foot and four feet above ground level. The fence will be gated to provide access for maintenance and placement of pumps and other necessary equipment. As stated in the O&M plan, the operator will ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

Netting and Protection of Wildlife

The game fence on the containment levee will be effective in excluding antelope, coyotes, and most other terrestrial wildlife.

The Recycling Containment is otherwise protective of wildlife, including migratory birds. The containment will contain treated produced water that has not shown to be a material threat to birds due to hydrogen sulfide gas or floating, free-phase hydrocarbons. The O&M plan calls for the operator to inspect for and, within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency ad to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

The containment will have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile may be placed under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.

Appendix C shows:

1. The levee has an inside grade no steeper than three horizontal feet to one vertical foot (3H:1V).
2. The levee outside grade is no steeper than three horizontal feet to one vertical foot (3H:1V).
3. The top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
4. The caliche gravel placed on the outside levee provides additional erosion control.

Field conditions may create the need for changes to the design. Any changes to the construction or grade requirements due to unforeseen conditions will be reviewed and approved prior to initiating installation of the liner system. Any design change that does not conform to the NMOCD Rule will be the subject of a variance request and will be submitted **to the OCD for review and approval.**

LINER AND DRAINAGE GEOTEXTILE INSTALLATION

The containment has a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions.

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is 40-mil LLDPE. Liner compatibility meets or exceeds a subsequent relevant publication to EPA SW-846 method 9090A.

The Recycling Containment design has a leak detection system between the upper and lower geomembrane liners of 200-mil geonet to facilitate drainage. The leak detection system consists of a properly designed drainage and collection and removal system placed above the lower geomembrane liner in depressions and sloped to facilitate the earliest possible leak detection. The containment floor design calls for a slope of approximately 0.5% toward the sump. This slope, combined with the highly transmissive geonet drainage layer, provides for the earliest possible leak detection.

The liners and drainage material will be installed consistent with the manufacture's specifications (See *Appendix D*). In addition to any specifications of the manufacturer, protocols for liner installation include measures to:

1. Minimize liner seams and orient them up and down, not across, a slope of the levee.
2. Use factory welded seams where possible.
3. Field seams in geosynthetic material are thermally seamed; prior to field seaming, overlap liner four to six inches.
4. Minimize the number of field seams and corners and irregularly shaped areas.
5. Provide for no horizontal seams within five feet of the slope's toe.
6. Use qualified personnel to perform field welding and testing.
7. Avoid excessive stress-strain on the liner.
8. The edges of all liners are anchored in the bottom of a compacted earth-filled trench that is at least 18-in deep.

At points of discharge into the lined earthen containment and AST, the pipe configuration (see *Appendix B*) effectively protects the liner from excessive hydrostatic force or mechanical damage during filling. The design shows that at any point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines do not penetrate the liner.

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, numerous lines are permanently placed in the containment with floats attached to prevent damage to the liner system. The containment may be equipped with permanent HDPE stinger (supported by a sacrificial liner or geotextile) for withdrawal of fluid during operations, if the owner deems necessary. External discharge or suction lines do not penetrate the liner.

LEAK DETECTION AND FLUID REMOVAL SYSTEM INSTALLATION

The leak detection system, contains the following design elements:

1. The 200-mil Hypernet drainage material between the primary and secondary liner is sufficiently permeable to allow the transport of fluids to the observation ports (*Appendix B*).

2. The containment floor, sloped towards the monitoring riser pipe, facilitates the earliest possible leak detection of the containment bottom. A pump may be placed in an observation port to provide for fluid removal.
3. Piping will withstand chemical attack from any seepage, structural loading from stresses and disturbances from overlying water, cover materials, equipment operation, and expansion or contraction (see *Appendix C*).
4. The slope of the interior subgrade is approximately 1%.

APPENDIX D

MATERIAL SPECIFICATIONS

Oilfield Water Logistics (OWL) is proposing to construct two (2) storage pits in the E/2 NE/4 of Section 18, Township 26 South, Range 35 East, Lea County, New Mexico. The Javelina Facility North shall consist of one basin with a total operational volume of approximately 246,000-bbl as well as an AST with a volume of approximately 48,000-bbl, and the Javelina Facility South shall consist of one basin with a total operation volume of approximately 512,000-bbl.

GEOMEMBRANE SPECIFICATION

This specification covers the technical requirements for the Manufacturing and Installation of the geomembrane. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications

1.1 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting
   2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
   3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
   4. D 1603 Test Method for Carbon Black in Olefin Plastics
   5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
   6. D 4218 Standard Test Method for Determination of Carbon Black in Polyethylene Compounds
   7. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
   8. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
   9. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
   10. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
   11. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes
   12. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
   13. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
   14. D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test)

B. Geosynthetic Research Institute
   1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

2. GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

1.2 DEFINITIONS

A. Lot - A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.
B. Construction Quality Assurance Consultant (CONSULTANT) – The Party, independent from MANUFACTURER and INSTALLER, that is responsible for observing and documenting activities related to quality assurance during the lining system construction.
C. ENGINEER- The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.
D. Geomembrane Manufacturer (MANUFACTURER) - The party responsible for manufacturing the geomembrane rolls.
E. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) – The Party, independent from the OWNER, MANUFACTURER, and INSTALLER, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the OWNER.
F. INSTALLER- The Party responsible for field handling, transporting, storing, deploying, seaming, and testing of the geomembrane seams.
G. Panel- Unit area of geomembrane that will be seamed in the field that is larger than 100-ft^2.
H. Patch - Unit area of geomembrane that will be seamed in the field that is less than 100-ft^2.
I. Subgrade Surface - Soil layer surface which immediately underlies the geosynthetic material(s).

1.3 SUBMITTALS POST-AWARD

A. Furnish the following product data, in writing, to ENGINEER prior to installation of the geomembrane material:
   1. Resin Data shall include the following:
      a. Certification stating that the resin meets the specification requirements (see *Table 1.9B*).
   2. Geomembrane Roll
      a. Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).
B. The INSTALLER shall furnish the following information to the ENGINEER and OWNER prior to installation:

1. Installation layout drawings
a. Must show proposed panel layout including field seams and details
b. Must be approved prior to installing the geomembrane
2. Approved drawings will be for concept only; actual panel placement will be determined by site conditions.
3. Installer's Geosynthetic Field Installation Quality Assurance Plan

C. The INSTALLER will submit the following to the ENGINEER upon completion of installation:

1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents
2. Material and installation warranties
3. As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail

1.4 QUALITY ASSURANCE

A. The OWNER will engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.5 QUALIFICATIONS

A. MANUFACTURER

1. Geomembrane shall be manufactured by the following:
    a. GSE Lining Technology, LLC

b. approved equal

2. MANUFACTURER shall have manufactured a minimum of 10,000,000 square feet of polyethylene geomembrane during the last year.

B. INSTALLER

1. Installation shall be performed by one of the following installation companies (or approved equal)

a. GSE Lining Technology, LLC
b. GSE Approved Installers

2. INSTALLER shall have installed a minimum of 5,000,000-ft^2 of HDPE geomembrane during the last two years.
3. INSTALLER shall have worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents, and with at least 500,000-ft^2 of HDPE geomembrane installation on each project.
4. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.
5. The INSTALLER shall provide a minimum of one Master Seamer for work on the project.

a. Must have completed a minimum of 1,000,000-ft^2 of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.

1.6 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the MANUFACTURER. The label will identify:

a. manufacturer's name
b. product identification
c. thickness
d. length
e. width

f. roll number

B. Delivery- Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage- The on-site storage location for geomembrane material, provided by the CONTRACTOR to protect the geomembrane from punctures, abrasions and excessive dirt and moisture, should have the following characteristics:

a. level (no wooden pallets)
b. smooth
c. dry
d. protected from theft and vandalism
e. adjacent to the area being lined

D. Handling- Materials are to be handled so as to prevent damage.

1.7 WARRANTY

A. Material shall be warrantied, on a pro-rata basis, against Manufacturer's defects for a period of 5 years from the date of geomembrane installation.

B. Installation shall be warrantied against defects in workmanship for a period of 1 year from the date of geomembrane completion.

1.8 GEOMEMBRANE PROPERTIES

A. Material shall be smooth/textured polyethylene geomembrane as shown on the drawings.

B. Resin

1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.
2. Natural resin (without carbon black) shall meet the following requirements:

Table 1.9B RAW MATERIAL PROPERTIES			
Property	Test Method	HDPE	LLDPE
Density (g/cm3)	ASTM D 1505	$\geq$0.932	$\geq$0.915
Melt Flow Index (g/10 min)	ASTM D 1238 (190/2.16)	$\leq$1.0	$\leq$1.0
OIT (minutes)	ASTM D 3895 (1 atm/200^{0}C)	$\geq$100	$\geq$100

C. Geomembrane Rolls

1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width, and MANUFACTURER.
4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in section 1.09 D and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.

D. Smooth surfaced geomembrane shall meet the requirements shown in the following data sheets below:

1. *Table 1.1* for Black HDPE
2. *Table 1.2* for Green HDPE
3. *Table 1.3* for White HDPE

a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
b. The white surface shall be installed upwards.

4. *Table 1.4* for Smooth Leak Location Liner HDPE

a. The geomembrane shall have a coextruded, electrically conductive layer.
b. The conductive layer is installed downward.
c. Electrical testing shall be performed after liner installation by the INSTALLER.

5. *Table 1.5* for Smooth White Leak Location Liner HDPE

a. The geomembrane shall have a coextruded, electrically conductive layer.
b. The conductive layer is installed downward.
c. The geomembrane shall be a white-surfaced, coextruded geomembrane.
d. The white surface shall be installed upwards.
e. Electrical testing shall be performed after liner installation by the INSTALLER.

6. *Table 1.6* for Black LLDPE
7. *Table 1.7* for White-surfaced LLDPE

a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
b. The white surface shall be installed upwards.

8. *Table 1.8* for Leak Location Liner LLDPE

a. The geomembrane shall have a coextruded, electrically conductive layer.
b. The conductive layer is installed downward.
c. Electrical testing shall be performed after liner installation by the INSTALLER.

9. *Table 1.9* for White Leak Location Liner LLDPE

a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
b. The white surface shall be installed upwards.
c. The geomembrane shall have a coextruded, electrically conductive layer.
d. The conductive layer is installed downward.
e. Electrical testing shall be performed after liner installation by the INSTALLER.

TABLE 1.1: GSE HD SMOOTH GEOMEMBRANE							
Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940

Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	114 63 700 12	152 84 700 12	228 126 700 12	304 168 700 12	380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(2), ft			1,120	870	560	430	340
Roll Width(2), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 1.2: GSE GREEN SMOOTH GEOMEMBRANE							
Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(3)], ft			1,120	870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE Green Smooth may have an overall ash content of 3.0% due to the green layer. These values apply to the black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE Green Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

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TABLE 1.3: GSE WHITE SMOOTH GEOMEMBRANE							
Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 114 63 700 12	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	54	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(3)], ft			1,120	870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2			25,200	19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE White Smooth may have an overall ash content of 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 4.1: GSE LEAK LOCATION SMOOTH GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE Leak Location Smooth may have an overall ash content of 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE Leak Location Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 1.5: GSE LEAK LOCATION WHITE SMOOTH GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 152 84 700 12	 228 126 700 12	 304 168 700 12	 380 210 700 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	72	108	144	180
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Notch Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE Leak Location White Smooth may have an overall ash content of 3.0% due to the white and conductive layers. These values apply to the black layer only.
- [(2)]Dispersion applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ± 1%.
- GSE Leak Location White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 1.6: GSE ULTRAFLEX SMOOTH GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	152 800	228 800	304 800	380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(2), ft			870	560	430	340
Roll Width(2), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ±1 %.
- GSE UltraFlex is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TALBE 1.7: GSE ULTRAFLEX WHITE SMOOTH GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex White Smooth may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 1.8: GSE ULTRAFLEX LEAK LOCATION LINER SMOOTH GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex Leak Location Smooth may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 1.9: GSE ULTRAFLEX LEAK LOCATION LINER WHITE SMOOTH GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Value			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 152 800	 228 800	 304 800	 380 800
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	56	84	112	140
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft			870	560	430	340
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2			19,575	12,600	9,675	7,650

NOTES:
- [(1)]GSE UltraFlex Leak Location White Smooth may have an overall ash content greater than 3.0% due to the white and conductive layers. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location White Smooth is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

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E. Textured surfaced geomembrane shall meet the requirements shown in the following data sheets below.

1. *Table 2.1* for Black coextruded textured HDPE
2. *Table 2.2* for Green coextruded textured HDPE
3. *Table 2.3* for White coextruded textured HDPE
    a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    b. The white surface shall be installed upwards.
4. *Table 2.4* for Leak Location Liner coextruded textured HDPE
    a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    b. The white surface shall be installed upwards.
5. *Table 2.4* for White Leak Location Liner coextruded textured HDPE
    a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    b. The white surface shall be installed upwards.
6. *Table 2.6* for Black coextruded textured LLDPE
7. *Table 2.7* for White coextruded textured LLDPE
    a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
    b. The white surface shall be installed upwards.
8. *Table 2.8* for Leak Location Liner coextruded textured LLDPE

a. The geomembrane shall have a coextruded, electrically conductive layer.
b. The conductive layer is installed downward.
c. Electrical testing shall be performed after liner installation by the INSTALLER.

9. *Table 2.9* for White Leak Location Liner coextruded textured LLDPE

a. The geomembrane shall be a white-surfaced, coextruded geomembrane.
b. The white surface shall be installed upwards.
c. The geomembrane shall have a coextruded, electrically conductive layer.
d. The conductive layer is installed downward.
e. Electrical testing shall be performed after liner installation by the INSTALLER.

TABLE 2.1: GSE HD TEXTURED GEOMEMBRANE							
Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load(2), hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length(3), ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width(3), ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)NCTL for GSE HD Textured is conducted on representative smooth geomembrane samples.
- (3)Roll lengths and widths have a tolerance of ± 1%.
- GSE HD Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

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TABLE 2.2 GSE GREEN TEXTURED GEOMEMBRANE							
Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:

- [(1)]GSE Green may have an overall ash content greater than 3.0% due to the green layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE Green Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE Green Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

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TABLE 2.3: GSE WHITE TEXTURED GEOMEMBRANE							
Tested Property	Test Method	Frequency	Minimum Average Values				
			30 mil	40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	30 27	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 45 63 100 12	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	21	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	45	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	16	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100	>100
Typical Roll Dimensions							
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		830 1,010	700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		18,675 22,725	15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:

- [(1)]GSE White may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE White Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.4: GSE LEAK LOCATION LINER TEXTURED GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3, (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Notch Constant Tensile Load[(3)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

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NOTES:

- [(1)]GSE Leak Location may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE Leak Location Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE Leak Location Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.5: GSE LEAK LOCATION LINER WHITE TEXTURED GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5994	every roll	40 36	60 54	80 72	100 90
Density, g/cm3 , (min.)	ASTM D 1505	200,000 lbs	0.940	0.940	0.940	0.940
Tensile Properties (each direction) Strength at Break, lb/in-width Strength at Yield, lb/in-width Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in G.L. 1.3 in	20,000 lbs	 60 84 100 12	 90 126 100 12	 120 168 100 12	 150 210 100 12
Tear Resistance, lb	ASTM D 1004	45,000 lbs	28	42	56	70
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	60	90	120	150
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Notch Constant Tensile Load[(2)], hr	ASTM D 5397, Appendix	200,000 lbs	300	300	300	300
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(4)], ft	Double-Sided Textured Single-Sided Textured		700 780	520 540	400 410	330 330
Roll Width[(4)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 17,550	11,700 12,150	9,000 9,225	7,425 7,425

NOTES:
- [(1)]GSE Leak Location White may have an overall ash content greater than 3.0% due to the conductive and white layers. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]NCTL for GSE Leak Location White Textured is conducted on representative smooth geomembrane samples.
- [(4)]Roll lengths and widths have a tolerance of ±1%.
- GSE Leak Location White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77° C when tested according to ASTM D 746.
- *Modified.

TABLE 2.6: GSE ULTRAFLEX TEXTURED GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	60 250	90 250	120 250	150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(2), ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width(2), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 2.7: GSE ULTRAFLEX WHITE TEXTURED GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex White Textured may have an overall ash content greater than 3.0% due to the white layer. These values apply to the black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex White Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 2.8: GSE ULTRAFLEX LEAK LOCATION TEXTURED GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
- [(1)]GSE UltraFlex Leak Location Textured may have an overall ash content greater than 3.0% due to the conductive layer. These values apply to the non-conductive black layer only.
- [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- [(3)]Roll lengths and widths have a tolerance of ±1%.
- GSE UltraFlex Leak Location Textured is available in rolls weighing approximately 4,000 lb.
- All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
- *Modified.

TABLE 2.9: GSE ULTRAFLEX LEAK LOCATION WHITE TEXTURED GEOMEMBRANE						
Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content[(1)], % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note[(2)]	Note[(2)]	Note[(2)]	Note[(2)]
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length[(3)], ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width[(3)], ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
• [(1)]GSE UltraFlex Leak Location White Textured may have an overall ash content greater than 3.0% due to the white and conductive layers. These values apply to the non-conductive black layer only.
• [(2)]Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
• [(3)]Roll lengths and widths have a tolerance of ±1%.
• GSE UltraFlex Leak Location White Textured is available in rolls weighing approximately 4,000 lb.
• All GSE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
• *Modified.

F. Extrudate Rod or Bead
1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

1.9 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:
1. Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present.
2. An adequate number of welding apparatus shall be available to avoid delaying work.
3. Power source must be capable of providing constant voltage under combined line load.

1.10 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.
B. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.
C. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
1. Geomembranes shall be installed according to site-specific specifications, and GSE Conductive should be installed with the Conductive layer down.

Note: A spark tester or ohm meter can be used to determine Conductive layer.

2. Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
3. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
4. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
5. Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 8 psi.
6. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.

D. Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

1.11 FIELD SEAMING

A. Seams shall meet the following requirements:
1. To the maximum extent possible, orient seams parallel to the line of the slope, i.e., down and not across slope.
2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
3. Slope seams (panels) shall extend a minimum of 5-ft beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the CONSULTANT and INSTALLER.

5. Align seam overlaps consistent with the requirements of the welding equipment being used. A 6-in overlap is commonly suggested.

B. During Welding Operations

1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding

1. Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
2. Clean geomembrane surfaces by disc grinder or equivalent.
3. Purge welding apparatus of heat-degraded extrudate before welding.

D. Hot Wedge Welding

1. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.

2. Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
3. Protect against moisture build-up between sheets.

E. Trial Welds

1. Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
4. Cut four, one-inch wide by six-inch long test strips from the trial weld.
5. Quantitatively test specimens for peel adhesion, and then for shear strength.
6. Trial weld specimens shall pass when the results shown in the following tables for HDPE and LLDPE are achieved in both peel and shear test.

TABLE 1.12.6A: MINIMUM WELD VALUES FOR HDPE GEOMEMBRANES							
Property	Test Method	30	40	60	80	100	120
Peel Strength (fusion), ppi Peel Strength (extrusion), ppi	ASTM D 6392 ASTM D 6392	49 39	65 52	98 78	130 104	162 130	196 157
Shear Strength (fusion & ext.), ppi	ASTM D 6392	61	81	121	162	203	242

TABLE 1.2.6B: MINIMUM WELD VALUES FOR LLDPE GEOMEMBRANES						
Property	Test Method	30	40	60	80	100
Peel Strength (extrusion), ppi Peel Strength (fusion), ppi	ASTM D 6392 ASTM D 6392	36 38	48 50	72 75	96 100	120 125

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Shear Strength (fusion & ext.), ppi	ASTM D 6392	45	60	90	120	150

a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
b. The break is ductile.
7. Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
8. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.
F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. INSTALLER shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.
G. Defects and Repairs
1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

1.12 FIELD QUALITY ASSURANCE

A. MANUFACTURER and INSTALLER shall participate in and conform to all terms and requirements of the Owner's quality assurance program. CONTRACTOR shall be responsible for assuring this participation.
B. Quality assurance requirements are as specified in this Section and in the Field Installation Quality Assurance Manual if it is included in the contract.
C. Field Testing
1. Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.
a. Vacuum Testing
1) Shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
b. Air Pressure Testing
1) Shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
c. Spark Testing
1) Shall be performed accordance with ASTM D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test).
d. Other approved methods.
2. Destructive Testing (performed by CONSULTANT with assistance from INSTALLER)
a. Location and Frequency of Testing
1) Collect destructive test samples at a frequency of one per every 500 lineal feet of seam length.
2) Test locations will be determined after seaming.
3) Exercise Method of Attributes as described by GRI GM-14 (Geosynthetic Research Institute, http://www.geosynthetic-institute.org) to minimize test samples taken.
b. Sampling Procedures are performed as follows:

1) INSTALLER shall cut samples at locations designated by the CONSULTANT as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
2) CONSULTANT will number each sample, and the location will be noted on the installation as-built.
3) Samples shall be 12-in wide by minimal length with the seam centered lengthwise.
4) Cut a 2-in wide strip from each end of the sample for field-testing.
5) Cut the remaining sample into two parts for distribution as follows:
a) One portion for INSTALLER, 12-in by 12-in
b) One portion for the Third-Party laboratory, 12-in by 18-in
c) Additional samples may be archived if required.
6) Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method for Determiningg the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
7) INSTALLER shall repair all holes in the geomembrane resulting from destructive sampling.
8) Repair and test the continuity of the repair in accordance with these Specifications.

3. Failed Seam Procedures

a) If the seam fails, INSTALLER shall follow one of two options:
1) Reconstruct the seam between any two passed test locations.
2) Trace the weld to intermediate location at least 10-ft minimum or where the seam ends in both directions from the location of the failed test.
b) The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10-ft long.
c) If sample passes, then the seam shall be reconstructed or capped between the test sample locations.
d) If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

1.13 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.
C. INSTALLER shall be responsible for repair of defective areas.
D. Agreement upon the appropriate repair method shall be decided between CONSULTANT and INSTALLER by using one of the following repair methods:
1. Patching- Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
2. Abrading and Re-welding- Used to repair short section of a seam.
3. Spot Welding- Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
4. Capping- Used to repair long lengths of failed seams.
5. Flap Welding- Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
6. Remove the unacceptable seam and replace with new material.
E. The following procedures shall be observed when a repair method is used:
1. All geomembrane surfaces shall be clean and dry at the time of repair.

2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.

F. Repair Verification

1. Number and log each patch repair (performed by CONSULTANT).
2. Non-destructively test each repair using methods specified in this Specification.

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2 OZ GEOTEXITLE

1.1 SCOPE

This specification covers the technical requirements for the Manufacturing and Installation of the nonwoven geotextile. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
1. ASTM D 5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles
2. ASTM D 4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
3. ASTM D 4533, Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles
4. ASTM D 4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
5. ASTM D 4491, Standard Test Method for Water Permeability of Geotextiles by Permittivity
6. ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile
7. ASTM D 4354, Standard Practice for Sampling of Geosynthetics for Testing
8. ASTM D 4759, Standard Practice for Determining the Specifications Conformance of Geosynthetics

1.3 SUBMITTALS

A. Prior to material delivery to project site, the contractor shall provide the engineer with a written certification or manufacturers quality control data which displays that the geotextile meets or exceeds minimum average roll values (MARV) specified herein.
B. The contractor shall submit, if required by the engineer, manufacturer's quality control manual for the geotextile to be delivered to the site.

2. PRODUCT

2.1 GEOTEXTILE

A. The nonwoven needle-punched geotextile specified herein shall be made from staple fiber.
B. The geotextile shall be manufactured from prime quality virgin polymer.
C. The geotextile shall be able to withstand direct exposure to ultraviolet radiation from Sun for up to 30 days without any noticeable effect on index or performance properties.
D. Geotextile shall meet or exceed all material properties listed in *Table 1*.

TABLE 1: GEOTEXTILE PROPERTIES			
Property	**Test Method**	**Test Frequency**	**Value**
Mass per Unit Area, oz/yd^2	ASTM D 5261	90,000-ft^2	12
Grab Tensile Strength, lb	ASTM D 4632	90,000-ft^2	320
CBR Puncture Strength, lb	ASTM D 6241	540,000-ft^2	925
Grab Elongation, %	ASTM D 4632	90,000-ft^2	50
Trapezoidal Tear Strength, lb	ASTM D 4533	90,000-ft^2	125
UV Resistance, % retained after 500 hours	ASTM D 4355	per formulation	70

2.2 MANUFACTURE

All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number, and roll dimensions.

2.3 TRANSPORT

A. Transportation of the geotextile shall be the responsibility of the contractor.
B. During shipment, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions.
C. Upon delivery at the job site, the contractor shall ensure that the geotextile rolls are handled and stored in accordance with the manufacturer's instructions as to prevent damage.

3. EXECUTION

3.1 QUALITY ASSURANCE

A. The engineer shall examine the geotextile rolls upon delivery to the site and report any deviations from project specifications to the contractor.

3.2 INSTALLATION

A. The geotextile shall be handled in such a manner as to ensure that it is not damaged in any way. Should the contractor damage the geotextile to the extent that it is no longer usable as determined by these specifications or by the engineer, the contractor shall replace the geotextile at his own cost.

B. The geotextile shall be installed to the lines and grades as shown on the contract drawings and as described herein.

C. The geotextile shall be rolled down the slope in such a manner as to continuously keep the geotextile in tension by self-weight. The geotextile shall be securely anchored in an anchor trench where applicable, or by other approved or specified methods.

D. In the presence of wind, all geotextiles shall be weighted by sandbags or approved equivalent. Such anchors shall be installed during placement and shall remain in place until replaced with cover material.

E. The contractor shall take necessary precautions to prevent damage to adjacent or underlying materials during placement of the geotextile. Should damage to such material occur due to the fault of the contractor, the latter shall repair the damaged materials at his own cost and to the satisfaction of the engineer.

F. During placement of the geotextile, care shall be taken not to entrap soil, stones or excessive moisture that could hamper subsequent seaming of the geotextile as judged by the engineer.

G. The geotextile shall not be exposed to precipitation prior to being installed and shall not be exposed to direct sunlight for more than 15 days after installation.

H. The geotextile shall be seamed using heat seaming or stitching methods as recommended by the manufacturer and approved by the engineer. Sewn seams shall be made using polymeric thread with chemical resistance equal to or exceeding that of the geotextile. All sewn seams shall be continuous. Seams shall be oriented down slopes perpendicular to grading contours unless otherwise specified. For heat-seaming, fusion welding techniques recommended by the manufacturer shall be used.

I. The contractor shall not use heavy equipment to traffic above the geotextile without approved protection.

J. The geotextile shall be covered as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than 15 days.

K. Material overlying the geotextile shall be carefully placed to avoid wrinkling or damage to the geotextile.

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Single Sided Geocomposite

1.1 SCOPE

This specification covers the technical requirements for the manufacturing and installation of the geocomposite drainage layer. All materials meet or exceed the requirements of this specification, and all work will be performed in accordance with the procedures provided in these project specifications.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D 1238 Standard Test Method for Melt Flow Rates of Thermoplastics
2. by Extrusion Plastometer
3. D 1505-98 Standard Test Method for Density of Plastics by the Density-Gradient Technique
4. ASTM D 4218, Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle Furnace Technique D 1603-94 Standard Test Method for Carbon Black in Olefin Plastics
5. D 4355-02 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
6. D 4491-99 Standard Test Method for Water Permeability of Geotextiles by Permittivity
7. D4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
8. D 4716-00 Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
9. D 4751-99 Standard Test Method for Determining Apparent Opening Size of a Geotextile
10. D 6241 Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe D 4833-88 (1996) Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
11. D 5261-92 (1996) Standard Test Method for Measuring the Mass Per Unit Area of Geotextiles
12. D7005-03 Determining The Bond Strength (Ply-Adhesion) of Geocomposites
13. D 7179 Standard Test Method for Determining Geonet Breaking Force

B. Relevant publications from the Environmental Protection Agency (EPA):
1. Daniel, D.E. and R.M. Koerner, (1993), Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities, EPA/600/R-93/182.

1.3 DEFINITIONS

A. Construction Quality Assurance Consultant (CONSULTANT) – The Party, independent from MANUFACTURER and INSTALLER, that is responsible for observing and documenting activities related to quality assurance during the lining system construction.

B. ENGINEER - The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.

C. Geocomposite Manufacturer (MANUFACTURER) - The party responsible for

manufacturing the geocomposite rolls.

D. Geosynthetic Quality Assurance Laboratory (TESTING LABORATORY) - The Party, independent from the MANUFACTURER and INSTALLER, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the OWNER.

E. INSTALLER- Party responsible for field handling, transporting, storing and deploying the geocomposite.

F. Lot- A quantity of resin (usually the capacity of one rail car) used to manufacture polyethylene geocomposite rolls. The finished rolls will be identified by a roll number traceable to the resin lot.

1.4 QUALIFICATIONS

A. MANUFACTURER

1. Geocomposite shall be manufactured by the following:
   a. GSE Lining Technology, Inc.
   b. Approved Equal

2. MANUFACTURER shall have manufactured a minimum of 10,000,000-ft^2 of polyethylene geocomposite material during the last year.

B. INSTALLER

1. INSTALLER shall have installed a minimum of 500,000 square feet of geocomposite in the last 3 years.
2. INSTALLER shall have worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents, and within at least 50,000 square feet of geonet installation on each project.
3. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents.

1.5 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling- Each roll delivered to the site shall be wrapped and labeled by the MANUFACTURER. The label will identify:

1. Manufacturer's name
2. Product identification
3. Length
4. Width
5. Roll number

B. Delivery- Rolls will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

C. Storage- The on-site storage location provided by the CONTRACTOR to protect the geonet from abrasions, excessive dirt and moisture, shall have the following characteristics:

1. Level (no wooden pallets)
2. Smooth
3. Dry
4. Protected from theft and vandalism

5. Adjacent to the area being lined

D. Handling
   1. The CONTRACTOR and INSTALLER shall handle all rolls in such a manner to ensure they are not damaged in any way.
   2. The INSTALLER shall take any necessary precautions to prevent damage to underlying layers during placement of the drainage material.

1.6 WARRANTY

A. Material shall be warranted, on a pro-rata basis against defects for a period of 1-year from the date of the geocomposite installation.
B. Installation shall be warranted against defects in workmanship for a period of 1-year from the date of geocomposite completion.

2. PRODUCTS

2.1 GEOCOMPOSITE PROPERTIES

A. A geocomposite shall be manufactured by extruding two crossing strands to form a bi-planar drainage net structure with a non-woven geotextile bonded to one or both sides.
B. The geocomposite specified shall have properties that meet or exceed the values listed in the following data sheets below.

TABLE 1: GEOCOMPOSITE PROPERTIES			
Property	**Test Method**	**Frequency**	**Value**
Geocomposite			
Transmissivity (1), gal/min/ft (m2/sec) Single-Sided Composite	ASTM D 4716	1/540,000-ft^2	6.2 (1.3 x 10-3)
Ply Adhesion, lb/in	ASTM D 7005	1/50,000-ft^2	0.5
Geonet			
Geonet Core Thickness, mil (1)	ASTM D 5199	1/50,000-ft^2	270
Transmissivity (2), gal/min/ft (m2/sec)	ASTM D 4716	1/540,000-ft^2	19 (4 x 10-3)
Compressive Strength, lbs/ft	ASTM D 6364	1/540,000-ft^2	40,000
Density, g/cm3	ASTM D 1505	1/50,000-ft^2	0.94
Tensile Strength (MD), lb/in	ASTM D 7179	1/50,000-ft^2	100
Carbon Black Content, %	ASTM D 4218	1/50,000-ft^2	2.0
8 oz. Geotextile (prior to lamination)			
Mass per Unit Area, oz/yd2	ASTM D 5261	1/90,000-ft^2	8
Grab Tensile Strength, lb	ASTM D 4632	1/90,000-ft^2	220
Grab Elongation	ASTM D 4632	1/90,000-ft^2	50%
CBR Puncture Strength, lb	ASTM D 6241	1/540,000-ft^2	575
Trapezoidal Tear Strength, lb	ASTM D 4533	1/90,000-ft^2	90
AOS, US Sieve (mm)	ASTM D 4751	1/540,000-ft^2	80 (0.180)
Permittivity, sec-1	ASTM D 4491	1/540,000-ft^2	1.3
Water Flow Rate, gpm/ft2	ASTM D 4491	1/540,000-ft^2	95
UV Resistance, % Retained	ASTM D 4355 (after 500 hours)	per formulation	70

Note: The design engineer shall prepare the table above based on the GSE product data sheet and then delete this note

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C. Resin

1. Resin shall be new first quality, compounded polyethylene resin.
2. Natural resin (without carbon black) shall meet the following additional minimum requirements:

TABLE 2: RAW MATERIAL PROPERTIES		
Property	**Test Method[(1)]**	**Value**
Density (g/cm^3)	ASTM D 1505	>0.94
Melt Flow Index (g/10 min)	ASTM D 1238	$\leq$ 1.0

[1]GSE utilizes test equipment and procedures that enable effective and economical confirmation that the product will conform to specifications based on the noted procedures. Some test procedures have been modified for application to geosynthetics. All procedures and values are subject to change without prior notification.

2.2 MANUFACTURING QUALITY CONTROL

The geocomposite shall be manufactured in accordance with the Manufacturer's Quality Control Plan submitted to and approved by the ENGINEER.
The geocomposite shall be tested according to the test methods and frequencies listed on *Table 1* which has been prepared based on product data sheets.

3. EXECUTION

3.1 FAMILIARIZATION

A. Inspection

1. Prior to implementing any of the work in the Section to be lined, the INSTALLER shall carefully inspect the installed work of all other Sections and verify that all Work is complete to the point where the installation of the Section may properly commence without adverse impact.
2. If the INSTALLER has any concerns regarding the installed work of other Sections, he shall notify the Project ENGINEER.

3.2 MATERIAL PLACEMENT

A. The geocomposite roll should be installed in the direction of the slope and in the intended direction of flow unless otherwise specified by the ENGINEER.
B. If the project contains long, steep slopes, special care should be taken so that only full length rolls are used at the top of the slope.

C. In the presence of wind, all geocomposites shall be weighted down with sandbags or the equivalent. Such sandbags shall be used during placement and remain until replaced with cover material.

D. If the project includes an anchor trench at the top of the slopes, the geocomposite shall be properly anchored to resist sliding. Anchor trench compacting equipment shall not come into direct contact with the geocomposite.
E. In applying fill material, no equipment can drive directly across the geocomposite. The specified fill material shall be placed and spread utilizing vehicles with a low ground pressure.
F. The cover soil shall be placed in the geocomposite in a manner that prevents damage to the geocomposite. Placement of the cover soil shall proceed immediately following the placement and inspection of the geocomposite.

3.3 SEAMS AND OVERLAPS

A. Each component of the geocomposite will be secured or seamed to the like component at overlaps.
B. Geonet Components
1. Adjacent edges of the geonet along the length of the geocomposite roll shall be placed with the edges of each geonet butted against each other.
2. The overlaps shall be joined by tying the geonet structure with cable ties. These ties shall be spaced every 5-ft along the roll length.
3. Adjoining geocomposite rolls (end to end) across the roll width should be shingled down in the direction of the slope, with the geonet portion of the top overlapping the geonet portion of the bottom geocomposite a minimum of 12-in across the roll width.
4. The geonet portion should be tied every 6-in in the anchor trench or as specified by the ENGINEER.

3.4 REPAIR

A. Prior to covering the deployed geocomposite, each roll shall be inspected for damage resulting from construction.
B. Any rips, tears or damaged areas on the deployed geocomposite shall be removed and patched. The patch shall be secured to the original geonet by tying every 6-in with the approved tying devices. If the area to be repaired is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be cut out and the two portions of the geonet shall be joined in accordance with *Subsection 3.03*.

APPENDIX E

OPERATING AND MAINTENANCE PLAN

Oilfield Water Logistics (OWL) is proposing to construct two (2) storage pits in the E/2 NE/4 of Section 18, Township 26 South, Range 35 East, Lea County, New Mexico. The Javelina Facility North shall consist of one basin with a total operational volume of approximately 246,000-bbl as well as an AST with a volume of approximately 48,000-bbl, and the Javelina Facility South shall consist of one basin with a total operation volume of approximately 512,000-bbl.

OPERATION AND MAINTENANCE PROCEDURES

In this plan, underlined text represents the language of the Rule.

The operator will operate and maintain the lined earthen containments and the AST to contain liquids and solids (blow sand and minimal precipitates from the treated produced water) and maintain the integrity of the liner system in a manner that prevents contamination of fresh water and protects public health and the environment as described below. The purpose of the lined earthen containment and AST is to facilitate recycling, reuse, and reclamation of produced water derived from nearby oil and gas wells. During periods when water for E&P operations is not needed, produced water will discharge to one of the injection wells in the operator's SWD system. The containment will not be used for the disposal of produced water or other oilfield waste.

The operation of the Recycling Containment is summarized below:

1. Via pipeline, produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
2. After treatment, the produced water discharges into the containment.
3. When required, treated produced water is removed from the containment for E&P operations. At this time, treated produced water will be used for drilling beneath the fresh water zones (beneath surface casing), for well stimulation (e.g. hydraulic fracturing) and other E&P uses as approved by OCD.
4. Whenever the maximum fluid capacity of the containment is reached, treatment and discharge to the containment ceases (see Freeboard and Overtopping Plan, below).
5. The operator will keep accurate records and shall report monthly to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.
6. The operator will maintain accurate records that identify the sources and disposition of all recycled water that shall be made available for review by the division upon request.
7. The containment shall be deemed to have ceased operations if less than 20 % of the total fluid capacity is used every six months following the first withdrawal of produced water for use. The operator will report cessation of operations to the appropriate division district office. The appropriate division district office may grant an extension to this determination of cessation of operations not to exceed six months.

The operation of the lined earthen containment and AST will follow the mandates listed below:

1. The operator will not discharge into or store any hazardous waste (as defined by 40 CFR 261 and NMAC 19.15.2.7.H.3) in the containments.

2. If the containment's primary liner is compromised above the fluid's surface, the operator will repair the damage or initiate replacement of the primary liner within 48 hours of discovery or seek an extension of time from the Division District office.
3. If the primary liner is compromised below the fluid's surface, the operator will remove all fluid above the damage or leak within 48 hours of discover, notify the division district office, and repair the damage or replace the primary liner.
4. If any penetration of the containment liner is confirmed by sampling of fluid in the leak detection system (see Inspection and Monitoring Plan), the operator will:
   a. Begin and maintain fluid removal from the leak detection/pump-back system,
   b. Notify the District office within 48 hours (phone or email) of the discovery,
   c. Identify the location of the leak, and
   d. Repair the damage or, if necessary, replace the containment liner.
5. The operator will install, or maintain onsite, an oil absorbent boom or other device to contain an unanticipated release and the operator will remove any visible layer of oil from the surface of the recycling containment.
6. The operator will report releases of fluid in a manner consistent with NMAC 19.15.29.
7. The containment will be operated to prevent the collection of surface water run-on.
8. The operator will maintain the containment free of miscellaneous solid waste or debris.
9. The operator will maintain at least 3-ft of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-ft of freeboard.
10. As described in the design/construction plan, the injection or withdrawal of fluids from the containment is accomplished through hardware that prevents damage to the liner by erosion, fluid jets, or impact from installation and removal of hoses or pipes.
11. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
12. The operator will maintain the fences in good repair.

MONITORING, INSPECTION, AND REPORTING PLAN

The operator will inspect the recycling containment and associated leak detection systems weekly while it contains fluids. The operator shall maintain a current log of such inspections and make the log available for review by the division upon request.

Weekly inspections consist of:

1. Reading and recording the fluid height of staff gauges,
2. Recording any evidence that the pond surface shows visible oil,
3. Visually inspecting the containment's exposed liners, and
4. Checking the leak detection system for any evidence of a loss of integrity of the primary liner.

As stated above, if a liner's integrity is compromised, or if any penetration of the liner occurs above the water surface, then the operator will notify the District office within 48 hours (phone or email).

Monthly, the operator will:

1. Inspect diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.

2. Inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.
3. Inspect the containment for dead migratory birds and other wildlife. Within 30 days of discovery, report the discovery of dead migratory birds or other wildlife to the appropriate wildlife agency and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.
4. Report to the division the total volume of water received for recycling, with the amount of fresh water received listed separately, and the total volume of water leaving the facility for disposition by use on form C-148.
5. Record sources and disposition of all recycled water.

The operator will maintain a log of all inspections and make the log available for the appropriate Division District office's review upon request. An example of the log is attached to this section of the permit application.

FREEBOARD AND OVERTOPPING PREVENTION PLAN

The method of operation of the containment allows for maintaining freeboard with very few potential problems. When the capacity of the containment is reached (3-ft of freeboard), the discharge of treated produced water ceases and the produced water generated by nearby oil and gas wells is managed by one of the injection wells as identified in *Appendix G*.

If rising water levels suggest that 3-ft of freeboard will not be maintained, the operator will implement one or more of the following options:

1. Cease discharging treated produced water to the containment.
2. Accelerate re-use of the treated produced water for purposes approved by the Division.
3. Transfer treated produced water from the containment to injection wells.

The reading of the staff gauge typically occurs daily when treatment operations are ongoing and weekly when discharge to the containment is not occurring.

PROTOCOL FOR LEAK DETECTION MONITORING, FLUID REMOVAL, AND REPORTING

As shown in *Appendix C*, the leak detection system includes a monitoring system. Any fluid released from the primary liner will flow to the collection sump, where fluid level monitoring is possible at the monitoring riser pipe associated with the leak detection system.

Staff may employ a portable electronic water level meter to determine if fluid exists in the monitoring riser pipe. Obtaining accurate readings of water levels in a sloped pipe beneath a containment can be a challenge. An electrician's wire snake may be required to push the probe to the bottom of the port and the probe may be fixed in a 2-in pipe "dry housing" to avoid false readings due to water condensation on the pipe. There are many techniques to determine the existence of water in the sumps, including low-flow pumps and a simple small bailer affixed to an electrician's snake. The operator will use the method that works best for this containment.

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If seepage from the containment into the leak detection system is suspected by a positive fluid level measurement, the operator will:

1. Re-measure fluid levels in the monitoring riser pipe on a daily basis for one week to determine the rate of seepage.
2. Collect a water sample from the monitoring riser pipe to confirm the seepage is treated produced water from the containment via field conductivity and chloride measurements.
3. Notify NMOCD of a confirmed positive detection in the system within 48 hours of sampling (initial notification).
4. Install a pump into the monitoring riser pipe sump to continually (manually on a daily basis or via automatic timers) remove fluids from the leak detection system into the containment until the liner is repaired or replaced.
5. Dispatch a liner professional to inspect the portion of the containment suspected of leakage during a “low water” monitoring event.
6. Provide NMOCD a second report describing the inspection and/or repair within 20 days of the initial notification.

If the point of release is obvious from a low water inspection, the liner professional will repair the loss of integrity. If the point of release cannot be determined by the inspection, the liner professional will develop a more robust plan to identify the point(s) of release. The inspection plan and schedule will be submitted to OCD with the second report. The operator will implement the plan upon OCD approval.

APPENDIX F
CLOSURE PLAN

Oilfield Water Logistics (OWL) is proposing to construct two (2) storage pits in the E/2 NE/4 of Section 18, Township 26 South, Range 35 East, Lea County, New Mexico. The Javelina Facility North shall consist of one basin with a total operational volume of approximately 246,000-bbl as well as an AST with a volume of approximately 48,000-bbl, and the Javelina Facility South shall consist of one basin with a total operation volume of approximately 512,000-bbl.

CLOSURE PLAN

In this plan, underlined text represents the language of the Rule.

After operations cease, the operator will remove all fluids within 60 days and close the containment within six months from the date the operator ceases operations from the containment for use.

The operator shall substantially restore the impacted surface area to

1. The condition that existed prior to the construction of the recycling containment or
2. To a condition imposed by federal, state trust land, or tribal agencies on lands managed by those agencies as these provisions govern the obligations of any operator subject to those provisions.

EXCAVATION AND REMOVAL CLOSURE PLAN - PROTOCOLS AND PROCEDURES

The workover pit is expected to contain a small volume of solids, the majority of which will be windblown sand and dust with some mineral precipitates from the water.

The operator will remove all liquids from the pits and either:

a. Dispose of the liquids in a division-approved facility, or
b. Recycle, reuse, or reclaim the water for reuse in drilling and stimulation

The operator will close the recycling containment by first removing all fluids, contents, and synthetic liners and transferring these materials to a Division approved facility.

After the removal of the pit contents and liners, soils beneath the workover pit will be tested by collection of a five-point (minimum) composite sample, which includes stained or wet soils, if any. That sample shall be analyzed for the constituents listed in *Table 1* of *19.15.34.14*.

After review of the laboratory results:

a. If any contaminant concentration is higher than the parameters listed in *Table 1*, additional delineation may be required, and the operator must receive approval before proceeding with closure.

b. If all contaminant concentrations are less than or equal to the parameters listed in *Table 1*, then the operator will proceed to:
    i. Backfill with non-waste containing, uncontaminated earthen material or
    ii. Undertake an alternative closure process pursuant to a variance request after approval by OCD.

The operator will reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area.

Topsoils and subsoils shall be replaced to their original relative positions and contoured so as to achieve erosion control, long-term stability, and preservation of surface water flow patterns.

The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment.

CLOSURE DOCUMENTATION

Within 60 days of closure completion, the operator shall submit a closure report on Form C-147, including required attachments, to document all closure activities including sampling results and the details on any backfilling, capping or covering, where applicable. The closure report shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in division rules or directives.

The operator shall notify the division when reclamation and re-vegetation are complete. Specifically, the notice will document that all ground surface disturbing activities at the site have been completed, and a uniform vegetative cover has been established that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.

Oilfield Water Logistics
Javelina Facility Pits
Closure Cost Estimate

	Item	Units	Quanity	$/Unit	Estimate Cost
	Facility Closure				
1	Fluid removal				
	Javelina Facility North Pit (346,000 bbls)	bbls	346,000	$ 1.20	$ 415,200.00
	Javelina Facility South (512,000 bbls)	bbls	512,000	$ 1.20	$ 614,400.00
	Javelina Facility AST	bbls	48,000	$ 1.20	$ 57,600.00
2	Vac truck (final fluid removal)	hrs	8	$ 105.00	$ 840.00
3	Liner removal (fold-in-place)				
	(Rostabout crews - 18 hrs)	hrs	18	$ 150.00	$ 2,700.00
	(Track hoe - 18 hrs)	hrs	18	$ 150.00	$ 2,700.00
4	Equipment removal				
	Tank clean-out and residue haul-off	ea	5	$ 1,000.00	$ 5,000.00
	Equipment removal (tanks, gun barrel, FWKO)	ea	5	$ 800.00	$ 4,000.00
	Electrical decomissioning (pumps and panels)	ea	8	$ 100.00	$ 800.00
	Misc equipment clean-up and removal	hr	40	$ 125.00	$ 5,000.00
5	Site Restoration				
	Dozier - push in berms (bid)	ea	1	$ 38,000.00	$ 38,000.00
	and final grading of the site				
	Re-vegetation	ea	1	$ 4,800.00	$ 4,800.00
	Plug and Abandon Monitoring Wells	ea	3	$ 1,000.00	$ 3,000.00
	Estimated Total				**$ 1,154,040.00**