

**2RF – 149**

**Eddy State Water  
Treatment  
and Reuse Facility  
Application  
Volume 1**

**Solaris Water  
Midstream LLC  
November 2, 2020**



9811 Katy Freeway • Suite 700 • Houston, Texas 77024

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November 2, 2020

Mr. Mike Bratcher  
NMOCD District II  
811 S. First St.  
Artesia, NM 88210  
Via E-Mail

Ms. Victoria Venegas  
NMOCD District II  
811 S. First St.  
Artesia, NM 88210  
Via E-Mail

RE: Solaris Water Midstream, Eddy State Recycling Facility and Containments  
Section 02 T26S R29E, Registration per Rule 34

Dear Mr. Bratcher and Ms. Venegas:

Solaris Water Midstream is pleased to provide the NMOCD with the attached C-147 Registration. Rule 34 requires no variances for this facility as now planned. Specifically,

- No AST Containments are proposed in this registration.
- The 40-mil HDPE secondary liner is “equivalent with a hydraulic conductivity no greater than 1x 10<sup>-9</sup> cm/sec” and meets or exceeds the “EPA SW-846 method 9090A or subsequent relevant publications” and is therefore consistent with the criteria of Rule 34.
- Solaris has installed a game fence which meets or exceeds the requirements of the Rule 34.
- The Mega Blaster Pro Sonic Bird Repeller “is otherwise protective of wildlife, including migratory birds” and is therefore consistent with the criteria of Rule 34.
- The registration package prepared by Mr. Randall Hicks on October 30<sup>th</sup>, 2020, which is included with this Letter, affirms that the location meets all siting criteria in Rule 34 and the Eddy State location meets the specified setback criteria.
- The Design/Construction Plan, Operation and Maintenance Plan and Closure Plan are consistent with Rule 34.
- The requisite reclamation bond for the Eddy State Containments, a copy of which is included, has been delivered to Mr. Sanchez and the NMOCD on the OCD Form.

Sincerely,

Drew Dixon  
Vice President Land, Permitting & Regulatory

October 2020

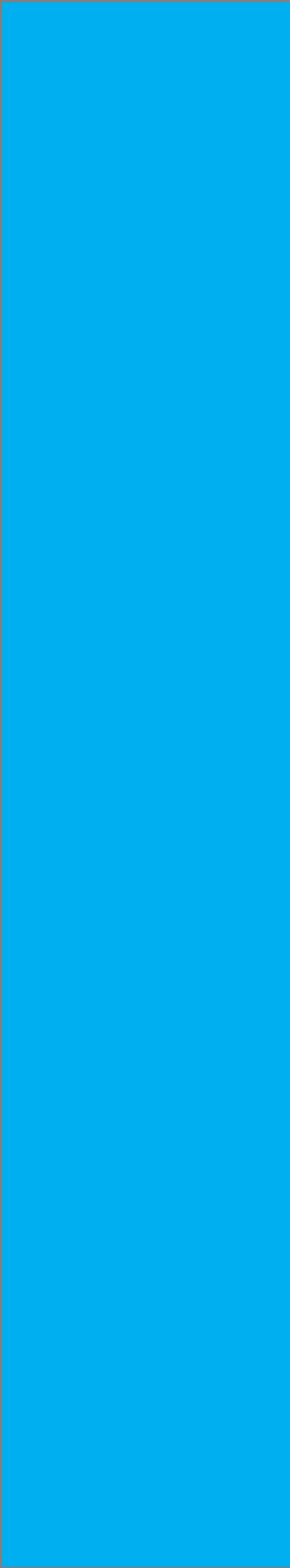
**C-147 REGISTRATION PACKAGE FOR EDDY STATE  
CONTAINMENTS AND RECYCLING FACILITY  
Section 2, T26S, R29E, Eddy County**



*Fold in an outcrop of the Gatuna Formation near the Pecos River. This outcrop is approximately 2.64 miles east of the site for the Eddy State Recycling Facility.*

**Prepared for:  
Solaris Midstream LLC  
9811 Katy Freeway Suite 900  
Houston, TX 77024**

**Prepared by:  
R.T. Hicks Consultants, Ltd.  
901 Rio Grande NW F-142  
Albuquerque, New Mexico**



**C-147**

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:**  Recycling Facility  Recycling Containment\*  
**Type of action:**  Permit  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: Solaris Water Midstream, LLC OGRID #: 371643  
Address: 811 Katy Freeway, Suite 700 Houston, Texas 77024  
Facility or well name (include API# if associated with a well): Eddy State Water Treatment and Reuse Facility  
OCD Permit Number: \_\_\_\_\_ (For new facilities the permit number will be assigned by the district office)  
U/L or Qtr/Qtr K Section 2 Township 26S Range 29E County: Eddy  
Surface Owner:  Federal  State  Private  Tribal Trust or Indian Allotment

2.  
 **Recycling Facility:**  
Location of (if applicable): Latitude \_\_\_\_\_ Longitude \_\_\_\_\_  
Proposed Use:  Drilling\*  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.  
 Fluid Storage  
 Above ground tanks  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.  
 **Recycling Containment:** Two (2) in-ground containments  
 Annual Extension after initial 5 years (attach summary of monthly leak detection inspections for previous year)  
Center of Recycling Containment (if applicable) Pond Lat 32.071540 Long -103.958919 (approx.) NAD 83  
 For multiple or additional recycling containments, attach design and location information of each containment  
 Lined  Liner type: Thickness Secondary 40 mil Primary 60- mil  LLDPE  HDPE  PVC  Other \_\_\_\_\_  
 String-Reinforced  
Liner Seams:  Welded  Factory  Other Volume: 1,150,000 BBL Ponds Dimensions See Attachment ..1  
 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 \$\_\_See Transmittal Letter\_\_ (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: Game fence to protect terrestrial wildlife

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.

**Variations:**

*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 **FIGURES 1-2**

- 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 **FIGURE 3**

- Yes  No
- NA

Within the area overlying a subsurface mine.

- Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division **FIGURE 4**

- Yes  No

Within an unstable area.

- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map **FIGURE 5**

- Yes  No

Within a 100-year floodplain. FEMA map **FIGURE 6**

- 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 **FIGURE 7**

- 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 **FIGURE 8**

- 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. **FIGURES 1 and 7**

- NM Office of the State Engineer - iWATERS database search; visual inspection (certification) of the proposed site

- Yes  No

Within 500 feet of a wetland. **FIGURE 9**

- 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.*

- Design Plan - based upon the appropriate requirements.
- Operating and Maintenance Plan - based upon the appropriate requirements.
- Closure Plan - based upon the appropriate requirements.
- Site Specific Groundwater Data -
- 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.

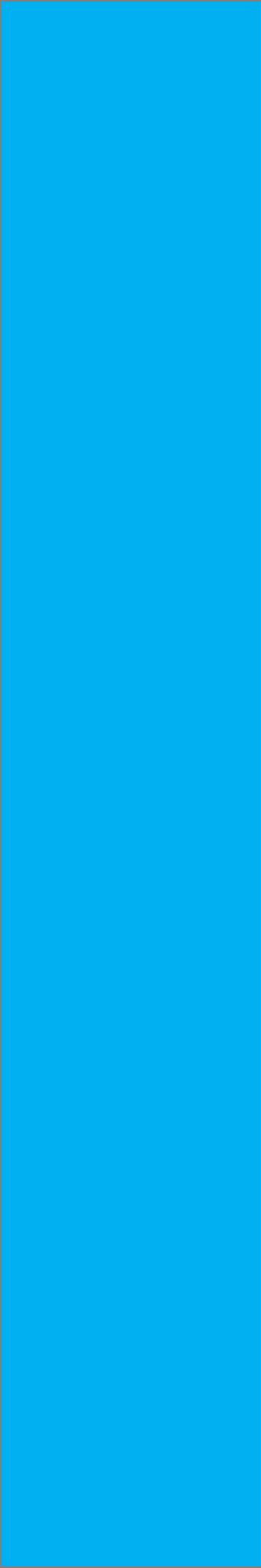
Name (Print): Bradley Todd Carpenter \_\_\_\_\_ Title: Operations Manager \_\_\_\_\_  
 Signature: Bradley Todd Carpenter \_\_\_\_\_ Date: October 30, 2020 \_\_\_\_\_  
 e-mail address: Todd Carpenter <todd.carpenter@solarismidstream.com> \_\_\_\_\_ Telephone: 432 203 9020 \_\_\_\_\_

11.

OCD Representative Signature: \_\_\_\_\_ Approval Date: \_\_\_\_\_

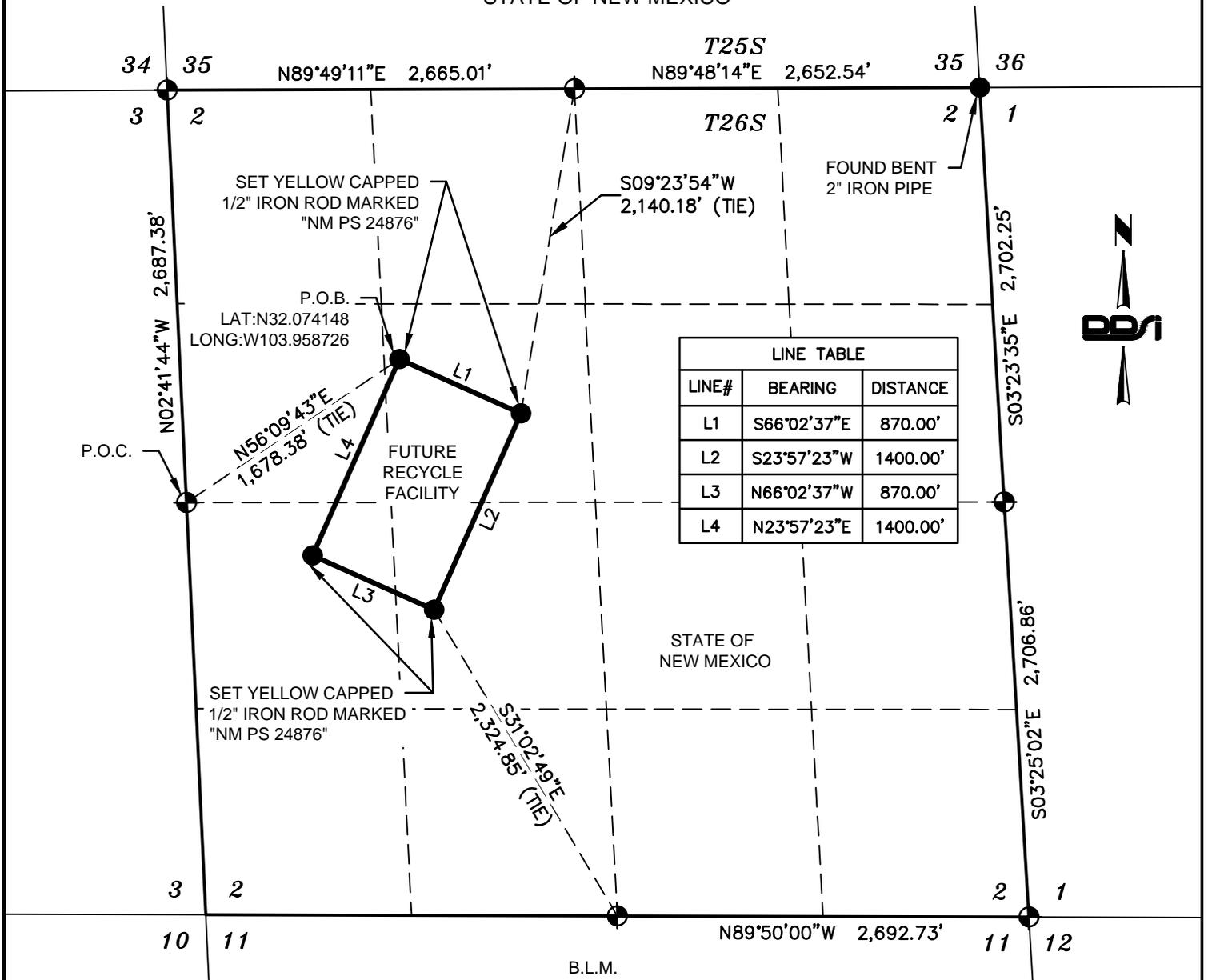
Title: \_\_\_\_\_ OCD Permit Number: \_\_\_\_\_

- OCD Conditions \_\_\_\_\_
- Additional OCD Conditions on Attachment \_\_\_\_\_



**SURVEY FOR CONTAINMENT AND  
RECYCLING FACILITY**

**EXHIBIT A**  
SECTION 2, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.  
EDDY COUNTY, NEW MEXICO  
STATE OF NEW MEXICO



LINE TABLE		
LINE#	BEARING	DISTANCE
L1	S66°02'37\"E	870.00'
L2	S23°57'23\"W	1400.00'
L3	N66°02'37\"W	870.00'
L4	N23°57'23\"E	1400.00'

**A METES AND BOUNDS DESCRIPTION OF A PROPOSED LEASE AREA**

BEING A 27.96 ACRE TRACT OF LAND SITUATED IN SECTION 2, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M., IN EDDY COUNTY, NEW MEXICO, SAID LEASE AREA BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 2, BEING A FOUND BRASS CAP STAMPED "U.S. GENERAL LAND OFFICE SURVEY", THENCE NORTH 56°09'43" EAST, 1,678.38 FEET TO THE POINT OF BEGINNING BEING A SET YELLOW CAPPED 1/2" IRON ROD MARKED "NM PS 24876"; THENCE SOUTH 66°02'37" EAST, 870.00 FEET TO A SET YELLOW CAPPED 1/2" IRON ROD MARKED "NM PS 24876", AND BEING SOUTH 09°23'54" WEST, 2,140.18 FEET OF A FOUND BRASS CAP STAMPED "U.S. GENERAL LAND OFFICE SURVEY", SAID MONUMENT BEING THE NORTH QUARTER CORNER OF SAID SECTION 2; THENCE SOUTH 23°57'23" WEST, 1,400.00 FEET TO A SET YELLOW CAPPED 1/2" IRON ROD MARKED "NM PS 24876"; THENCE NORTH 66°02'37" WEST, 870.00 FEET TO A SET YELLOW CAPPED 1/2" IRON ROD MARKED "NM PS 24876"; THENCE NORTH 23°57'23" EAST, 1,400.00 FEET TO THE POINT OF BEGINNING, AND CONTAINING 27.96 ACRES (1,218,000 SQUARE FEET) OF LAND.

BASIS OF BEARING: BEARINGS SHOWN HEREON ARE BASED UPON THE NORTH AMERICAN DATUM OF 1983, NEW MEXICO EAST STATE PLANE ZONE 3001, US SURVEY FEET. ALL DISTANCES ARE GRID. COORDINATES SHOWN ARE IN N.A.D. 1983.

**SECTION 2**

SW/4 NW/4 3.02 ACRES  
SE/4 NW/4 13.52 ACRES  
NE/4 SW/4 6.41 ACRES  
NW/4 SW/4 5.01 ACRES

**NOTES:**

- RESEARCH HAS BEEN PROVIDED BY OTHERS.
- THIS PLAT IS FOR EASEMENT PURPOSES ONLY.
- EASEMENTS, SETBACKS, AND OTHER ENCUMBRANCES ARE NOT SHOWN BY AGREEMENT WITH CLIENT.
- P.O.C. = POINT OF COMMENCEMENT
- P.O.B. = POINT OF BEGINNING
- P.O.T. = POINT OF TERMINATION
- MODIFICATION IN ANY WAY OF THE FOREGOING DESCRIPTION TERMINATES LIABILITY OF SURVEYOR.

**SURVEYOR'S CERTIFICATE**

I, CHRIS E. CARLSON, NEW MEXICO PROFESSIONAL SURVEYOR NO. 24876, DO HEREBY CERTIFY THAT THIS EASEMENT SURVEY PLAT AND THE ACTUAL SURVEY ON THE GROUND UPON WHICH IT IS BASED WERE PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION; THAT I AM RESPONSIBLE FOR THIS SURVEY; THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO; AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I FURTHER CERTIFY THAT THIS SURVEY IS NOT A LAND DIVISION OR SUBDIVISION IN THE NEW MEXICO SUBDIVISION ACT AND THAT THIS INSTRUMENT IS AN EASEMENT SURVEY PLAT ACROSS EXISTING TRACT OR TRACTS.

*Chris Carlson*

DATE OF SIGNATURE: 08/25/2020  
CHRIS E. CARLSON N.M.P.S. NO. 24876

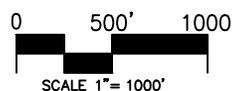


**LEGEND:**

- = DENOTES LEASE AREA
- = DENOTES PIPELINE
- = DENOTES FOUND OR SET CORNER AS NOTED
- = DENOTES FOUND 2 INCH BRASS CAP MONUMENT STAMPED "U.S. GENERAL LAND OFFICE SURVEY"

**EASEMENT TABLE**

SURFACE SITE LEASE	1,218,000 SQ. FT.	27.96 ACRES
--------------------	-------------------	-------------



DOWNTOWN DESIGN SERVICES, INC.  
16 E. 16TH ST. SUITE 400  
TULSA, OK 74119  
Tel: 918-592-3374 Fax: 918-221-3940  
www.ddsiglobal.com

**SOLARIS WATER MIDSTREAM, LLC.**

EDDY STATE RECYCLE FACILITY  
LOCATION OF A PROPOSED LEASE AREA IN  
SECTION 2, TOWNSHIP 26 SOUTH, RANGE 29 EAST, N.M.P.M.,  
EDDY COUNTY, NEW MEXICO

FIELD DATE:	04/06/2020	SURFACE SITE
DRAFTING DATE:	05/01/2020	PAGE 1 OF 1

NO.	REVISION DESCRIPTION	DATE	BY
1	ADD 1/16 BREAKDOWN	5/1/20	CC
2	SITE MOVED SOUTH	7/7/20	MM
3	REDUCE SIZE, RELOCATE	8/25/20	CC

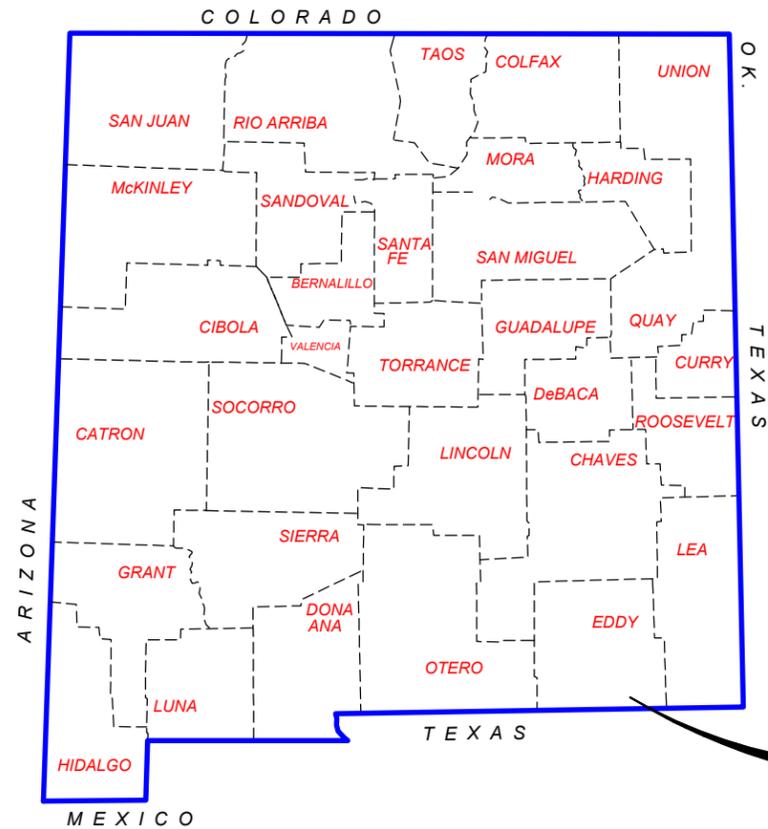
JOB No. 2020-099 APPROVED BY: CEC DRAWN BY: DMB TRACT: ESRF-1

RECYCLING CONTAINMENT DESIGN DRAWINGS

40-MIL HDPE SPECIFICATIONS

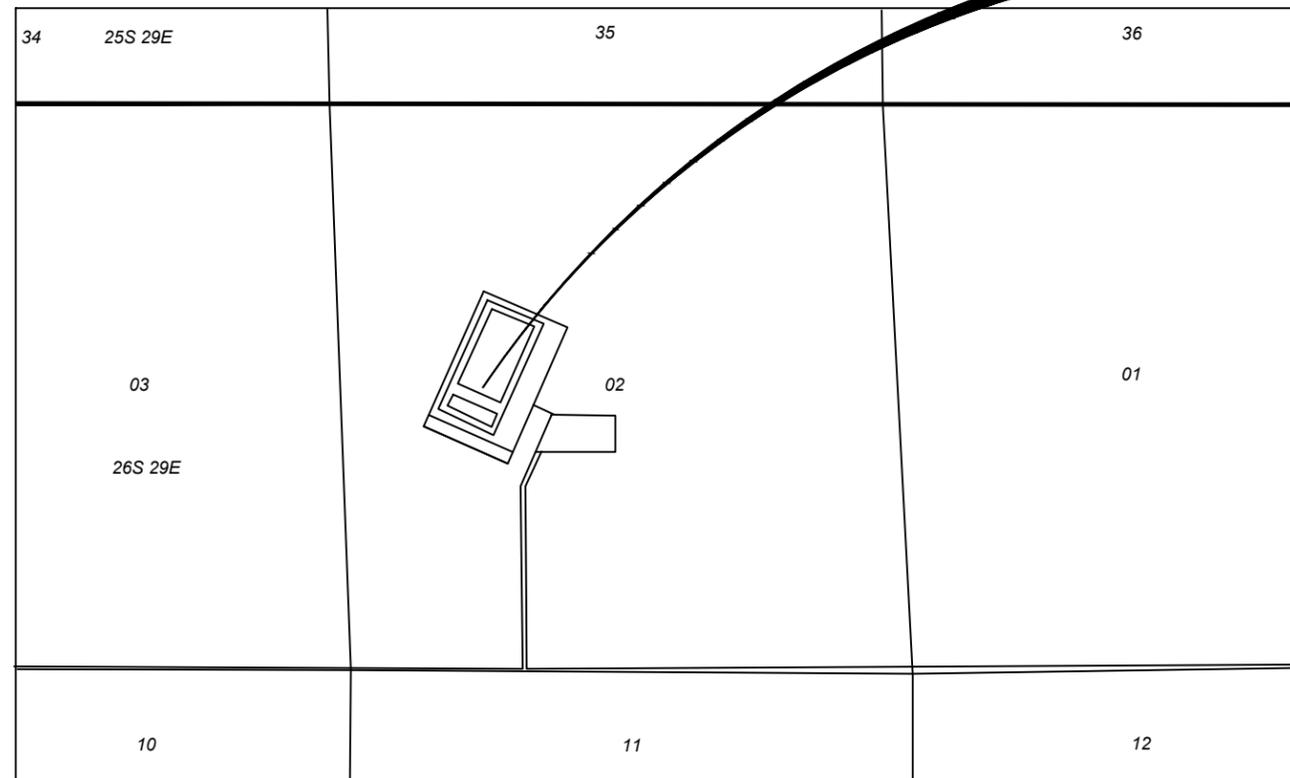
EQUIVALENCY DEMONSTRATION OF 40-MIL HDPE

AVIAN SPECIES HAZING EQUIPMENT



# SOLARIS WATER MIDSTREAM, LLC EDDY STATE PRODUCED WATER TREATMENT AND REUSE FACILITY S02, T26S, R29E EDDY COUNTY, NM

SOLARIS  
EDDY STATE



INDEX OF SHEETS

- 1COVER - COVER SHEET
- 1HL01 - SITE PLAN
- 1HL02 - LINER AND FENCE PLAN
- 1HL03 - SUMMARY OF QUANTITIES AND GENERAL NOTES
- 3GP01 - GRADING PLAN
- 3GP02 - CROSS SECTIONS
- 3GP03 - LEAK DETECTION SYSTEM DETAILS
- 3GP04 - MISCELLANEOUS DETAILS
- 3GP05 - LEVEE AND PAD DETAILS
- 3GP06 - FENCE DETAILS
- 3GP07 - ESCAPE LADDER GAGE DETAILS

**FINAL PLANS  
REVISION 2**



*[Signature]*  
08/28/2020



Magrym Consulting, Inc.  
110 W. Louisiana Ave. Ste 314  
Midland, TX 79701  
(432) 999-2737  
www.magrym.com

REV	DESCRIPTION	DATE	BY
REV2	REVISED SITE LOCATION	8/28/20	CSC
REV1	REVISED SITE LOCATION	8/21/20	CSC
IFC	ISSUED FOR CONSTRUCTION	8/11/20	CSC
R-X	REVISIONS (OR CHANGE NOTICES)		

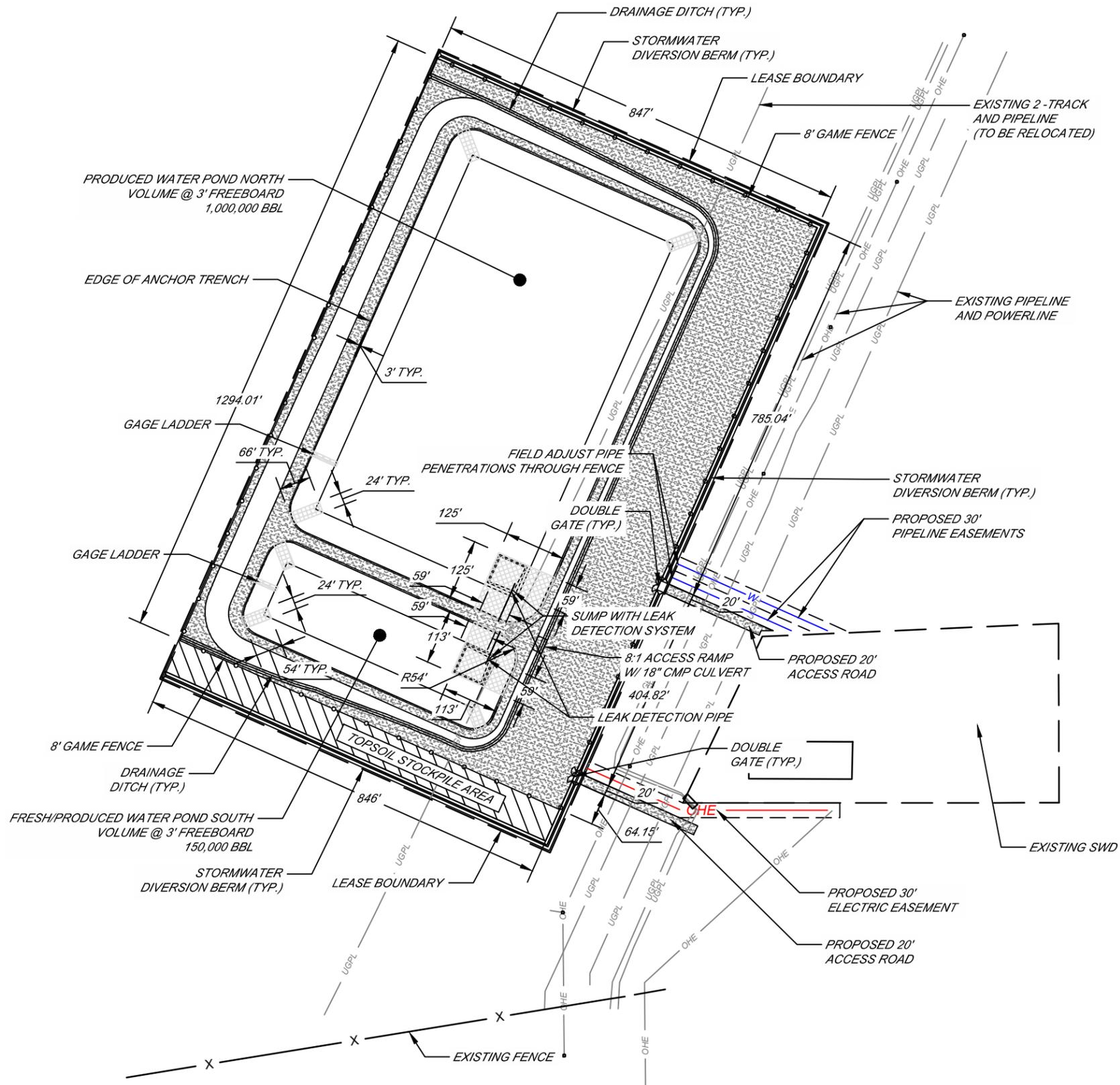


Solaris Water Midstream, LLC  
907 Tradewinds Boulevard  
Midland, TX 79701  
432-203-9020  
www.solarismidstream.com

**EDDY STATE WATER TREATMENT AND REUSE FACILITY**  
S02, T26S, R29E  
EDDY COUNTY, NM  
SOLARIS WATER MIDSTREAM, LLC.

**COVER SHEET**

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 8/29/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: COVER	SHEET: 1COVER

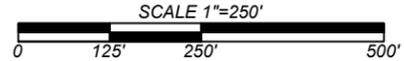


**LEGEND**

PROPOSED 8' GAME FENCE	—○—○—
EXISTING UNDERGROUND PIPELINE	—UGPL—
EXISTING OVERHEAD ELECTRIC	—OHE—
EXISTING FENCE	—x—
PROPOSED WATERLINE	—W—W—
PROPOSED OVERHEAD ELECTRIC	—OHE—
PROPOSED EASEMENT	—
LEASE BOUNDARY	—
PROPOSED DRIVING SURFACE	—
PROPOSED RUB SHEET	—
EDGE OF ANCHOR TRENCH	—
EXISTING POWERPOLE	—

NOTE:  
COORDINATES IN STATE PLANE NM83-EF

**FINAL PLANS  
REVISION 2**



Magrym Consulting, Inc.  
110 W. Louisiana Ave. Ste 314  
Midland, TX 79701  
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www.magrym.com

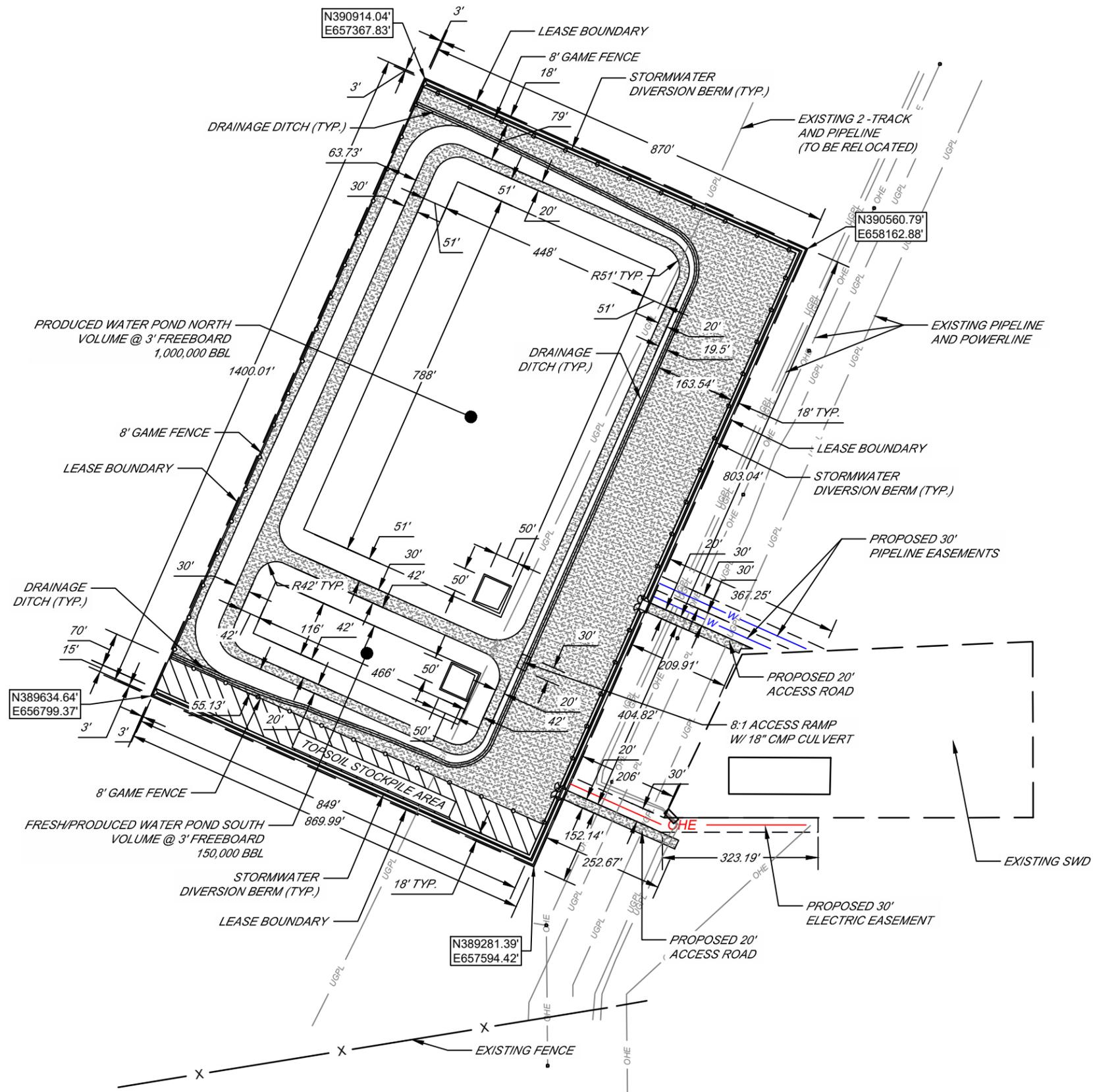
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R-X	DESCRIPTION	DATE	BY
REVISIONS (OR CHANGE NOTICES)			



Solaris Water Midstream, LLC  
907 Tradewinds Boulevard  
Midland, TX 79701  
432-203-9020  
www.solarismidstream.com

**EDDY STATE WATER TREATMENT AND REUSE FACILITY**  
S02, T26S, R29E  
EDDY COUNTY, NM  
SOLARIS WATER MIDSTREAM, LLC.

LINER AND FENCE PLAN	
HORIZONTAL SCALE: 1"=250'	VERTICAL SCALE: NTS
PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL02



**LEGEND**

PROPOSED 8' GAME FENCE	—○—○—
EXISTING UNDERGROUND PIPELINE	—UGPL—
EXISTING OVERHEAD ELECTRIC	—OHE—
EXISTING FENCE	—x—
PROPOSED WATERLINE	—W—W—
PROPOSED OVERHEAD ELECTRIC	—OHE—
PROPOSED EASEMENT	—
LEASE BOUNDARY	—
PROPOSED DRIVING SURFACE	—
EXISTING POWERPOLE	—

NOTE:  
COORDINATES IN STATE PLANE NM83-EF

**FINAL PLANS  
REVISION 2**

CLAUDIUS SANCHEZ CZYZEWSKA  
NEW MEXICO  
22897  
PROFESSIONAL ENGINEER

08/28/2020

Magrym Consulting, Inc.  
110 W. Louisiana Ave. Ste 314  
Midland, TX 79701  
(432) 999-2737  
www.magrym.com

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**EDDY STATE WATER TREATMENT AND REUSE FACILITY**  
S02, T26S, R29E  
EDDY COUNTY, NM  
SOLARIS WATER MIDSTREAM, LLC.

SITE PLAN	
HORIZONTAL SCALE: 1"=250'	VERTICAL SCALE: NTS
PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL01

**GENERAL NOTES**

- ALL BOUNDARY, TOPOGRAPHIC AND UTILITY INFORMATION SHOWN ARE BASED ON SURVEY INFORMATION FURNISHED BY SOLARIS WATER MIDSTREAM, LLC.
- THE CONTRACTOR SHALL IDENTIFY AND LOCATE UTILITY LINES, MONITORING WELLS, SURVEY MONUMENTS, AND OTHER NEARBY STRUCTURES PRIOR TO PERFORMING WORK.
- COORDINATE INFORMATION IS BASED ON STATE PLANE COORDINATES, NEW MEXICO EAST FOOT, NAD 83. THE CONTRACTOR SHALL IDENTIFY ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION.

**LINER NOTES**

- INSTALLER TO SIGN SUBGRADE ACCEPTANCE FORM (PROVIDED BY OWNER REPRESENTATIVE) DAILY PRIOR TO INSTALLATION.
- CONTRACTOR TO PROVIDE SUBMITTAL OF LINER PANEL LAYOUT.
- A 3' DIAMETER MINIMUM PIECE OF 40MIL LINER SHALL BE EXTRUDED WELDED WHERE THE PIE SHAPED CORNER SECTIONS MEET FOR SEAM REINFORCEMENT.
- INSTALL A FULL DOUBLE WIDTH SECTION OF BLACK OR WHITE 60 MIL TEXTURED HDPE GEOMEMBRANE RUB SHEET. EXTRUDE WELD TO LINER. WELDS SHALL BE 2" LONG AND SPACED EVERY 12" ALONG BOTH SIDES OF THE SHEET. DO NOT WELD END EDGES. SECTION SHALL EXTEND FROM SUMP AND INSTALLED INTO LINER ANCHOR TRENCH AS SHOWN.
- CONTRACTOR SHALL PLACE SANDBAGS ON LINER DURING INSTALLATION AS REQUIRED TO PREVENT WIND UPLIFT UNTIL POND IS FILLED TO A DEPTH OF 3 FEET.
- CONTRACTOR SHALL INSPECT GRADED SURFACE FOR DEBRIS, ROCKS OR OTHER MATERIAL THAT MAY DAMAGE THE LINER.
- CONTRACTOR SHALL ROLL SURFACE WITH A SMOOTH ROLLER TO ELIMINATE RUTS.
- CONTRACTOR SHALL USE BLACK 60 MIL HDPE SMOOTH GEOMEMBRANE AS THE PRIMARY LINER AND BLACK 40 MIL HDPE SMOOTH GEOMEMBRANE AS THE SECONDARY LINER.
- LINER TO BE INSTALLED PER MANUFACTURER'S RECOMMENDING PROCEDURES (GSI INSTALLATION QUALITY ASSURANCE MANUAL AND THE GSI DROP-IN SPECIFICATIONS FOR GEOMEMBRANES.)
- ALL SEAMS MUST BE WELDED WITH A 6" MINIMUM OVERLAP.
- CONTRACTOR SHALL NON-DESTRUCTIVELY TEST ALL SEAMS THEIR FULL LENGTH USING AN AIR PRESSURE OR VACUUM TEST, THE PURPOSE OF THIS TEST IS TO CHECK THE CONTINUITY OF THE SEAM PER THE INSTALLATION QUALITY ASSURANCE MANUAL.
- FOR AIR PRESSURE TESTING (ASTM 5820), THE FOLLOWING PROCEDURES ARE APPLICABLE TO THE SEAMS WELD WITH DOUBLE SEAM FUSION WELDER.
  - THE EQUIPMENT USED SHALL CONSIST OF AN AIR TANK OR PUMP CAPABLE OF PRODUCING A MINIMUM 30 PSI AND A SHARP NEEDLE WITH A PRESSURE GAUGE ATTACHED TO INSERT INTO THE AIR CHAMBER.
  - SEAL BOTH ENDS OF THE SEAM BY HEATING AND SQUEEZING THEM TOGETHER. INSERT THE NEEDLE WITH THE GAUGE INTO THE AIR CHANNEL. PRESSURIZE THE AIR CHANNEL TO A MINIMUM OF 35 PSI. NOTE TIME STARTS AND WAIT A MINIMUM OF 5 MINUTES TO CHECK. IF PRESSURE AFTER 5 MINUTES HAD DROPPED LESS THAN 2 PSI THE TEST IS SUCCESSFUL (THICKNESS OF MATERIAL MAY CAUSE VARIANCE).
  - CUT OPPOSITE SEAM END AND LISTEN FOR PRESSURE RELEASE TO VERIFY FULL SEAM HAS BEEN TESTED.
  - IF THE TEST FAILS, FOLLOW THESE PROCEDURES.
    - WHILE CHANNEL IS UNDER PRESSURE WALK THE LENGTH OF THE SEAM LISTENING FOR A LEAK.
    - WHILE CHANNEL IS UNDER PRESSURE APPLY A SOAPY SOLUTION TO THE SEAM EDGE AND LOOK FOR BUBBLES FORMED BY AIR ESCAPING.
    - RE-TEST THE SEAM IN SMALLER INCREMENTS UNTIL THE LEAK IS FOUND.
  - ONCE LEAK IS FOUND USING ONE OF THE PROCEDURES ABOVE, CUT OUT THE AREA AND RETEST THE PORTIONS OF THE PORTIONS OF THE SEAMS BETWEEN THE LEAK AREAS PER 6A AND 6B ABOVE. CONTINUE THIS PROCEDURE UNTIL ALL SECTIONS OF THE SEAM PASS THE PRESSURE TEST.
  - REPAIR THE LEAK WITH A PATCH AND VACUUM TEST.
- ALL NON-DESTRUCTIVE TESTS WILL BE NOTED IN THE NON-DESTRUCTIVE LOGS.
- LINER SHALL BE PROTECTED WITH A 10 OZ. NONWOVEN GEOTEXTILE IF ROCK OR OTHER ANGULAR MATERIALS WITH A DIMENSION GREATER THAN 3/4 INCH ARE PRESENT.
- SUMPS SHALL BE BACKFILLED WITH NON-ANGULAR MAXIMUM 3/8 INCH SIZED PEA GRAVEL.
- LINER GAS VENTS SHALL BE SPACED ALONG THE INSIDE SLOPE AT APPROXIMATELY 100 FEET ON CENTER OR MINIMUM 2 VENTS PER SIDE.
- WHEN ANY PIPING EQUIPMENT, INLET, OR OUTLET IS IN DIRECT CONTACT WITH THE LINER, AN APRON CONSISTING OF 60 MIL HDPE MATERIAL SHALL BE INSTALLED BENEATH THE EQUIPMENT OR STRUCTURE TO PROTECT THE PRIMARY LINER SYSTEM.
- LAY BOTH LINERS IN ANCHOR TRENCH. BACKFILL ANCHOR TRENCH IN 2 LIFTS AND COMPACT.

**EARTHWORK NOTES**

- FILL FOR BERMS SHALL BE PLACED AND COMPACTED IN HORIZONTAL LIFTS WITH MAXIMUM LOOSE LIFT THICKNESS OF 10 INCHES, OR AS DIRECTED BY ENGINEER. CONSTRUCT EACH LAYER CONTINUOUSLY AND APPROXIMATELY HORIZONTAL FOR THE WIDTH AND LENGTH OF THE DIKE. FILL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DRY DENSITY DETERMINED BY THE ASTM D698 AND AT MOISTURE CONTENT WITHIN +2% TO -2% OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY A STANDARD PROCTOR SOILS TEST ON SAMPLES FROM THE SOURCE AREA.
- FILL SHALL NOT BE PLACED AND COMPACTED WHEN THE MATERIALS ARE TOO WET TO PROPERLY COMPACT. MATERIAL WHICH IS TOO WET SHALL BE SPREAD ON THE FILL AREA AND PERMITTED TO DRY, ASSISTED BY HARROWING IF NECESSARY, UNTIL THE MOISTURE CONTENT IS REDUCED TO ALLOWABLE LIMITS. IF THE ENGINEER DETERMINED THAT ADDED MOISTURE IS REQUIRED, WATER SHALL BE APPLIED UNIFORMLY OVER THE AREA TO BE TREATED, AND GIVE COMPLETE AND ACCURATE CONTROL OF THE AMOUNT OF WATER TO BE USED. IF TOO MUCH WATER IS ADDED, THAT AREA SHALL BE PERMITTED TO DRY BEFORE COMPACTION IS CONTINUED.
- PERFORM ONE NUCLEAR DENSITY GAGE TEST PER 2500 CY OR AS DIRECTED BY ENGINEER.
- EARTHWORK CONTRACTOR SHALL PERFORM A VISUAL INSPECTION OF THE FINISHED COMPACTED POND BOTTOM AND SIDE SLOPES BEFORE HDPE LINE INSTALLATION, REMOVING ALL DEBRIS, SHARP OBJECTS AND GRAVEL LARGER THAN 3/4 INCH.

STAGE STORAGE			
PRODUCED WATER POND NORTH ELEVATION (FT)	PRODUCED WATER POND NORTH VOLUME (BBL)	PRODUCED/FRESH WATER POND SOUTH ELEVATION (FT)	PRODUCED/FRESH WATER POND SOUTH VOLUME (BBL)
2986.4	0	2990.4	0
2987.4	186	2991.4	186
2988.4	807	2992.4	807
2989.4	8,727	2993.4	5,315
2990.4	47,741	2994.4	15,256
2991.4	111,279	2995.4	25,827
2992.4	176,148	2996.4	37,040
2993.4	242,356	2997.4	48,903
2994.4	309,913	2998.4	61,425
2995.4	378,829	2999.4	74,617
2996.4	449,114	3000.4	88,487
2997.4	520,775	3001.4	103,045
2998.4	593,824	3002.4	118,301
2999.4	668,269	3003.4	134,264
3000.4	744,120	3004.4	150,943
3001.4	821,386	3005.4	168,347
3002.4	900,076	3006.4	186,487
3003.4	980,201	3007.4	205,372
3004.4	1,061,770		
3005.4	1,144,791		
3006.4	1,229,275		
3007.4	1,315,231		



SUMMARY OF QUANTITIES			
ITEM NUMBER	ITEM	UNIT	QTY
1	CLEARING AND GRUBBING*	ACRE	27
2	ESTIMATED TOPSOIL (6" AVERAGE)	CUBIC YARD	21,455
3	ESTIMATED CUT (INCLUDING TOPSOIL)	CUBIC YARD	127,513
4	ESTIMATED FILL (ABOVE EXISTING GRADE)**	CUBIC YARD	105,959
5	DRAINAGE SWALE	LINEAR FEET	2,521
6	STORMWATER DIVERSION BERM	LINEAR FEET	3,111
7	8' GAME FENCE	LINEAR FEET	4,324
8	20' DOUBLE GATE	EACH	2
9	RUB SHEET 60 MIL HDPE GEOMEMBRANE (TEXTURED)***	SQUARE FEET	36,034
10	PRIMARY 60 MIL HDPE GEOMEMBRANE (SMOOTH)***	SQUARE FEET	627,163
11	200 MIL GEONET***	SQUARE FEET	627,163
12	SECONDARY 40 MIL HDPE GEOMEMBRANE (SMOOTH)***	SQUARE FEET	627,163
13	10 OZ. GEOTEXTILE***	SQUARE FEET	627,163
14	6" HDPE DR11 PIPE WITH PERFORATIONS IN SUMP	LINEAR FEET	168
15	GAGE LADDER	EACH	2
16	DRAIN ROCK	CUBIC YARD	1
17	ANCHOR TRENCH	LINEAR FEET	4,295
18	30' X 18" CMP CULVERT WITH END SECTIONS	EACH	1
19	RELOCATE EXISTING PIPELINE	LUMP SUM	1
20	BUILD LEASE ROAD	LUMP SUM	1

**NOTES:**  
 \* INCLUDES LEASE ROAD AREAS.  
 \*\* 18% FILL FACTOR APPLIED. CUT AND FILL QUANTITIES PERTAIN TO THE ENTIRE SITE. LEASE ROAD MATERIAL AND BERM MATERIAL ARE INCLUDED IN FILL QUANTITY.  
 \*\*\* COMPLETE-IN-PLACE QUANTITIES. OVERLAP, SCRAPS AND/OR OTHER QUANTITIES NOT INCLUDED.

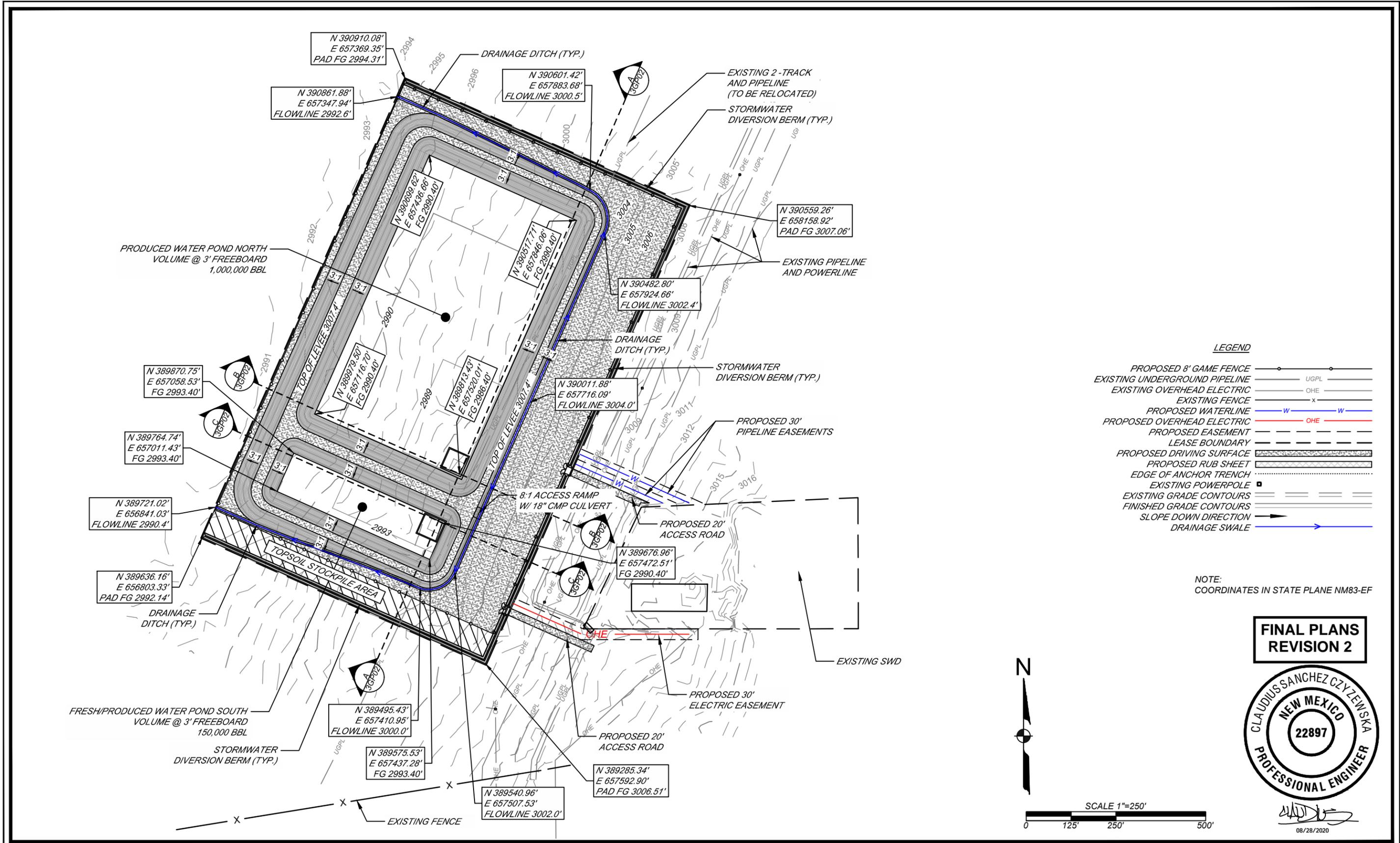
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REV	DESCRIPTION	DATE	BY
REV2	REVISED SITE LOCATION	8/28/20	CSC
REV1	REVISED SITE LOCATION	8/21/20	CSC
IFC	ISSUED FOR CONSTRUCTION	8/11/20	CSC
R-X	DESCRIPTION	DATE	BY

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 432-203-9020  
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**EDDY STATE WATER TREATMENT AND REUSE FACILITY**  
 S02, T26S, R29E  
 EDDY COUNTY, NM  
 SOLARIS WATER MIDSTREAM, LLC.

SUMMARY OF QUANTITIES AND GENERAL NOTES	
HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL03



NOTE:  
COORDINATES IN STATE PLANE NM83-EF

**FINAL PLANS  
REVISION 2**



08/28/2020

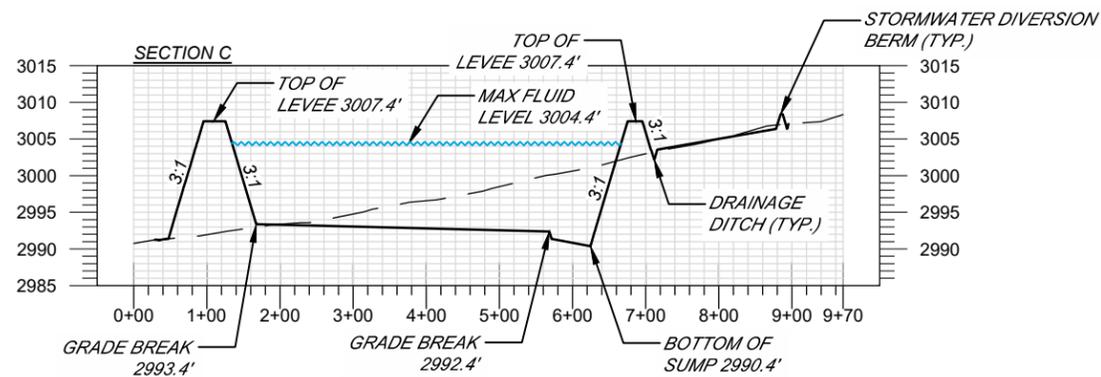
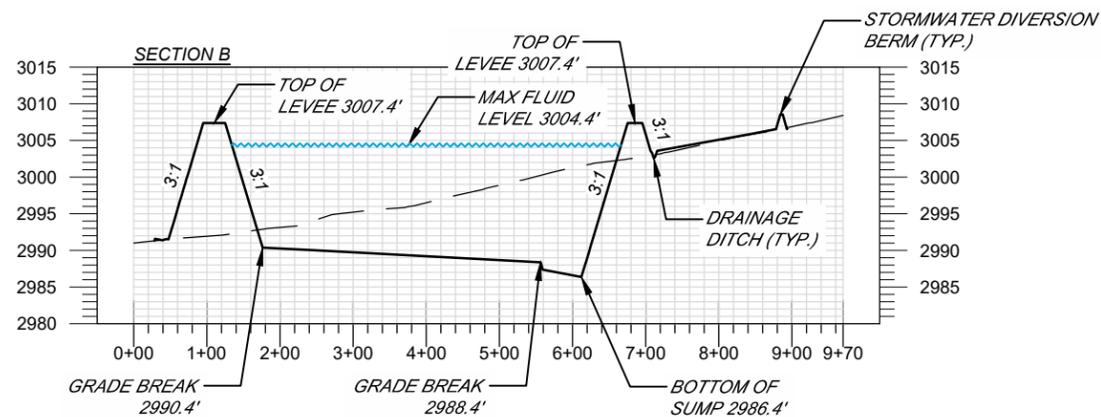
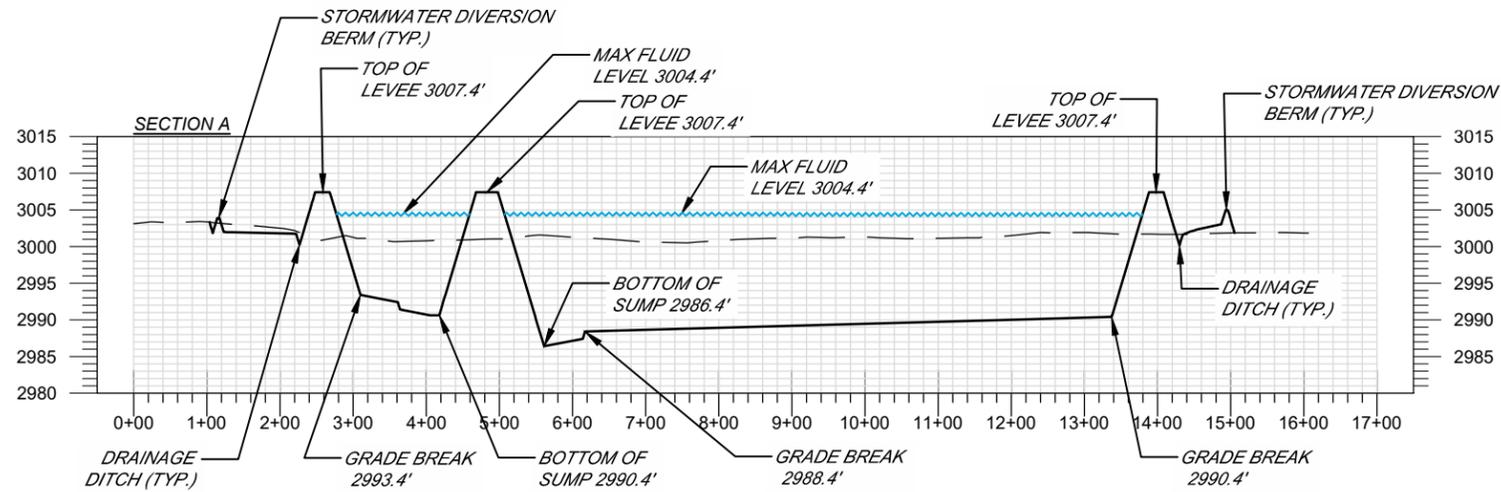
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R-X	REVISIONS (OR CHANGE NOTICES)		

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**SOLARIS WATER MIDSTREAM, LLC.**

GRADING PLAN	
HORIZONTAL SCALE: 1"=250'	VERTICAL SCALE: NTS
PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING	SHEET: 3GP01



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*[Signature]*  
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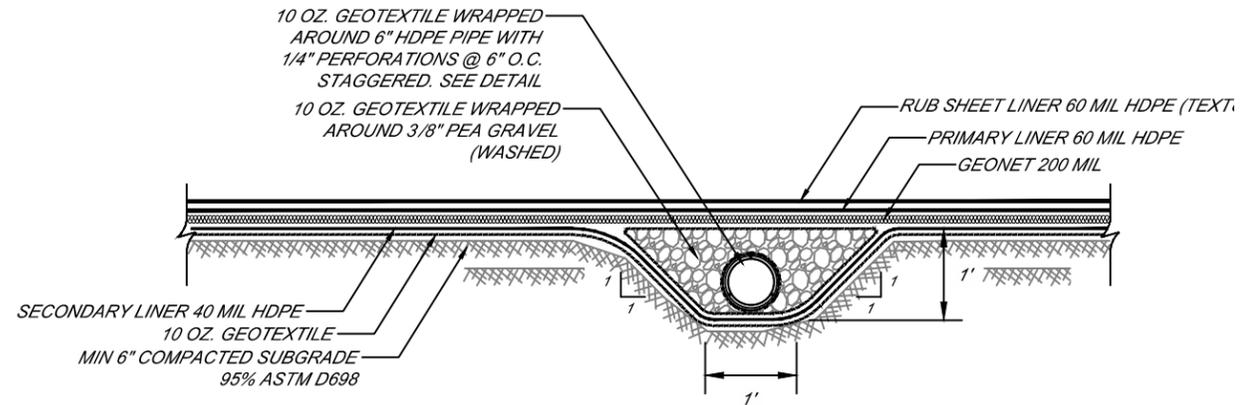


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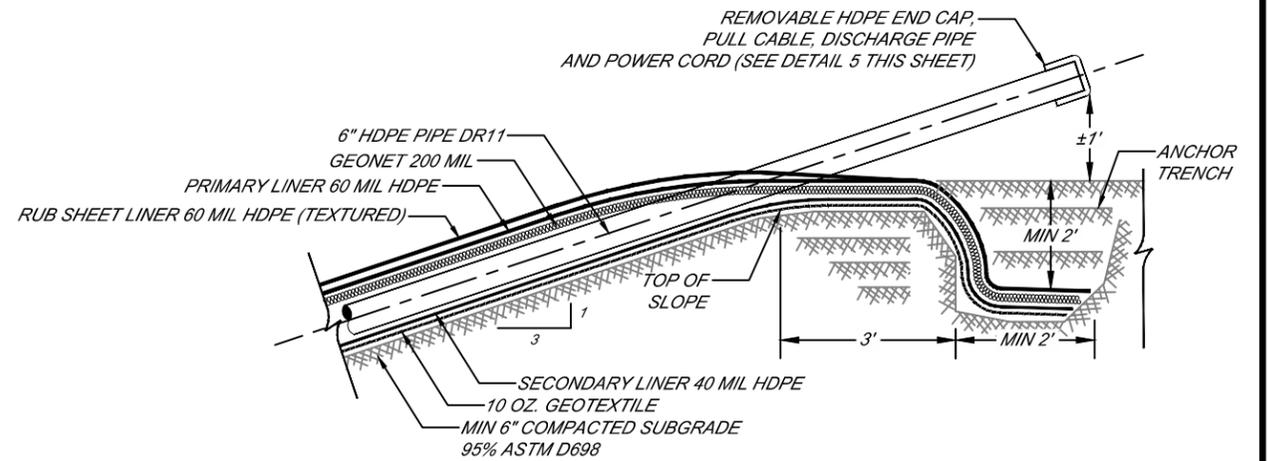
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**CROSS SECTIONS**

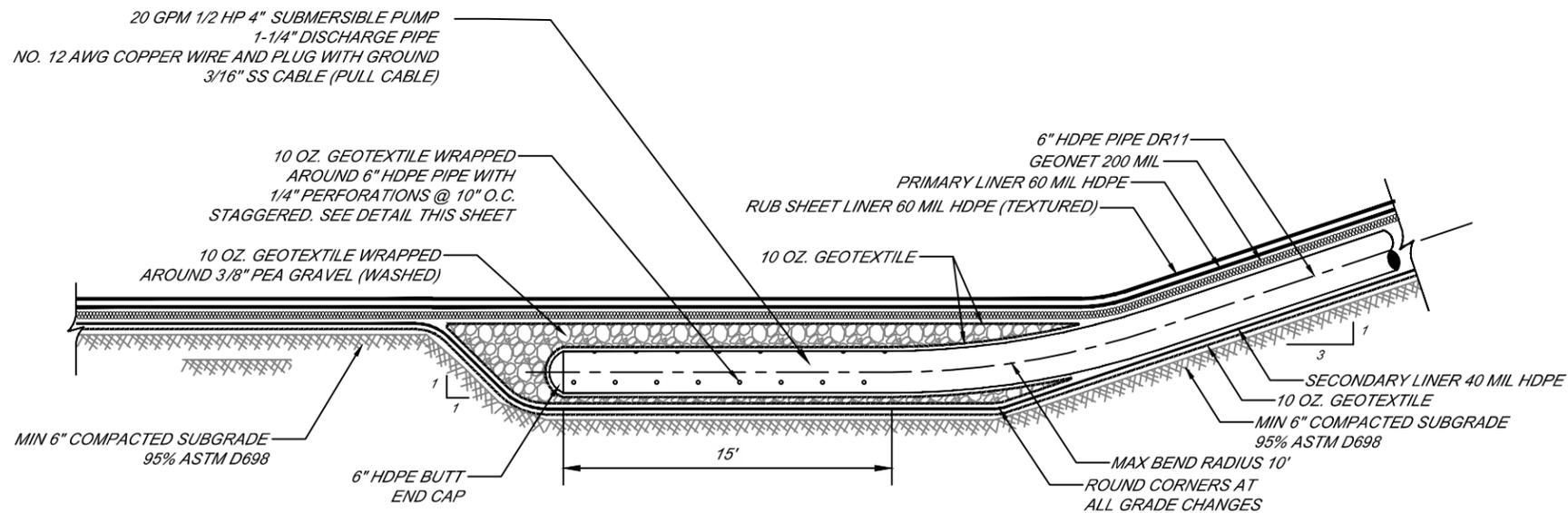
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PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING	SHEET: 3GP02



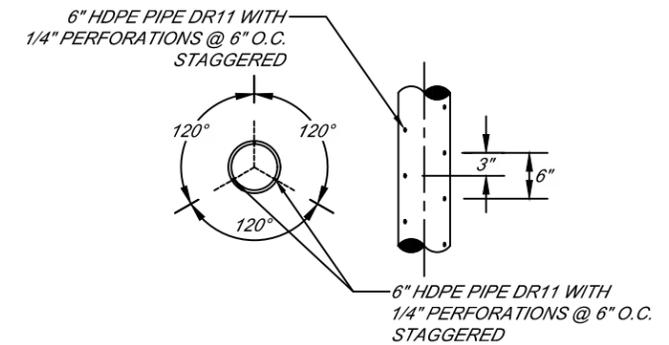
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3GP03 NOT TO SCALE



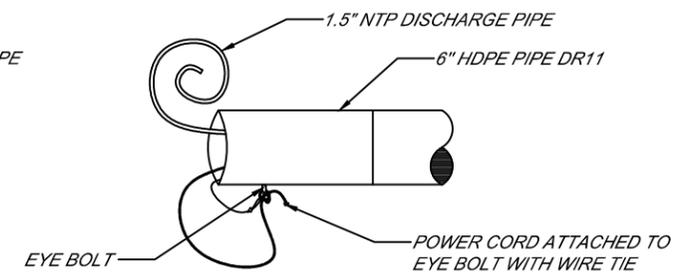
**2 LEAK DETECTION SYSTEM PIPE RISER**  
3GP03 NOT TO SCALE



**3 LEAK DETECTION SYSTEM SECTION B**  
3GP03 NOT TO SCALE



**4 LEAK DETECTION SYSTEM PERFORATED PIPE**  
3GP03 NOT TO SCALE



**5 DISCHARGE PIPE, PULL CABLE AND POWER CORD**  
3GP03 NOT TO SCALE

**FINAL PLANS  
REVISION 2**

CLAUDIUS SANCHEZ CZYZEWSKA  
NEW MEXICO  
22897  
PROFESSIONAL ENGINEER

08/28/2020



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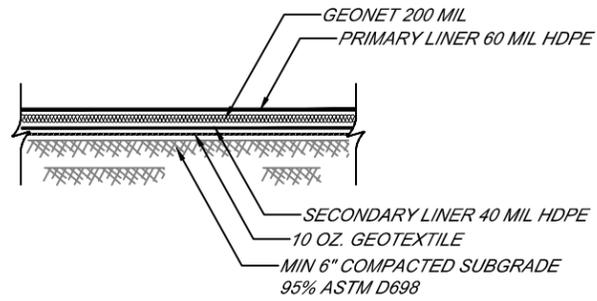
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REVISIONS (OR CHANGE NOTICES)			



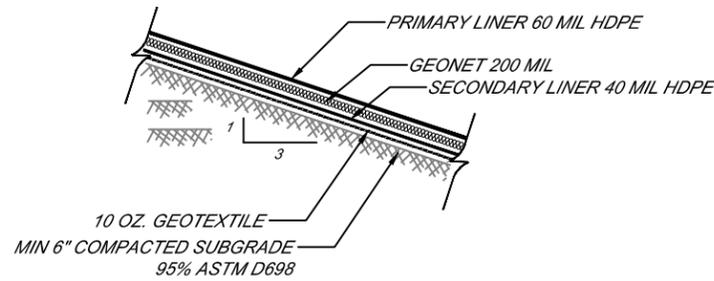
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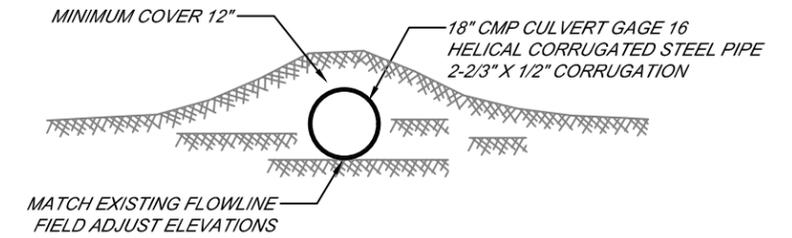
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PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP03



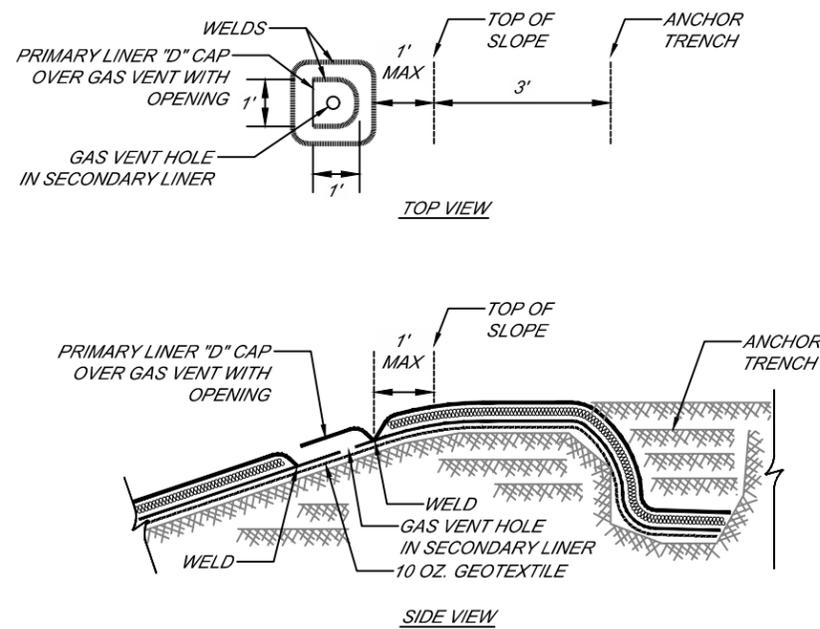
1  
3GP04 TYPICAL POND BOTTOM LINER  
NOT TO SCALE



2  
3GP04 TYPICAL POND SLOPE LINER  
NOT TO SCALE

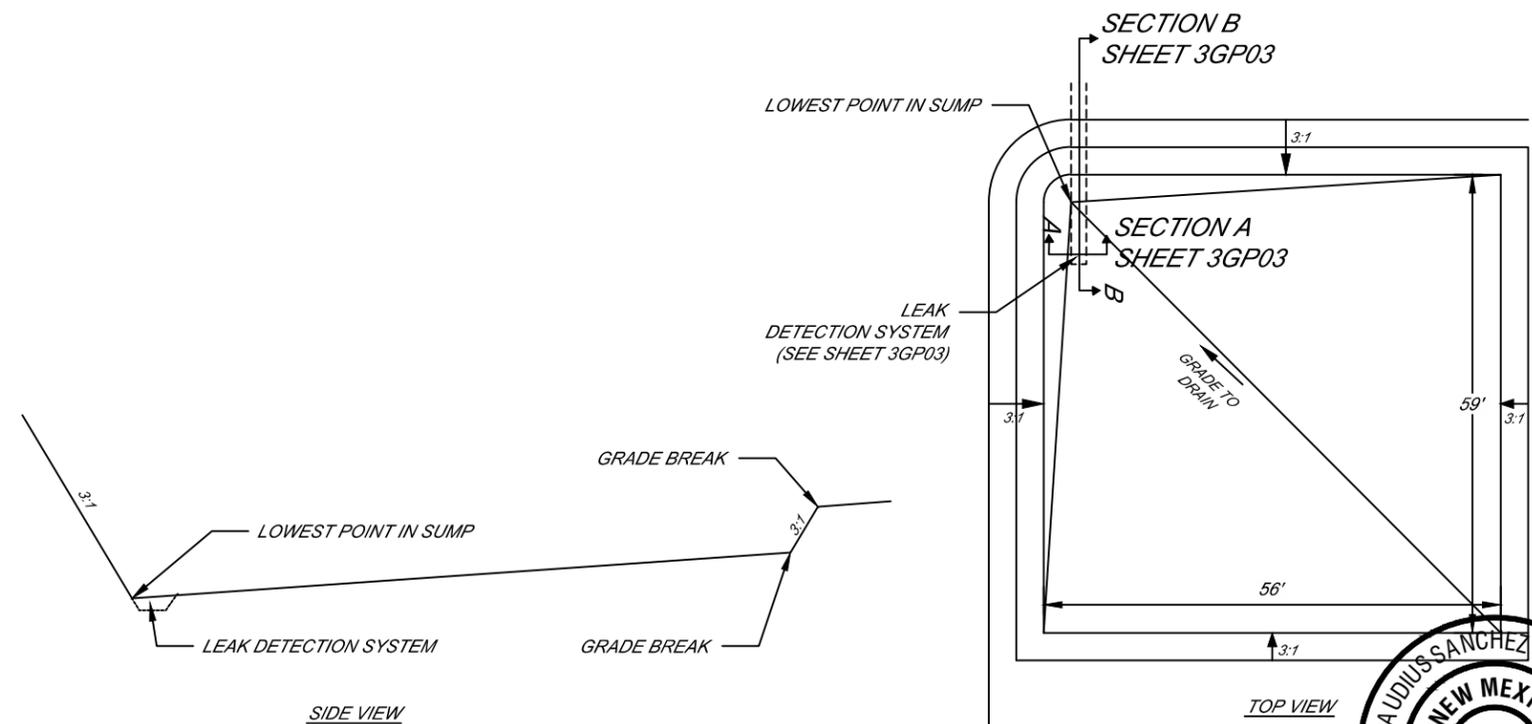


3  
3GP04 TYPICAL CULVERT DETAIL  
NOT TO SCALE



NOTE:  
GAS VENT SPACING SHALL BE INSTALLED  
PER MANUFACTURER'S RECOMMENDATIONS

4  
3GP04 TYPICAL GAS VENT  
NOT TO SCALE



5  
3GP04 SUMP DETAIL  
NOT TO SCALE



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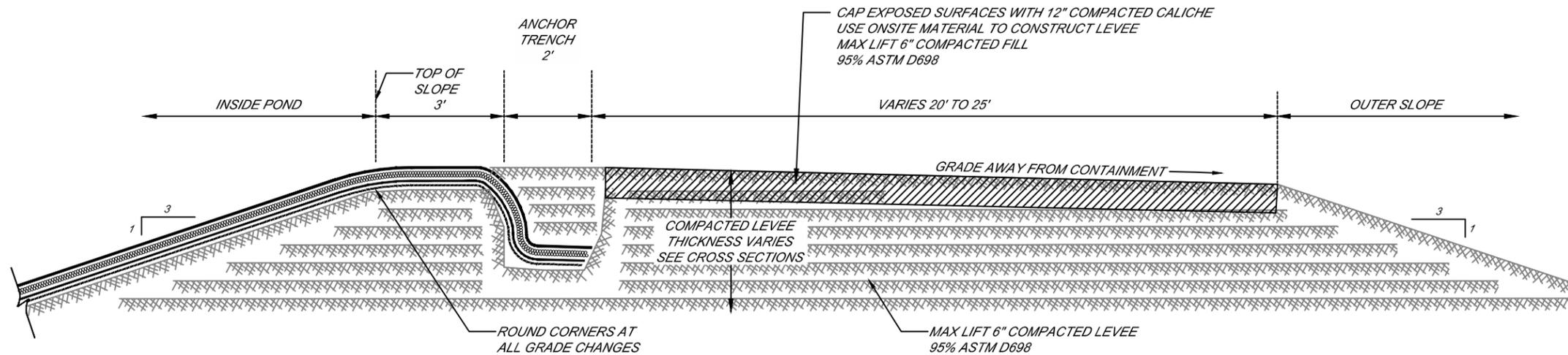
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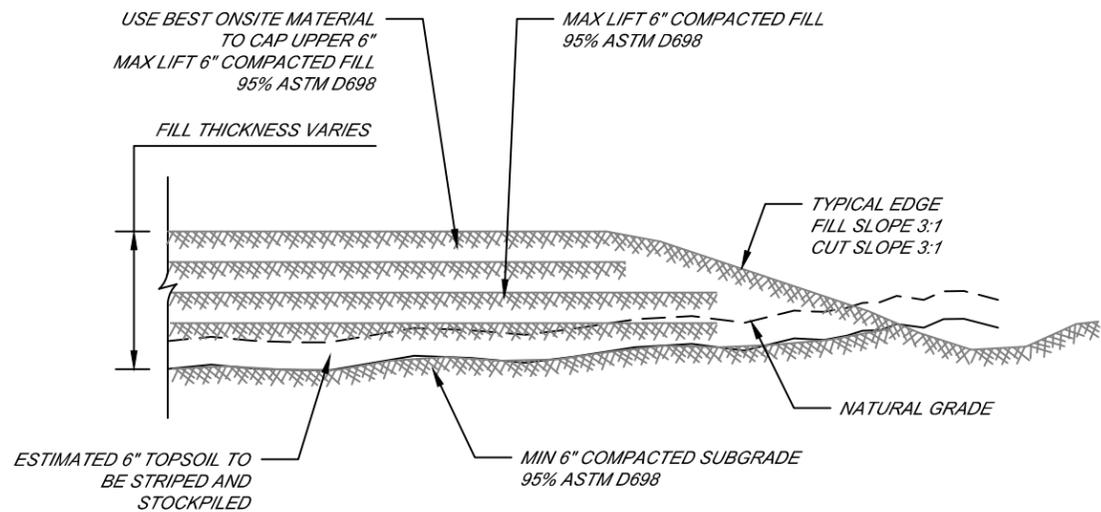
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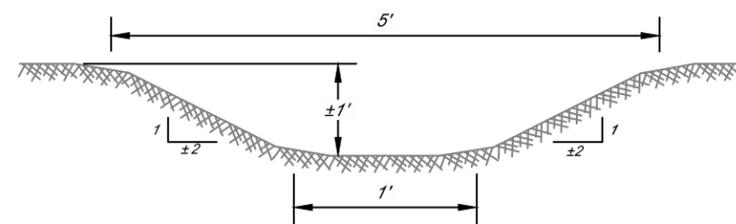
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PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP04



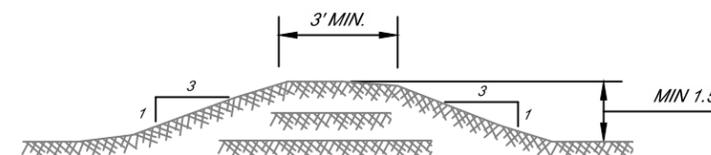
1 **TYPICAL LEVEE SECTION**  
3GP05 NOT TO SCALE



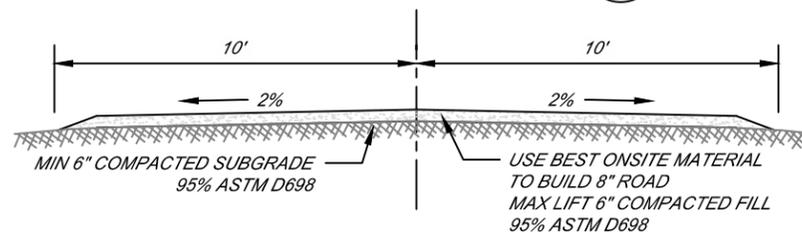
2 **TYPICAL PAD EDGE SECTION**  
3GP05 NOT TO SCALE



3 **TYPICAL DRAINAGE DICH**  
3GP05 NOT TO SCALE



4 **TYPICAL EROSION PROTECTION BERM**  
3GP05 NOT TO SCALE



5 **20\' LEASE ROAD SECTION**  
3GP05



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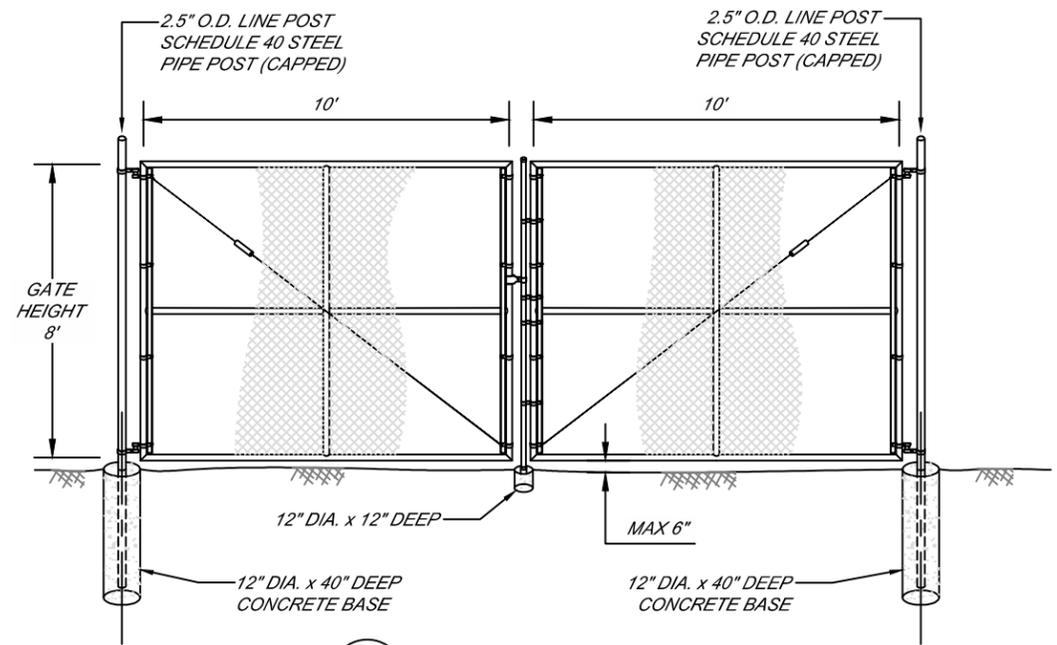
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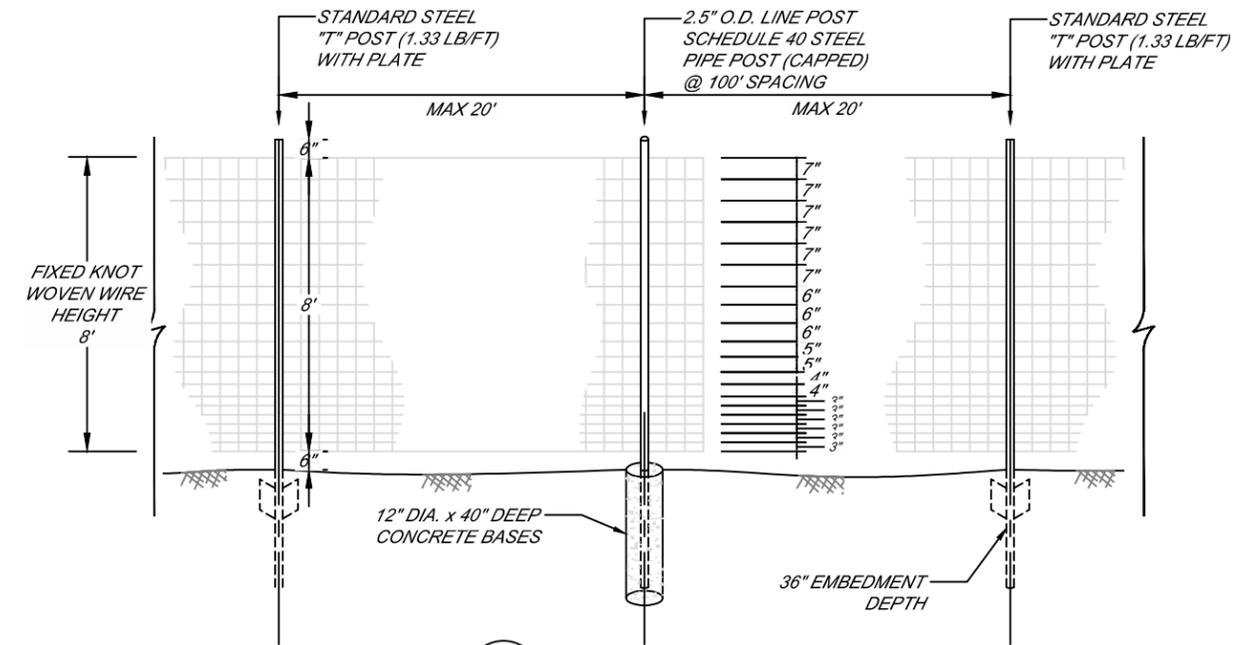
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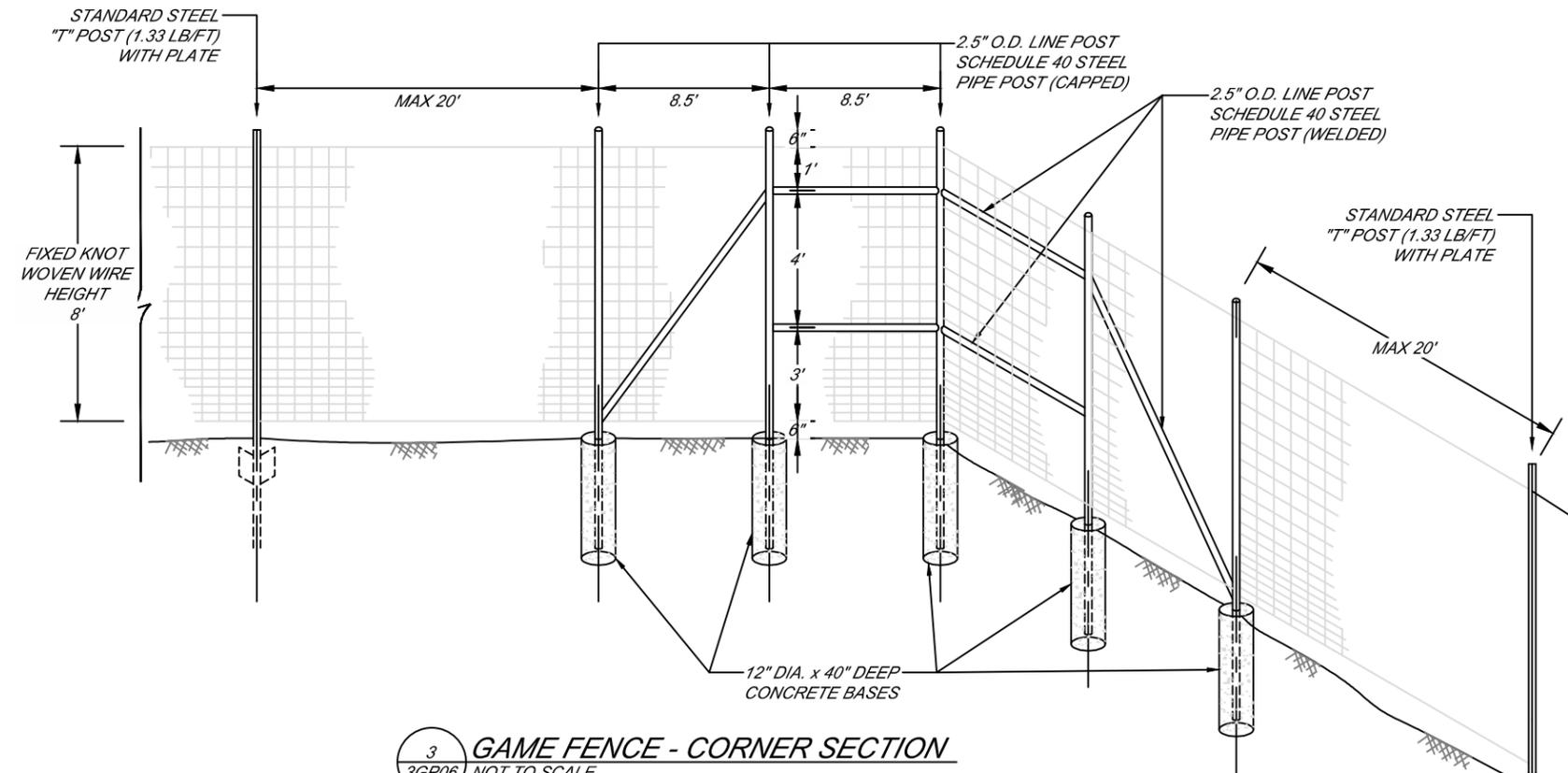
LEVEE AND PAD DETAILS	
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PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP05



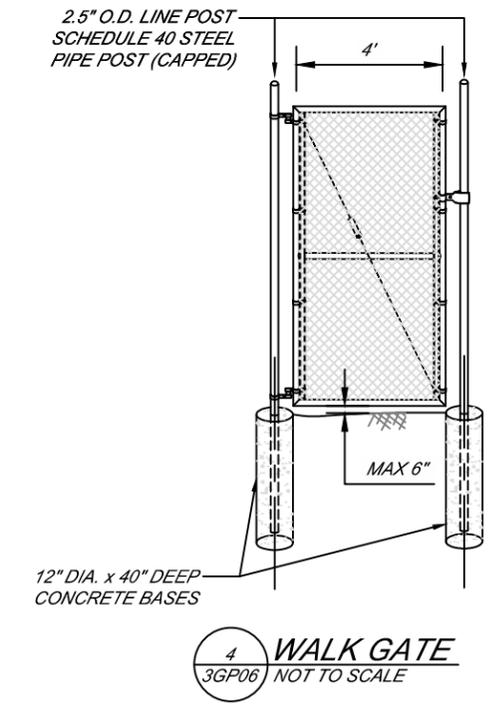
**1 DOUBLE SWING GATE**  
3GP06 NOT TO SCALE



**2 GAME FENCE - LINE SECTION**  
3GP06 NOT TO SCALE



**3 GAME FENCE - CORNER SECTION**  
3GP06 NOT TO SCALE



**4 WALK GATE**  
3GP06 NOT TO SCALE

- NOTES:**
1. FOR WOVEN WIRE, TOP AND BOTTOM STRANDS SHALL BE 12<sup>1</sup>/<sub>2</sub> GAUGE OR HEAVIER; INTERMEDIATE STRANDS SHALL BE 14<sup>1</sup>/<sub>2</sub> GAUGE OR HEAVIER.
  2. ALL WIRE SHALL HAVE CLASS III GALVANIZATION.
  3. STANDARD WOVEN WIRE FENCES MAY HAVE LINE POSTS SPACED UP TO 15 FEET APART. HI-TENSILE WOVEN WIRE FENCE MAY HAVE LINE POSTS SPACED UP TO 20 FEET APART. CLOSER SPACING IS REQUIRED WHERE NEEDED FOR INCLINES OR CHANGES IN TOPOGRAPHY.
  4. CONCRETE FOOTINGS SHALL HAVE TOPS CROWNED.
  5. TO PREVENT WIRE FROM SLIPPING ON STEEL POST, DOUBLE WRAP ALL WIRE AROUND STEEL POST OR WELD CHAIN LINK LOOPS.



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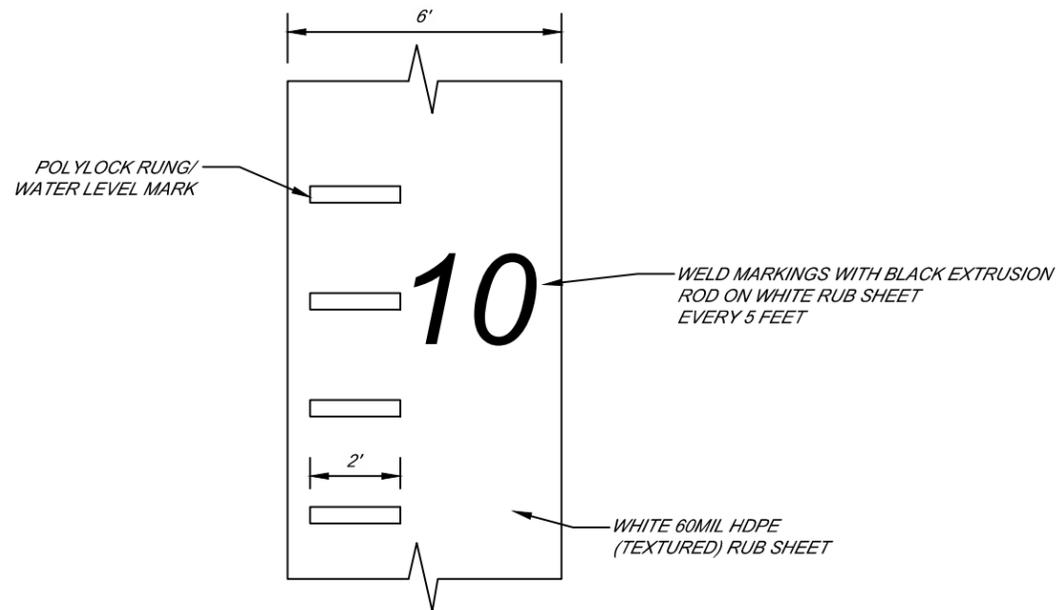
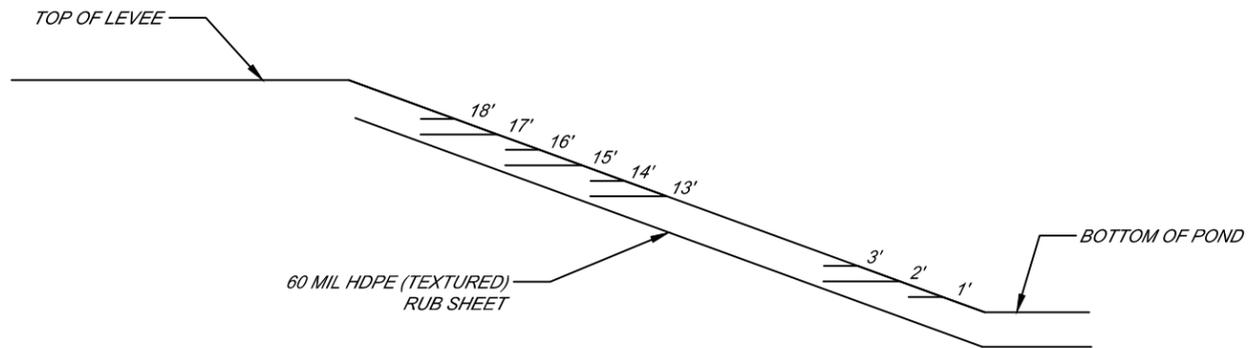
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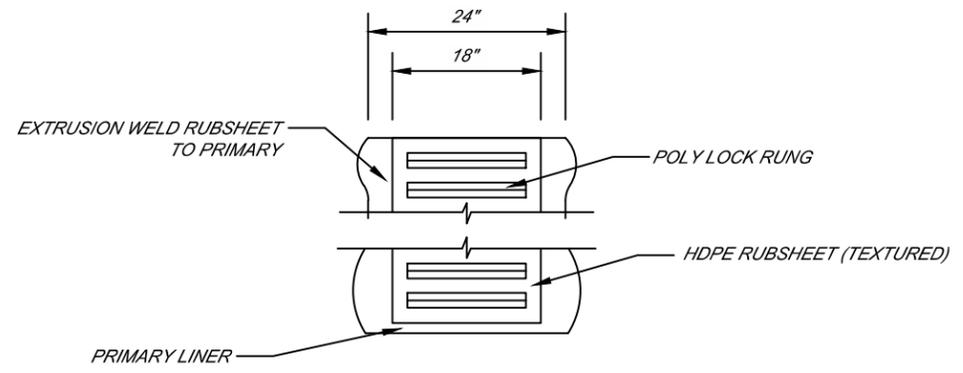
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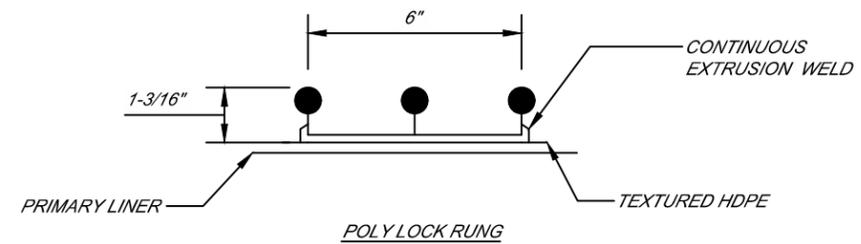
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PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP06



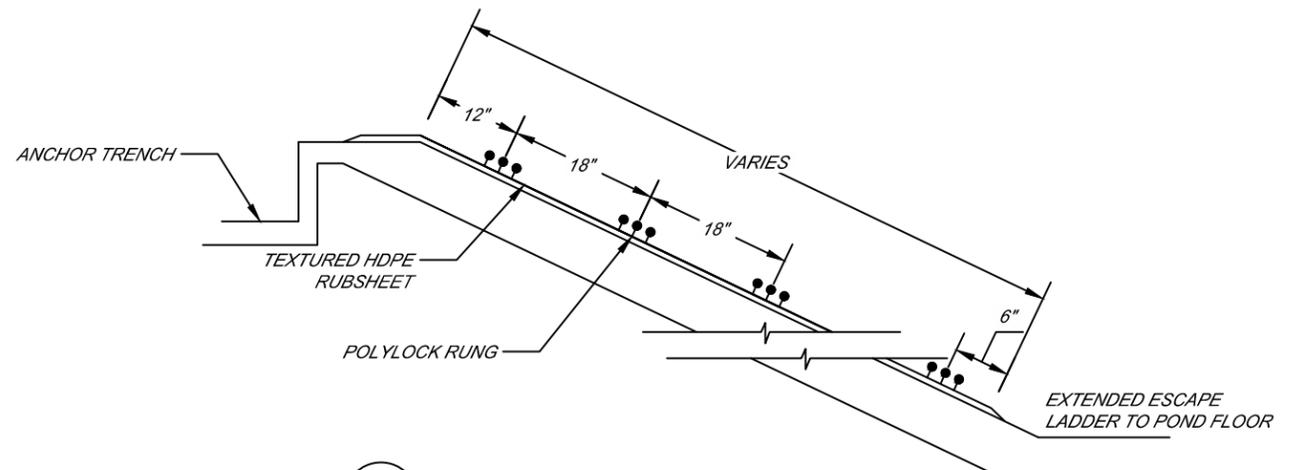
1 WATER LEVEL MARKS  
3GP07 NOT TO SCALE



ESCAPE LADDER FRONT VIEW



POLY LOCK RUNG



2 ESCAPE LADDER DETAILS  
3GP07 NOT TO SCALE



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08/28/2020

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ESCAPE LADDER AND GAGE DETAILS	
HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 8/28/2020	DESIGNED BY: CSC
PROJECT NO: 19-172	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP07



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PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	
<b>SPECIFICATIONS</b>				
Thickness (min. avg.)	ASTM D5199	Every roll	mils	40.0
Thickness (min.)	ASTM D5199	Every roll	mils	36.0
Melt Index - 190/2.16 (max.)	ASTM D1238	1/Batch	g/10 min	1.0
Sheet Density (8)	ASTM D792	Every 10 rolls	g/cc	≥ 0.94
Carbon Black Content	ASTM D4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D3895	Per formulation	min	160
HPOIT - High Pressure (avg)	ASTM D5885	Per formulation	min	800
Tensile Properties (min. avg) (2)	ASTM D6693	Every 2 rolls		
Strength at Yield			ppi	84
Elongation at Yield			%	13
Strength at Break			ppi	152
Elongation at Break			%	750
Tear Resistance (min. avg.)	ASTM D1004	Every 5 rolls	lbf	28
Puncture Resistance (min. avg.)	ASTM D4833	Every 5 rolls	lbf	85
Dimensional Stability	ASTM D1204	Certified	%	± 2
Stress Crack Resistance (SP-NCTL) (avg.)	ASTM D5397	1/Batch	hr	1000
Multi-Axial Tensile (min. avg.)	ASTM D5617	Per formulation	%	15
Oven Aging - % retained after 90 days	ASTM D5721	Per formulation		
HP OIT (min. avg.)	ASTM D5885		%	80
UV Res. - % retained after 1600 hr	ASTM D7238	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	80

**SUPPLY SPECIFICATIONS** (Roll dimensions may vary ±1%)

### NOTES

1. Testing frequency based on standard roll dimension and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
8. Correlation table is available for ASTM D792 vs ASTM D1505. Both methods give the same results.

\* All values are nominal test results, except when specified as minimum or maximum.

\* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

Solmax is not a design professional and has not performed any design services to determine if Solmax's goods comply with any project plans or specifications, or with the application or use of Solmax's goods to any particular system, project, purpose, installation or specification.



Mustang Extreme

December 9, 2019

Attn: Mr. Steven Roeder  
Re: 40 mil HDPE Geomembrane – Hydraulic Conductivity

Dear Mr. Roeder:

Hydraulic Conductivity of HDPE geomembranes can be indirectly obtained through ASTM E96 method (Designing with Geosynthetics, page 437, fifth edition – Robert Koerner).

Based on our test results and the method pointed out in the above reference, it can be concluded that Solmax HDPE geomembranes have a typical Hydraulic Conductivity no higher than  $10^{-12}$  cm/s

Should you need further information, please do not hesitate to contact us.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mauricio Ossa".

Mauricio Ossa  
Senior Technical Manager  
Houston- Texas

● T +1 800 435-2008



GSE ENVIRONMENTAL, LLC | A SOLMAX COMPANY  
19103 GUNDLE ROAD, HOUSTON, TX 77073, USA

SOLMAX.COM

**R.K. FROBEL & ASSOCIATES**  
*Consulting Engineers*

**Technical Memorandum: 40-mil HDPE as Alternative Secondary Liner System for In Ground Recycling Containment Facilities**

**NMAC 19.15.34.12 A**

I have investigated the suitability of application for 40 mil HDPE geomembrane as an equivalent secondary liner to 30 mil scrim reinforced LLDPE (LLDPEr) in the application for In Ground Recycling Containment facilities. *In summary, it is my professional opinion that the specified 40 mil HDPE geomembrane will provide a secondary liner system that is equal to or better than 30 mil scrim reinforced LLDPEr and will provide the requisite protection of fresh water, public health and the environment for many years when engineering design provides requisite site/soil/slope preparation and when used in concert with requisite primary liners and drainage layers.*

It is understood that the lining system under discussion is composed of a 60 mil HDPE Primary liner, geonet drainage layer and a 40 mil HDPE Secondary liner. *In consideration of the secondary lining system application, size of impoundment and depth, design details as well as the chemical nature of typical processed water, it is my professional opinion that the 40 mil HDPE geomembrane will provide the requisite barrier against processed water loss and will function effectively as a secondary liner.*

The following are discussion points that hopefully will exhibit the equivalency of a 40 mil HDPE secondary liner to that of a 30 mil LLDPEr.

The nature and formulation of the 40 mil HDPE resin is the same as the Primary 60 mil HDPE. The major difference is that the 40 mil HDPE is lower in thickness (more flexible and less puncture resistant). However, in covered conditions, HDPE will resist aging and degradation and remain intact for many decades. In fact, a secondary liner of 40 mil HDPE will outlast an exposed 60 mil HDPE liner. According to the Geosynthetic Research Institute (GRI) study on lifetime prediction (GRI Paper No. 6), the half life of HDPE (GRI GM 13) exposed is > 36 years and the half-life of HDPE covered or buried is greater than 100 years. It is understood that in order to ensure compliance of materials, the primary 60 mil HDPE to be used must meet or exceed GRI GM 13 Standards. Likewise, the secondary liner that is not exposed to the same environmental and chemical conditions must meet or exceed GRI GM 13 for non-reinforced HDPE. Adhering to the minimum requirements of the GRI Specifications, 40 mil HDPE when used as a secondary liner will be equally as protective as the primary 60 mil HDPE liner (reference: [www.geosynthetic-institute.org/grispecs](http://www.geosynthetic-institute.org/grispecs)) and equally as protective as a 30 mil scrim reinforced LLDPEr liner.

Durability of Geomembranes is directly affected by exposure conditions. Buried or covered geomembranes are not affected by the same degradation mechanisms (UV, Ozone, Chemical, Stress, Temperature, etc) as are fully exposed geomembranes. In this regard, the secondary liner material and thickness can be much less robust than the fully exposed primary liner which in this case is 60 mil HDPE. This is also the case for

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landfill lining systems where the secondary geomembrane in a bottom landfill cell may be 40 mil HDPE.

Thermal Fusion Seaming Requirements. Thermal seaming and QC seam test requirements for geomembranes are product specific and usually prescribed by the sheet manufacturer. Dual wedge thermal fusion welding is commonly used on HDPE and QC testing by air channel (ASTM D 5820) is fully acceptable and recognized as an industry standard. In this regard, there should be no exception requirement for seaming and QC testing as both the Primary and Secondary geomembranes are HDPE. This is fully covered in comprehensive specifications for both the Primary and Secondary geomembranes (Reference: [www.ASTM.org/Standards](http://www.ASTM.org/Standards)).

Potential for Leakage through the Primary and Secondary Liners. Leakage through geomembrane liners is directly a function of the height of liquid head above any hole or imperfection. The geonet drainage media provides immediate drainage to a low point or sump and thus no hydrostatic head or driving gradient is available to push leakage water through a hole in the secondary liner. In this regard, secondary geomembrane materials can be (and usually are) much less in thickness and also polymer type. Hydraulic Conductivity through the 40 mil HDPE liner material is extremely low due to the polymer type, structure and crystallinity and exceeds requirements of EPA SW-846 Method 9090A.

Chemical Attack. Chemical attack to polymeric geomembranes is directly a function of type of chemical, temperature and exposure time. Again, the HDPE Primary provides the chemically resistant liner and is QC tested to reduce potential defects or holes. If there is a small hole, the geonet drain takes any leakage water immediately to the sump for extraction. Thus, exposure time is very limited on a secondary liner in addition to low temperature, little volume and virtually no head pressure. In this regard, a chemically resistant geomembrane material such as 40 mil HDPE can be specified for the secondary and is a fully acceptable alternate to 30 mil scrim reinforced LLDPEr.

Mechanical Properties Characteristics. Geomembranes of different polymer and/or structure (i.e., reinforced vs non-reinforced) cannot be readily compared using such characteristics as tensile stress/strain, tear, puncture and polymer requirements. For a 40 mil HDPE liner material to function as a Secondary liner it should meet or exceed the manufacturers minimum requirements for Density, Tensile Properties, Tear, Puncture as well as other properties such as UV resistance. The sheet material must also meet or exceed GRI GM 13 minimum requirements. *In this regard, a 40 mil HDPE will be equivalent to a 30 mil LLDPEr as a secondary liner for the conditions listed below:*

- *The subgrade or compacted earth foundation will be smooth, free of debris or loose rocks, dry, unyielding and will support the lining system.*
- *The side slopes for the containment shall be equal to or less than 3H:1V.*
- *The physical properties and condition of the subgrade or liner foundation*

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**Consulting Engineers**

*(i.e., density, slope, moisture) will be inspected and certified by a Professional Engineer that it meets or exceeds specification requirements,*

- *Immediately prior to installation, the installation contractor shall inspect and sign off on the subgrade conditions that they meet or exceed the HDPE manufacturer and installers requirements.*
- *A protective geotextile will be placed on the finished and accepted subgrade between subgrade and the 40 mil HDPE Secondary liner.*
- *A 200 mil geonet will be placed over the 40 mil HDPE Secondary Liner.*
- *A 60 mil HDPE Primary liner will be placed over the 200 mil geonet drainage layer.*

If you have any questions on the above technical memorandum or require further information, give me a call at 720-289-0300 or email [geosynthetics@msn.com](mailto:geosynthetics@msn.com)

Sincerely Yours,

*RK Frobel*

Ronald K. Frobel, MSCE, PE



References:

NMAC 10-15-34-12 A DESIGN AND CONSTRUCTION SPECIFICATIONS FOR A RECYCLING CONTAINMENT

Geosynthetic Research Institute (GRI) Published Standards and Papers 2017  
[www.geosynthetic-institute.org](http://www.geosynthetic-institute.org)

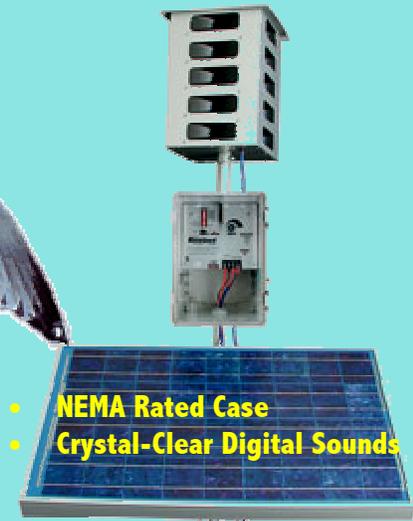
ASTM Geosynthetics' Standards 2017  
[www.ASTM.org/Standards](http://www.ASTM.org/Standards)

# EFFECTIVE WIDE-AREA BIRD CONTROL!

## Mega Blaster PRO sonic bird repeller covers 30 acres!



Mega Blaster PRO uses intermittent distress calls to create a "danger zone" that frightens infesting birds away for good. PREDATOR cries help scare all the birds.



- NEMA Rated Case
- Crystal-Clear Digital Sounds

- Laughing Gull
- Ring-Billed Gull
- Herring Gull
- California Gull
- Black-Headed Gull
- Glaucous-Winged Gull
- Double Crested Cormorant
- Marsh Hawk

### Perfect for Landfills, Airfields, Fish Farms, Farm Fields or any multi-acre facility.

Our most powerful system features two high-output amplifiers that drive our specially-designed 20 speaker tower. The intense sound output covers up to 30 acres (12 hectares).

It features solid-state electronics mounted inside a NEMA-type control box, suitable for most any application.

The generating unit mounts easily to a post or pole using the included hardware. The unit comes pre-recorded in four different configurations for the most common bird infestations.

Choose any or all of the 8 sounds, including predators to give the birds even more of a sense of danger. Customize by choosing volume and silent time between sounds.

### Mega Blaster PRO

Complete system includes the generating unit with two built-in high-output amplifiers, 20-speaker tower with audio cables, 40 watt solar panel, battery clips and all mounting hardware.

#### CONFIGURATIONS AVAILABLE:

- Agricultural  
# MEGA-AG
- Crow / Raven  
# MEGA-CROW
- Woodpecker  
# MEGA-WP
- Marine / Gull  
# MEGA-MAR



The Bird Control 'X'-Perts

**NOTE:** This unit is capable of sound output up to 125 decibels. **HEARING PROTECTION IS RECOMMENDED.**

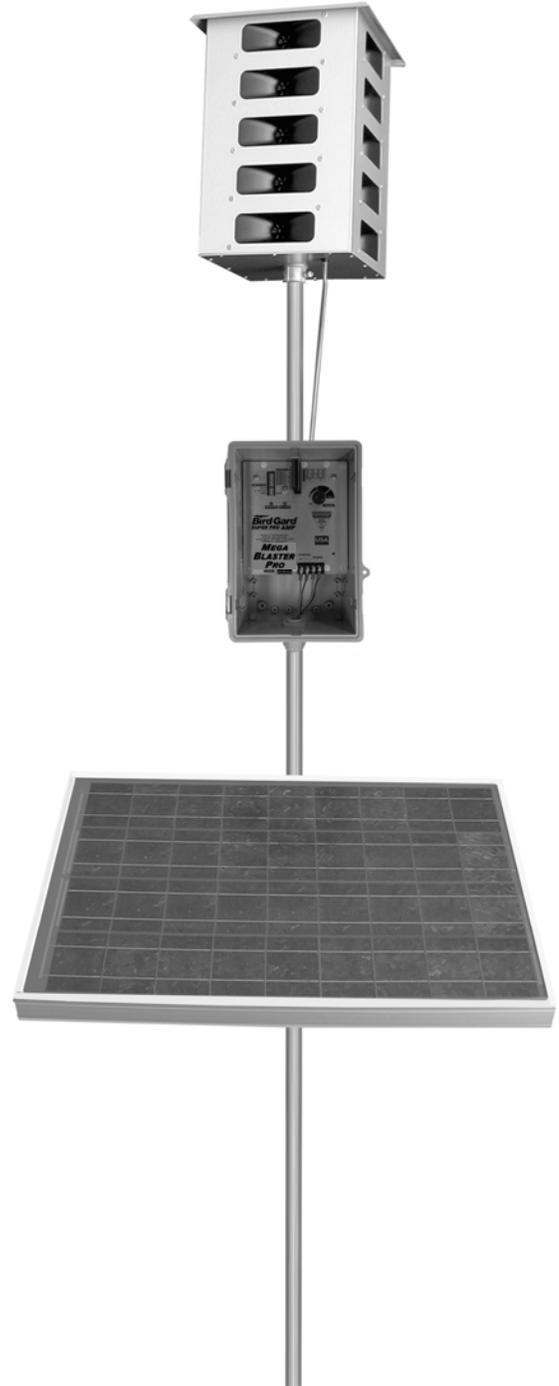


# **MEGA BLASTER PRO**



## User's Manual

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# Overview

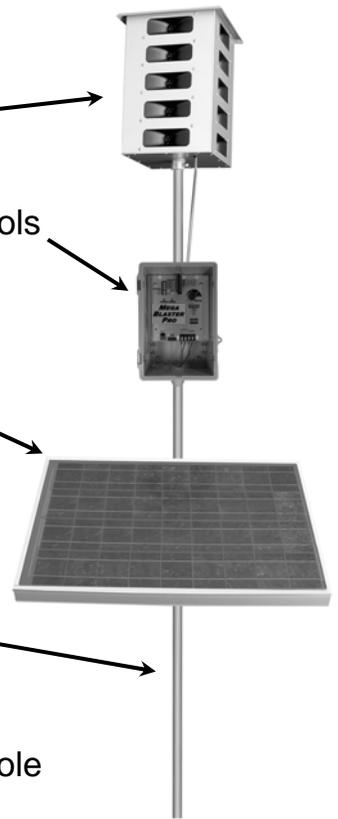
The Bird-X Mega Blaster Pro utilizes the innate power of the natural survival instincts of birds to effectively repel them. Digital recordings of distressed and alarmed birds, along with the sounds made by their natural predators are broadcast through high fidelity weather-resistant speakers over the 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 not 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**

# DESIGN AND CONSTRUCTION PLAN OPERATION AND MAINTENANCE PLAN CLOSURE PLAN

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.*

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

This plan addresses construction of the earthen containments.

Magrym Engineers is providing the design of the containment and their plans are presented in this submission.

### *Dike Protection and Structural Integrity*

The design and operation provide for the confinement of produced water, prevention of releases and prevention of 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 (a berm) and/or diversion ditch (between the levee and the soil stockpile) 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.

### *Signage*

The operator will place an upright sign no less than 12 inches by 24 inches 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:

- the operator's name,
- the location of the site by quarter-quarter or unit letter, section, township and range, and
- emergency telephone numbers

### *Fencing*

The operator will provide for a fence to enclose the recycling containment in a manner that deters unauthorized wildlife and human access. As specified in the design drawings, the operator will employ a chain-link or game fence in addition to a four foot, four-strand wire fence. Because feral pigs, javelina and deer are present in the area, a chain link or game fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. However, 19.15.34.12 D.2 requires "a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level". Therefore, the barbed wire specification is added to the game fence to avoid a variance.

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.

19.15.34.12 A Design and Construction Specifications

(1). The operator shall design and construct a recycling containment to ensure the confinement of produced water, to prevent releases and to prevent overtopping due to wave action or rainfall.  
(8). The operator of a recycling containment shall design the containment to prevent run-on of surface water. The containment shall be surrounded by a berm, ditch or other diversion to prevent run-on of surface water

19.15.34.12 B. Prior to constructing containment, the operator shall strip and stockpile the topsoil for use as the final cover or fill at the time of closure

19.15.34.12 C. Signs.

The operator shall post an upright sign no less than 12 inches by 24 inches with lettering not less than two inches in height in a conspicuous place on the fence surrounding the containment. The operator shall post the sign in a manner and location such that a person can easily read the legend. The sign shall provide the following information: the operator's name, the location of the site by quarter-quarter or unit letter, section, township and range, and emergency telephone numbers

19.15.34.12 D. Fencing

(1) The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

(2) Recycling containments shall be fenced with a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level.

## *Netting and Protection of Wildlife*

The perimeter game/chain-link fence will be effective in excluding stock and most terrestrial wildlife. If requested by the surface owner, the game fence can include a fine mesh from the base to 1 foot above the ground to exclude the small reptiles (e.g. dune sagebrush lizard).

The recycling containment will be protective of wildlife, including migratory birds through the implementation of an Avian Protection Plan, routine inspections and the perimeter fence.

The avian protection plan includes the use of a Bird-X Mega Blaster Pro as a primary hazing program for avian species. The device will be equipped with sounds suitable for the Permian Basin environment. In addition to this sonic device, staff will routinely inspect the containment for the presence of avian species and, if detected, may use a blank cartridge or shell in a handgun, starter pistol or shotgun as additional hazing if necessary. Decoys of birds of prey may be placed on the game fence and other roosts around the open water to provide additional hazing.

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 and to the division district office in order to facilitate assessment and implementation of measures to prevent incidents from reoccurring.

This Avian Protection Plan meets the specific language of Rule 34 as it is "otherwise protective of wildlife, including migratory birds".

## *Earthwork*

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 is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity.

This volume provides the stamped drawings for the containment with the following design/construction specifications:

- a) levee has inside grade no steeper than two horizontal feet to one vertical foot (2H: 1V).
- b) levee outside grade is no steeper than three horizontal feet to one vertical foot (3H: 1V)

### 19.15.34.12 E Netting.

The operator shall ensure that a recycling containment is screened, netted or otherwise protective of wildlife, including migratory birds. The operator shall on a monthly basis inspect for and, 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.

### 19.15.34.12 A

(2) A recycling containment shall 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 is required under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity...

### 19.15.34.12 A

(2) ...The operator shall construct the containment in 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). The top of the levee shall be wide enough

# Design and Construction Plan In Ground Containments

- c) top of the levee is wide enough to install an anchor trench and provide adequate room for inspection and maintenance.
- d) The containment floor design calls for a slope toward the sump in the corner(s).

## *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 specified in the design drawings and is 40-mil HDPE or thicker. Attached to the engineering drawings are specifications for this material, a professional opinion regarding the equivalency of 40-mil HDPE to 30-mil LLDPEr, and information on hydraulic conductivity. As stated in that opinion, 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 toward the sump in the corner(s) of the containment, as shown in the design drawings. This slope combined with the highly transmissive geonet drainage layer provide for rapid leak detection.

The liners and drainage material will be installed consistent with the Manufacturer's specifications. In addition to any specifications of the Manufacturer, protocols for liner installation include measures to:

- i. minimizing liner seams and orient them up and down, not across, a slope of the levee.
- ii. use factory-welded seams where possible.
- iii. use field seams in geosynthetic material that are thermally seamed and prior to field seaming, overlap liners four to six inches.
- iv. minimize the number of field seams and comers and irregularly shaped areas.
- v. provide for no horizontal seams within five feet of the

to install an anchor trench and provide adequate room for inspection and maintenance.

19.15.34.12 A

(3) Each recycling containment shall incorporate, at a minimum, a primary (upper) liner and a secondary (lower) liner with a leak detection system appropriate to the site's conditions.

19.15.34.12 A

(4) All primary (upper) liners in a recycling containment shall be geomembrane liners composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. All primary liners shall be 30-mil flexible PVC, 45-mil LLDPE string reinforced or 60-mil HDPE liners. Secondary liners shall be 30-mil LLDPE string reinforced or equivalent with a hydraulic conductivity no greater than 1 x 10-9 cm/sec. Liner compatibility shall meet or exceed the EPA SW-846 method 9090A or subsequent relevant publications.

19.15.34.12 A

(7) The operator of a recycling containment shall place a leak detection system between the upper and lower geomembrane liners that shall consist of 200-mil geonet or two feet of compacted soil with a saturated hydraulic conductivity of 1 x 10-5 cm/sec or greater to facilitate drainage. The leak detection system shall consist 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.

19.15.34.12 A

(5) The operator of a recycling containment shall minimize liner seams and orient them up and down, not across, a slope of the levee. Factory welded seams shall be used where possible. The operator shall ensure field seams in geosynthetic material are thermally seamed. Prior to field seaming, the operator shall overlap liners four to six inches...

19.15.34.12 A

(5) ...The operator shall minimize the number of field seams and corners and irregularly shaped areas. There shall be no horizontal seams within five feet of the slope's toe. Qualified personnel shall perform field welding and testing.

19.15.34.12 A

## Design and Construction Plan In Ground Containments

- slope's toe.
- vi. use qualified personnel to perform field welding and testing.
- vii. avoid excessive stress-strain on the liner
- viii. The edges of all liners are anchored in the bottom of a compacted earth-filled trench that is at least 18 inches deep

At points of discharge into the lined earthen containment the pipe configuration 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, 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 if the owner deems necessary during operations.

### *Leak Detection and Fluid Removal System Installation*

The leak detection system, contains the following design elements

- a. The 200-mil HyperNet Geonet drainage material between the primary and secondary liner that is sufficiently permeable to allow the transport of fluids to the observation ports (Appendix A).
- b. The containment floor is sloped towards the monitoring riser pipe to facilitate the earliest possible leak detection of the containment bottom. A pump may be placed in the observation port to provide for fluid removal.
- c. Piping will withstand chemical attack from any seepage, structural loading from stresses and disturbances from overlying water, cover materials, equipment operation or expansion or contraction (see Appendix A).

(3) The edges of all liners shall be anchored in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep.

19.15.34.12 A

(6) At a point of discharge into or suction from the recycling containment, the operator shall insure that the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines shall not penetrate the liner.

# Operation and Maintenance Plan In Ground Containments

## Overview

The operator will operate and maintain the lined earthen containment to contain liquids and solids (blow sand and minimal precipitates from the 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 is to facilitate recycling, reuse and reclamation of produced water derived from oil and gas wells. During periods when water for E&P operations is not needed, produced water will discharge to injection wells or to a pipeline for transfer to another recycling facility. The containment will not be used for the disposal of produced water or other oilfield waste.

The operation of the containment is summarized below.

- A. Produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
- B. Unless specified in the transmittal letter, after treatment, the produced water discharges into the containment.
- C. When required, produced water is removed from the containment for E&P operations. At this time, produced water will be used for drilling beneath the freshwater zones (beneath surface casing), for well stimulation (e.g. hydraulic fracturing) and other E&P uses as approved by OCD.
- D. Whenever the maximum fluid capacity of the containment is reached, treatment and discharge to the containment ceases (see Freeboard and Overtopping Plan, below).
- E. 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 (see attached example).
- F. 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.

19.15.34.10 D

Recycling containments may not be used for the disposal of produced water or other oilfield wastes.

19.15.34.9 E

The operator of a recycling facility shall 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.

19.15.34.9 F

The operator of a recycling facility shall 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.

## Operation and Maintenance Plan In Ground Containments

- G. 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.

19.15.34.13 C

A recycling 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 must 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 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 discovery, 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 Monitoring, Inspection, and Reporting Plan; below), 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 on site, 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.

19.15.34.13 B

(4) If the containment's primary liner is compromised above the fluid's surface, the operator shall 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.

(5) If the primary liner is compromised below the fluid's surface, the operator shall remove all fluid above the damage or leak within 48 hours of discovery, notify the division district office and repair the damage or replace the primary liner.

19.15.34.13 B

(7) The operator shall install, or maintain on site, an oil absorbent boom or other device to contain an unanticipated release.

(1) The operator shall remove any visible layer of oil from the surface of the recycling containment.

19.15.34.8 A

(6) All releases from the recycling and re-use of produced water shall be handled in accordance with 19.15.29 NMAC.

19.15.34.13

(6) The containment shall be operated to prevent the collection of surface water run-on.

## Operation and Maintenance Plan In Ground Containments

8. The operator will maintain the containment free of miscellaneous solid waste or debris.
9. The operator will maintain at least three feet of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-foot 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:

- reading and recording the fluid height of staff gauges,
- recording any evidence that the pond surface shows visible oil,
- visually inspecting the containment's exposed liners
- checking the leak detection system for any evidence of a loss of integrity of the primary liner.
- inspect diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
- inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.

As stated above, if a liner's integrity is compromised, or if any penetration of the liner occurs, then the operator will take appropriate action within 48 hours, based on if above or below water surface, as noted above.

19.15.34.13 B

(2) The operator shall maintain at least three feet of freeboard at each containment.

19.15.34.13 B

(3) The injection or withdrawal of fluids from the containment shall be accomplished through a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.

19.15.34.12 D

(1) The operator shall fence or enclose a recycling containment in a manner that deters unauthorized wildlife and human access and shall maintain the fences in good repair. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

19.15.34.13 A

The operator shall 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.

## Operation and Maintenance Plan In Ground Containments

Monthly, the operator will:

- A. 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.
- B. 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.
- C. 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-feet of freeboard), the discharge of produced water ceases and the produced water generated by nearby oil and gas wells is managed by an injection well(s).

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

- I. Cease discharging produced water to the containment.
- II. Accelerate re-use of the produced water for purposes approved by the Division.
- III. Transfer 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.

19.15.34.12 E

The operator shall on a monthly basis inspect for and, 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.

19.15.34.9 E

The operator of a recycling facility shall 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.

19.15.34.9 F

The operator of a recycling facility shall 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.

### *Protocol for Leak Detection Monitoring, Fluid Removal and Reporting*

As shown in Appendix A, 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-inch 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.

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 produced water from the containment via electrical 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.

## **Operation and Maintenance Plan In Ground Containments**

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.



*Overview*

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

- a. the condition that existed prior to the construction of the recycling containment or
- b. 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,

The surface owner will impose a closure design that conforms to their needs for the site. The operator understands that a variance will be submitted to OCD to allow for any alternative closure protocol.

*Excavation and Removal Closure Plan – Protocols and Procedures*

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

1. The operator will remove all liquids from the containment 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.
2. 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.
3. After the removal of the containment contents and liners, soils beneath the containment will be tested by collection of a five-point (minimum) composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I of 19.15.34.14.
4. After review of the laboratory results:
  - a. If any contaminant concentration is higher than the parameters listed in Table I, additional delineation may be required, and the operator must receive approval before proceeding with closure.

19.15.34.14 A

Once the operator has ceased operations, the operator shall 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.

19.15.34.14 E

The operator shall substantially restore the impacted surface area to the condition that existed prior to the construction of the recycling containment.

19.15.34.14 G

The re-vegetation and reclamation obligations imposed by federal, state trust land or tribal agencies on lands managed by those agencies shall supersede these provisions and govern the obligations of any operator subject to those provisions, provided that the other requirements provide equal or better protection of fresh water, human health and the environment.

19.15.34.14 B

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

19.15.34.14 C

The operator shall test the soils beneath the containment for contamination with a five-point composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I below.

19.15.34.14 C

(1) If any contaminant concentration is higher than the parameters listed in Table I, the division may require additional delineation upon review of the results 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 I, 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.

19.15.34.14 C

(2) If all contaminant concentrations are less than or equal to the parameters listed in Table I, then the operator can proceed to backfill with non-waste containing, uncontaminated, earthen material.

### *Reclamation and Re-vegetation*

- a. The operator will reclaim the containment's location to a safe and stable condition that blends with the surrounding undisturbed area.
- b. 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.
- c. The disturbed area shall then be reseeded in the first favorable growing season following closure of a recycling containment.

19.15.34.14 E

Once the operator has closed the recycling containment, the operator shall 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.

19.15.34.14 D

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.

19.15.34.14 H

The operator shall notify the division when reclamation and re-vegetation are complete.

19.15.34.14 F

Reclamation of all disturbed areas no longer in use shall be considered complete when 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.



## **Distance to Groundwater**

*Figure 1, Figure 1a, Figure 2, Figure 2a, and the discussion presented below demonstrate that groundwater (fresh water, as defined by NMOCD Rules) at the location is greater than the required 50 feet below the proposed Eddy State Recycling Facility and Containment.*

## **Hydrogeology of Eddy State Recycling Facility and Containment**

The site for the Eddy State Recycling Facility and Containment is located off Pipeline Road near the southern New Mexican border with Texas. It is roughly 2.7 miles east of the Pecos River. According to the geologic map of New Mexico (Seen in Figure 2), surface unit is Quaternary age older alluvium deposits (Qoa), which are described as follows:

Older alluvial deposits of upland plains and piedmont areas, and calcic soils and eolian cover sediments of High Plains region (middle to lower Pleistocene)—Includes scattered lacustrine, playa, and alluvial deposits of the Tahoka, Double Tanks, Tule, Blackwater Draw, and Gatuña Formations, the latter of which may be Pliocene at base; outcrops, however are basically of Quaternary deposits.

The Qoa in this area may include the Gatuña Formation beneath an upper veneer (5-20 feet) of sand and caliche. According to Ground-Water Report 3 by G.E. Hendrickson and R.S. Jones<sup>1</sup>, the Gatuña Formation exists in large sink depressions east of the Pecos River. Powers and Holt<sup>2</sup> map outcrop and subcrop of the Gatuña Formation from the east side of the Pecos River to near the Eddy State Containment location. The Permian Quartermaster Formation is probably absent beneath the containment site due to Tertiary or later erosion. In this area, based on oil well data, we can assume that the underlying unit in the area is the Rustler formation. A majority of the USGS wells displayed in Figures 1 and 2 are wells whose principal water-bearing unit is Rustler and the depth to water in these wells is between 60 and 120 feet. The Rustler Formation consists of siltstone, anhydrite, gypsum, sandstone and dolomite. The Salado formation underlies the Rustler formation consistently on the east side of the Pecos River, and we can presume this is the case in the area local to the Eddy State Facility. The Salado is a halite and anhydrite unit that acts as a barrier to groundwater flow from higher aquifers to lower aquifers and vice versa. Based on well completion logs from a nearby well (Lusitano 27-34FEDCOM734H from Devon Energy), we can see that the contact between the Rustler and Salado is at 1490 feet from the surface at the location of the well.

Topography is relatively flat with some gentle upslopes in the area. Surface soil appears to be thin with underlying caliche which outcrops in some erosional channels throughout the area. Surface vegetation is sparse, consisting mainly of mesquite, catclaw, creosote, rabbitbrush, and some cacti. Majority of mesquite, catclaw, and creosote appears to be dead. Carlsbad Soil & Water Conservation District affirms that the area has been treated for invasive mesquite and creosote (See Image 1). Small patches of green moss are visible in areas that appear to experience ephemeral drainage.

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<sup>1</sup> <https://geoinfo.nmt.edu/publications/water/gw/3/GW3.pdf>

<sup>2</sup> [https://nmgs.nmt.edu/publications/guidebooks/downloads/44/44\\_p0271\\_p0282.pdf](https://nmgs.nmt.edu/publications/guidebooks/downloads/44/44_p0271_p0282.pdf)



Image 1 – Vegetation along an ephemeral drainage channel in the area of the facility. Caliche pieces can be seen in the foreground of the image.

Figure 1 and 1a is a topographic map of the state of New Mexico and associated legend that displays the following:

- The Eddy State Recycling Facility identified by a blue polygon labeled by a yellow callout box.
- Water wells from the USGS database as dark and light green, red, brown, and dark purple triangles, and green squares with an “X” through (indicating a nearby pumping well). The colors indicate the principle water bearing-unit for each well: Alluvium/Bolsom, Santa Rosa, Forty-Niner Member of the Rustler Formation, Castle Formation, and Rustler Formation. The well number as defined in the USGS database, recorded depth to water value, and date the value was recorded is displayed next to the corresponding well point.
- Miscellaneous water wells from non-public databases that were identified by field inspection or other published documents are represented by yellow, blue, and green squares with black dots at the center. The colors correspond to the depth to water recorded in the RT Hicks database. The depth to water and date the depth to water value was recorded are also displayed.
- Water wells from the Office of the State Engineer WATERS database as light blue, light green, and dark blue circles with colored triangles that represent the depth to water. Well ID as documented in the OSE WATERS database, depth to water value, and the date the value was recorded.

Figure 2 and Figure 2a is a topographic map overlain by a transparent geologic map of the state of New Mexico and a potentiometric surface map and the associated legend that displays the following:

- The Eddy State Recycling Facility identified by a blue polygon labeled by a yellow callout box.
- Water wells from the USGS database as dark and light green, red, brown, dark purple, and light blue triangles. The colors indicate the principle water bearing-unit for each well: Alluvium/Bolsom, Santa Rosa, Forty-Niner Member of the Rustler Formation, Castle Formation, Rustler Formation, and Not Defined. The well number as defined in the USGS database, recorded groundwater elevation value, and date the value was recorded is displayed next to the corresponding well point.
- Miscellaneous water wells from non-public databases that were identified by field inspection or other published documents are represented by yellow, blue, and green squares with black dots at the center. The colors correspond to the depth to water recorded in the RT Hicks database. The groundwater elevation and date the ground water elevation value was recorded are also displayed near the representative point on the map.
- Isocontours of a potentiometric surface from the RT Hicks database. USGS and Miscellaneous wells and their groundwater elevation values were used to create the potentiometric surface.

We queried the OSE database for nearby driller's logs of water wells to gain information regarding the depth to the uppermost water-bearing unit and the characteristics of the aquifer. We found the following information (see also Appendix A):

- Well C-3483 is about 3.75 miles east of the proposed containment and the well log indicates:
  - Dry sand, brown clay and sandstone appears to overlie the water-bearing unit from surface to 200 feet.
  - First encountered water is 200 feet below land surface in "hard sandstone fractures" that is underlain by gray shale
  - Below the gray shale that did not produce water is gray clay layers, gravel layers and hard sandstone with fractures, most of which produce water
- Well C-3782 was drilled in 2015, lies about 4 miles to the northeast and has a detailed well log. This well shows
  - The same dry, clayey brown sand as described above to a depth of 260 feet
  - Water is observed in brown, fine sand and silty sand from 260 feet to 380 feet
  - Saturated gray fine sandy clay or clayey sand exist from 380 feet
  - At 760 feet the lithology is dominantly clay and red.
- Well C-3507 is 3 miles east of the containment and west of the Pecos River. We did not employ this well in our evaluation

The data are too sparse to allow a confident conclusion, but these data and other data from nearby wells suggest that the Rustler is the aquifer beneath the containment and probably does not produce sufficient water for stock in this area. East of the containment it is possible

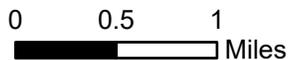
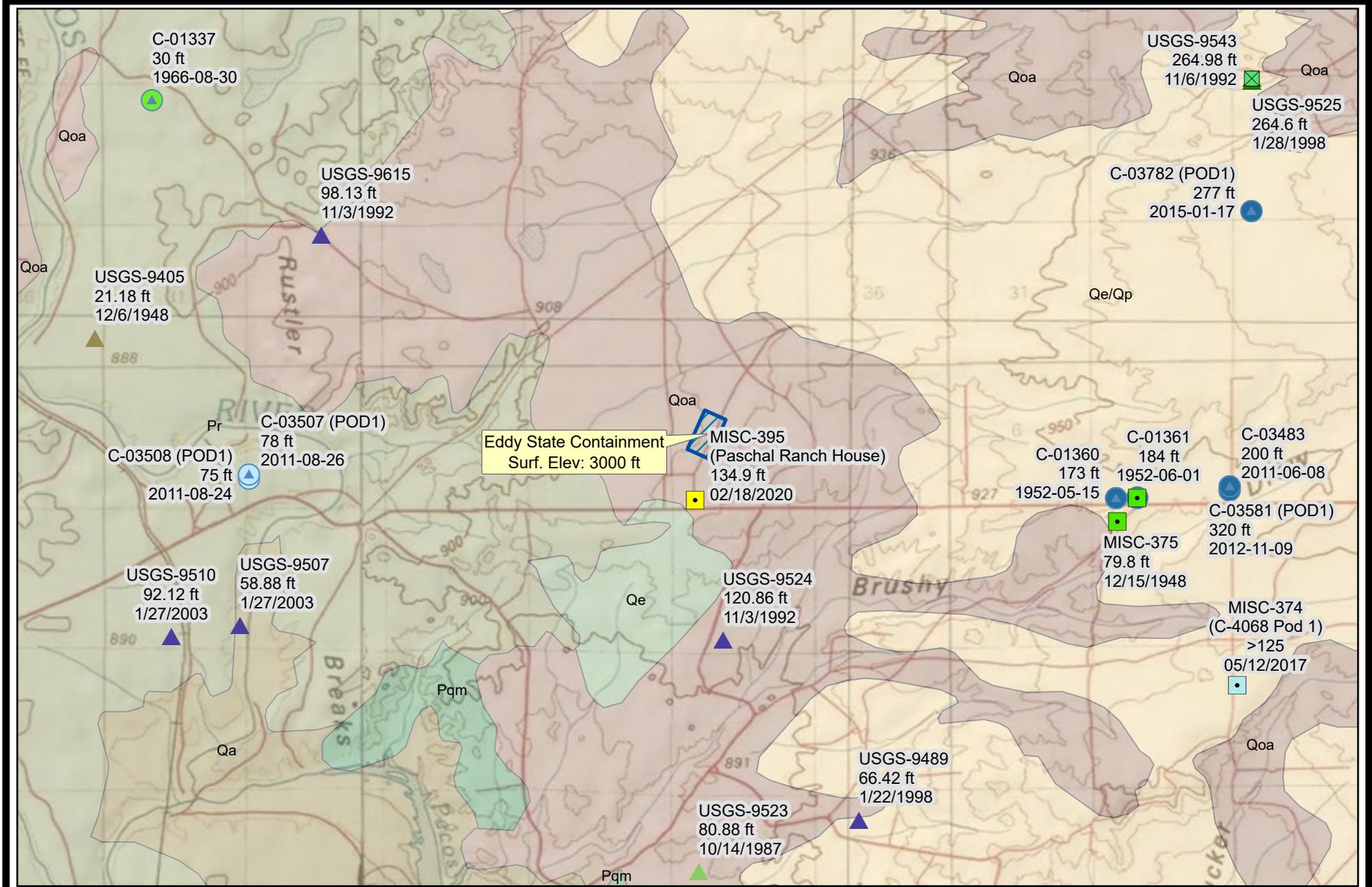
that the uppermost water bearing unit is the Gatuña Formation. Perhaps the Quartermaster is the gray silty sand/sandy clay unit observed from 320 feet 760 feet. The groundwater in this area does not appear to be under significant confining pressure based upon these available data.

### ***Depth to Groundwater***

We employed Google Earth and USGS topographic maps to identify locations of any nearby wells.

- We found no evidence of USGS-9524 in historic air photos or topographic maps
- We measured a depth to water of 134.9 feet in well just east of the ranch house to the south of the proposed containment. The grazing lessee indicated was recently drilled but did not produce sufficient water for stock and was not pumped as a result.
- We believe this well is USGS-9524 is mis-located in the USGS database and the correct location is an abandoned windmill at the ranch house.
- Figure 2 shows that the potentiometric surface beneath the containment is about 2880

The surveyed elevation of the Eddy State Containment is 3000 feet ASL. Thus, the estimated depth to water is  $(3000-2880) = 120$  feet



**R.T. Hicks Consultants, Ltd**  
 901 Rio Grande Blvd NW Suite F-142  
 Albuquerque, NM 87104  
 Ph: 505.266.5004

**Depth to Water and Geology**  
 Solaris Midstream –  
 Eddy State Recycling Containment Facility

**Figure 1**  
 April 2020



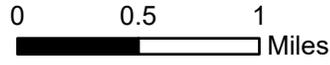
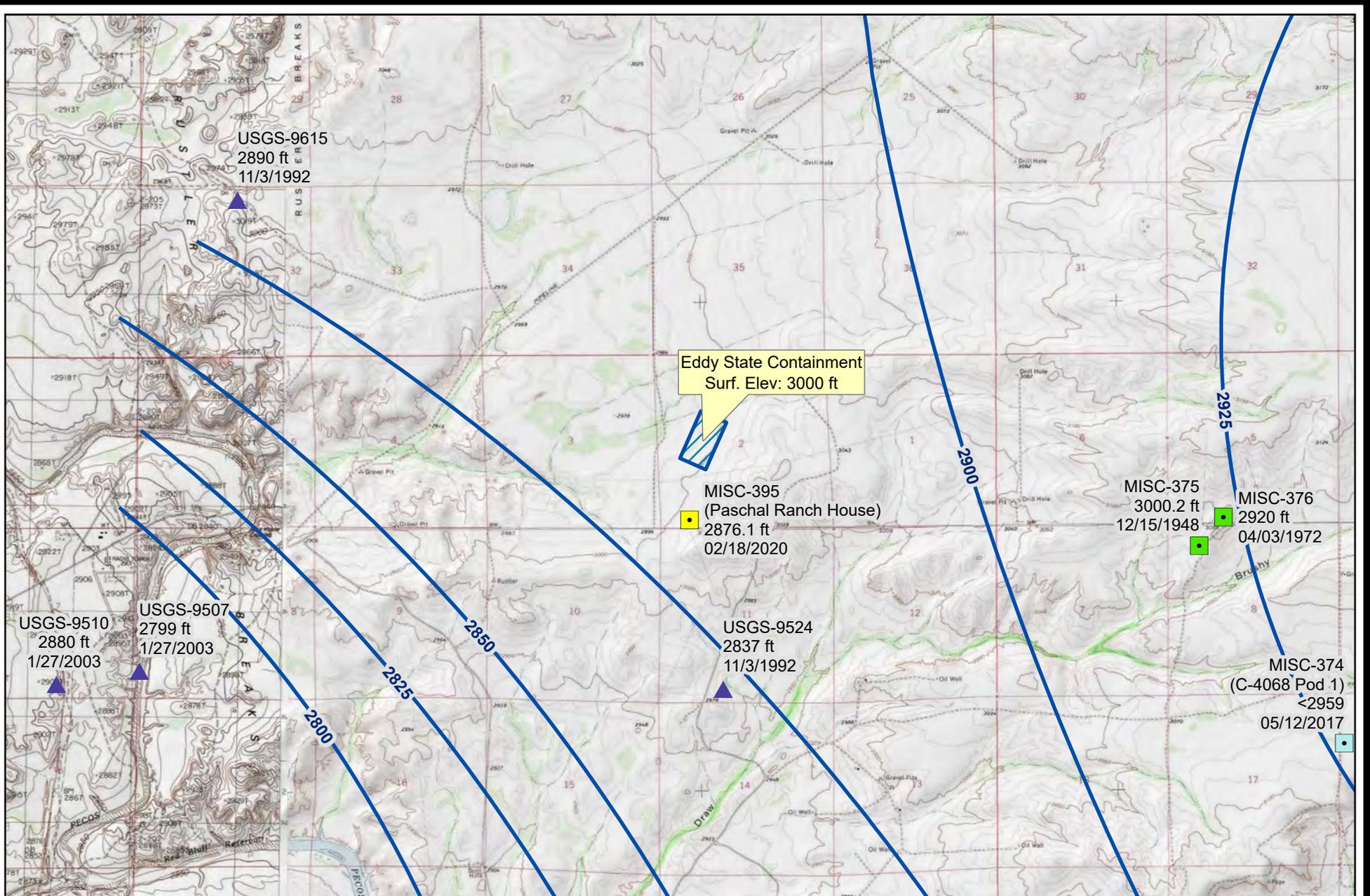
R.T. Hicks Consultants, Ltd  
 901 Rio Grande Blvd NW Suite F-142  
 Albuquerque, NM 87104  
 Ph: 505.266.5004

Depth to Water and Geology

Figure 1a

Solaris Midstream –  
 Eddy State Recycling Containment Facility

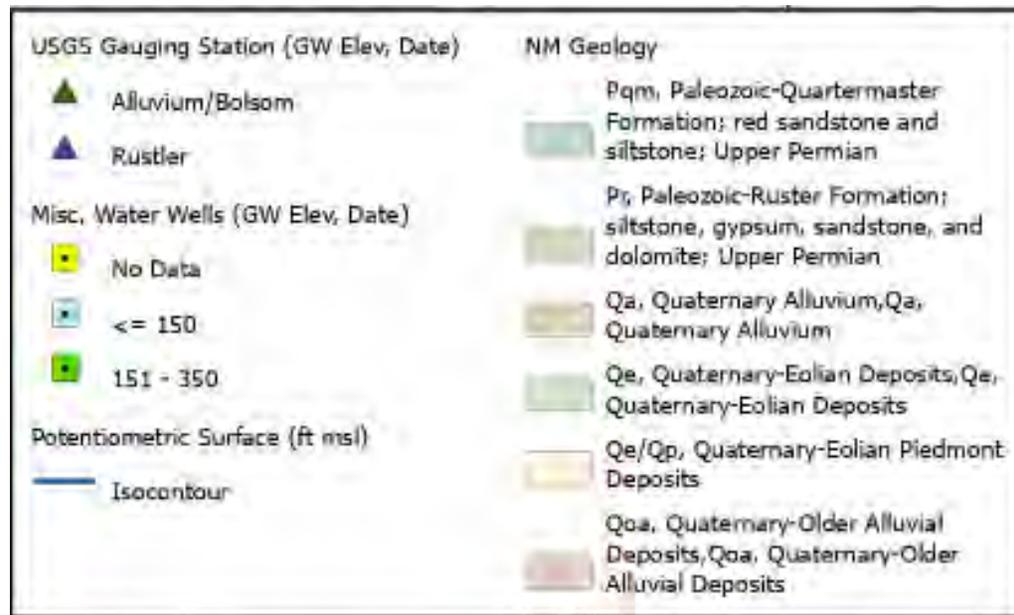
April 2020



**R.T. Hicks Consultants, Ltd**  
 901 Rio Grande Blvd NW Suite F-142  
 Albuquerque, NM 87104  
 Ph: 505.266.5004

**Groundwater Elevation and Geology**  
 Solaris Midstream –  
 Eddy State Recycling Facility

**Figure 2**  
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R.T. Hicks Consultants, Ltd  
 901 Rio Grande Blvd NW Suite F-142  
 Albuquerque, NM 87104  
 Ph: 505.266.5004

Groundwater Elevation and Geology

Figure 2a

Solaris Midstream –  
 Eddy State Recycling Containment Facility

April 2020

### **Distance to Municipal Boundaries and Freshwater Fields**

*Figure 3 demonstrates that the area of interest is not within incorporated municipal boundaries or within defined municipal freshwater well fields covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended*

- The closest municipality is Malaga, NM, which is about 12 miles to the north west.
- The closest mapped well field is near Carlsbad, NM, which is approximately 21.5 miles to the northwest.

### **Distance to Subsurface Mines**

*Figure 4 and our general reconnaissance of the area demonstrate the proximity of subsurface mines.*

- The nearest mapped surface mine is a gravel pit and lies approximately 1.8 miles directly to the west.
- An unmapped, restored caliche pit is about 1.25 miles west-northwest of the proposed containment and is visible in Figure 8
- There are no subsurface mines in the area.

### **Distance to High or Critical Karst Areas**

*Figure 5 illustrates the Eddy State Recycling Facility's proximity to areas of high or critical karst potential.*

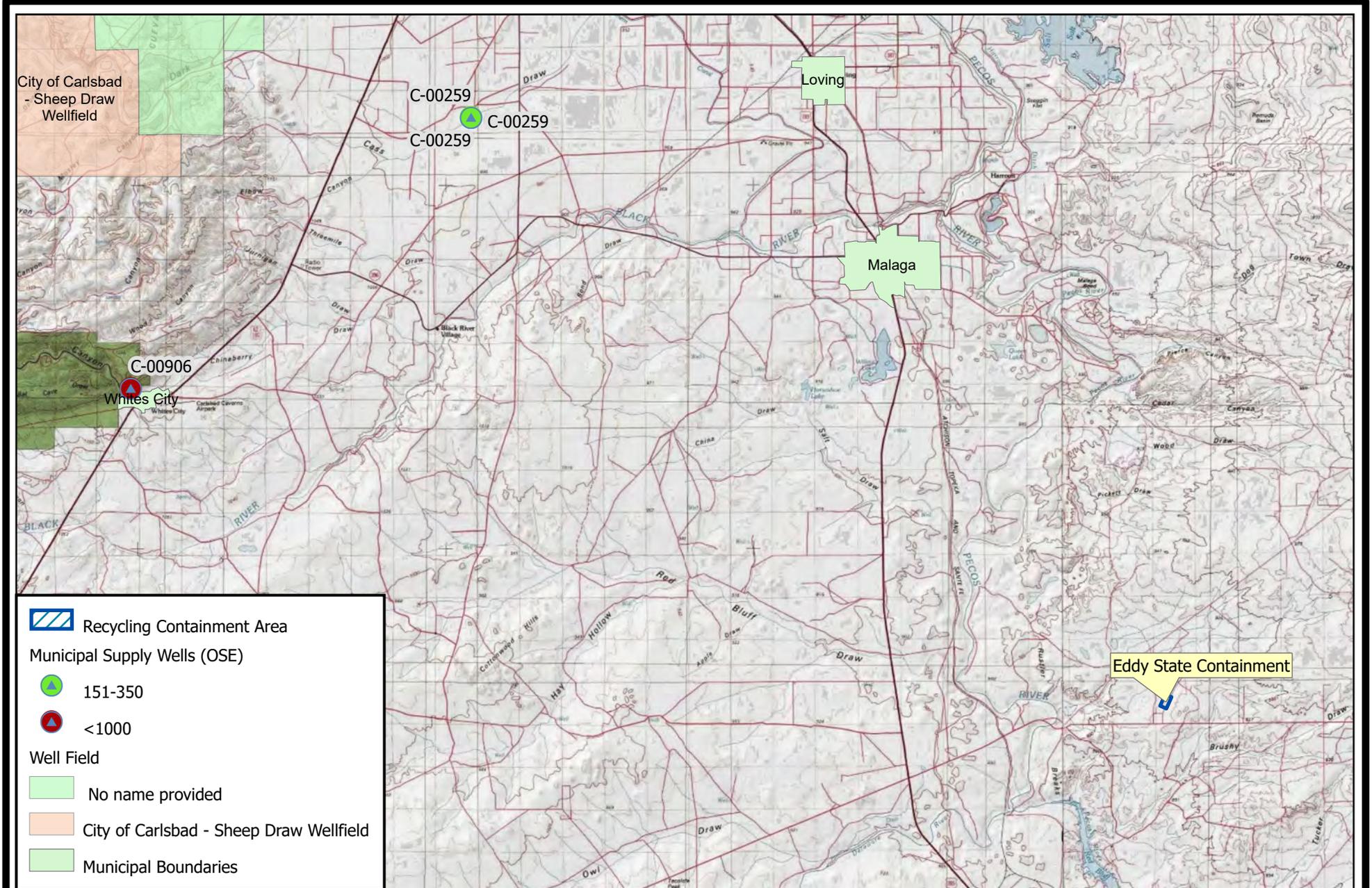
- The proposed location for the recycling facility is wholly contained within an area considered medium karst potential by the Bureau of Land Management.
- Our field investigation identified caliche at the surface near the containment and this caliche layer is about 10 feet thick, based upon observations at the restored caliche pit mentioned above
- The well log for the adjacent Eddy State SWD shows the top of anhydrite at 1732 feet and the surface casing to protect fresh water set at 575 feet

We conclude that the soluble rock units of the Rustler that cause ground instability (e.g. anhydrite) or caverns are sufficiently deep that a classification of low karst potential may be warranted.

### **Distance to 100-Year Floodplain**

*Figure 6 and 6a demonstrate the proximity of 100-year flood plains with respect to the proposed location for the Eddy State Recycling Facility.*

- The proposed location lies east of a 100-year flood plain the proposed location is not within a 100-year floodplain



 Recycling Containment Area

Municipal Supply Wells (OSE)

-  151-350
-  <1000

Well Field

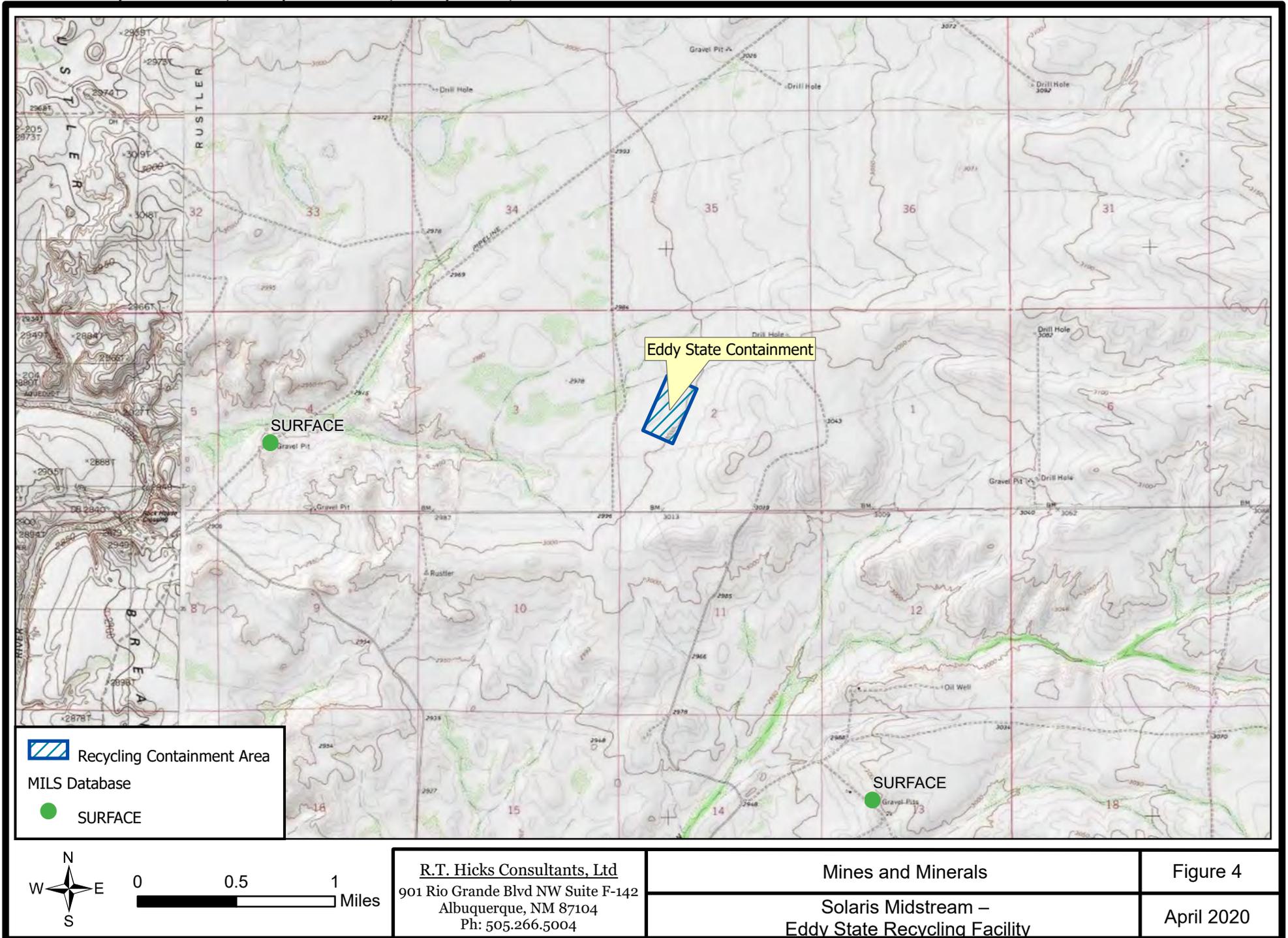
-  No name provided
-  City of Carlsbad - Sheep Draw Wellfield
-  Municipal Boundaries



**R.T. Hicks Consultants, Ltd**  
 901 Rio Grande Blvd NW Suite F-142  
 Albuquerque, NM 87104  
 Ph: 505.266.5004

**Well Fields and Municipalities**  
 Solaris Midstream –  
 Eddy State Recycling Facility

**Figure 3**  
 April 2020



Eddy State Containment

SURFACE

SURFACE

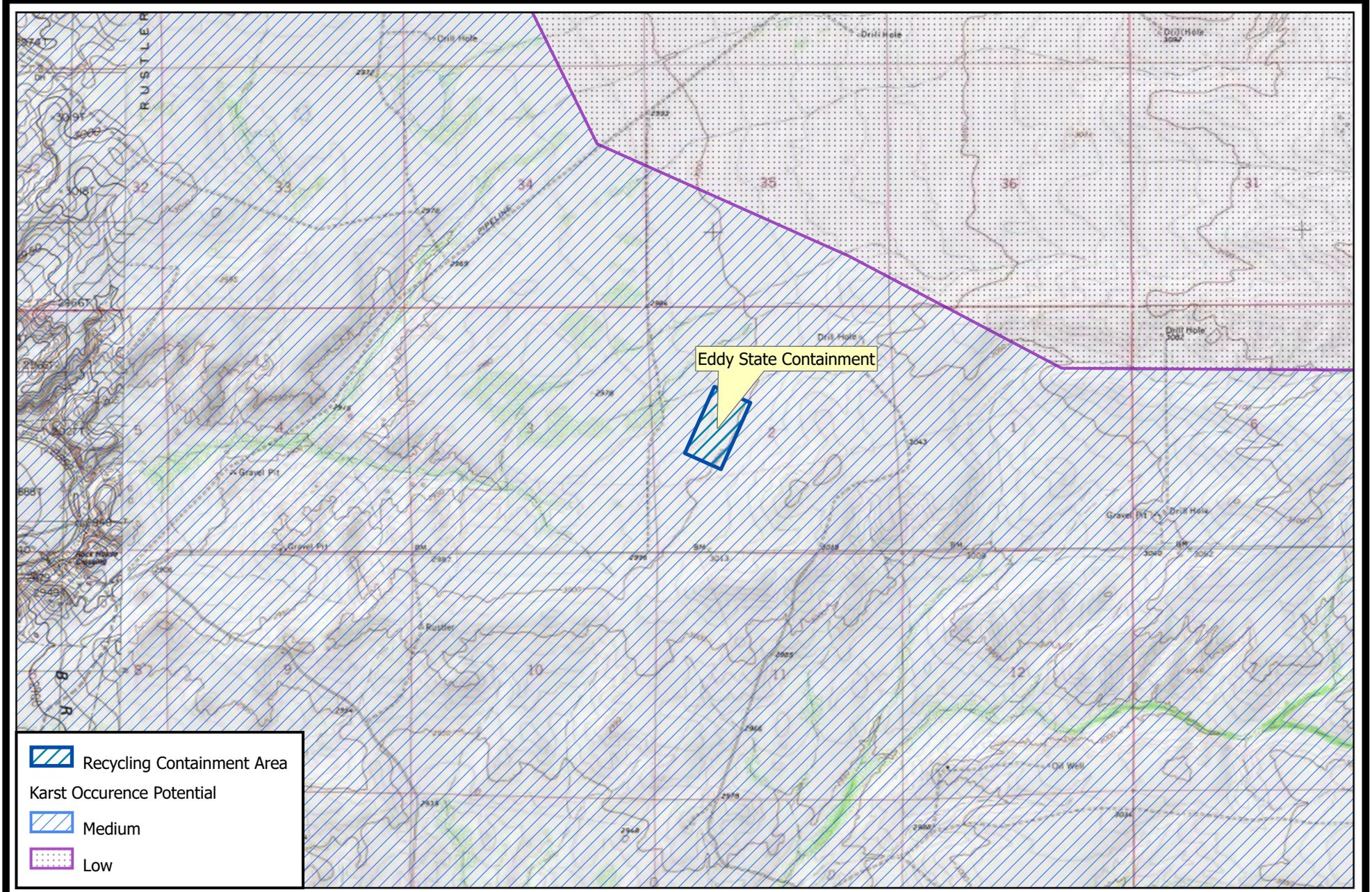
-  Recycling Containment Area
- MILS Database
-  SURFACE



R.T. Hicks Consultants, Ltd  
901 Rio Grande Blvd NW Suite F-142  
Albuquerque, NM 87104  
Ph: 505.266.5004

Mines and Minerals  
Solaris Midstream –  
Eddy State Recycling Facility

Figure 4  
April 2020

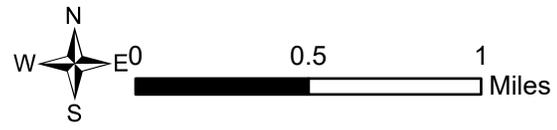


 Recycling Containment Area

Karst Occurrence Potential

 Medium

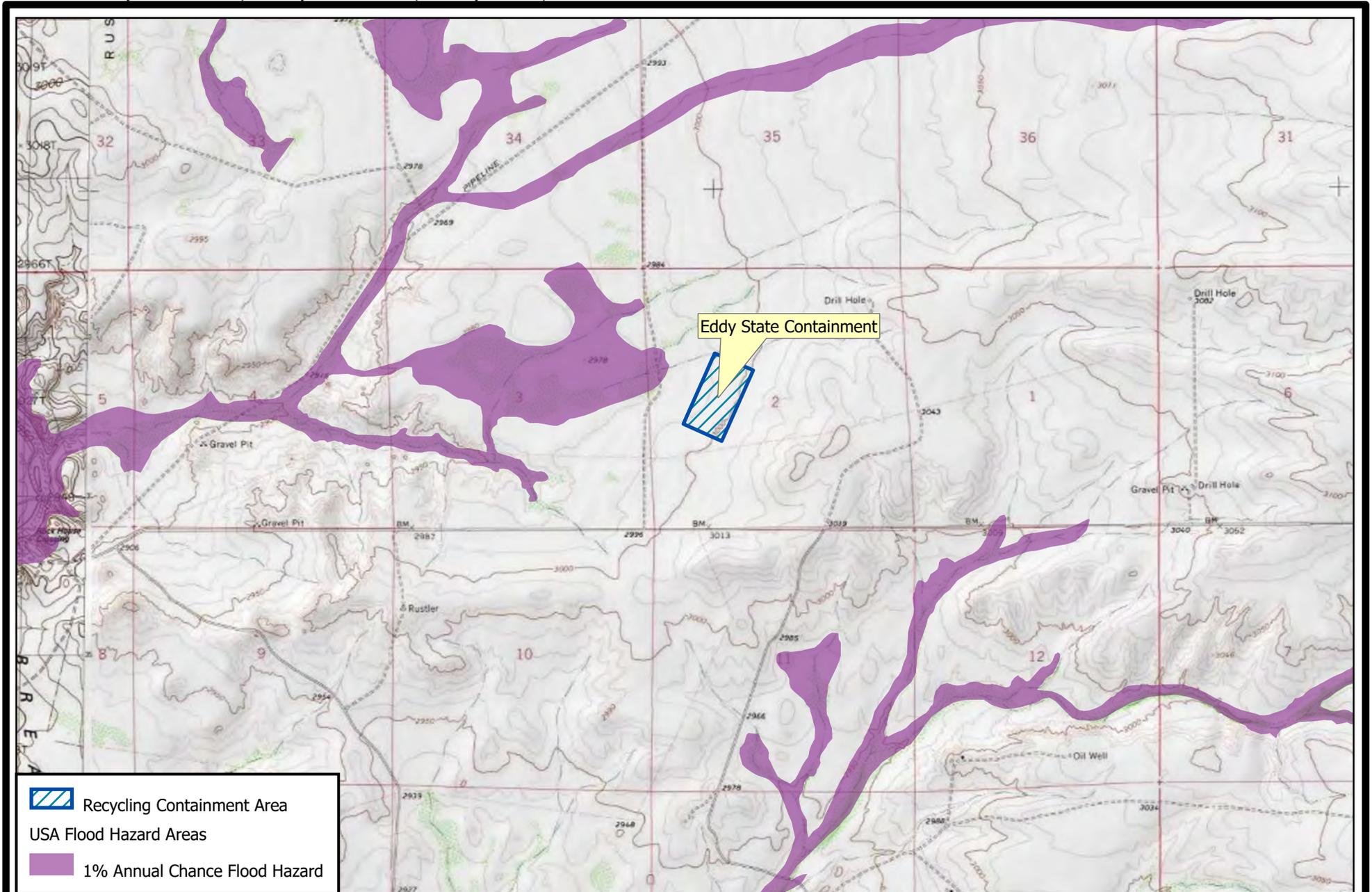
 Low



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Albuquerque, NM 87104  
Ph: 505.266.5004

Karst Potential  
Solaris Midstream -  
Eddy State Recycling Facility

Figure 5  
April 2020



 Recycling Containment Area  
USA Flood Hazard Areas  
 1% Annual Chance Flood Hazard

W  E 0 0.5 1 Mile  
S

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Ph: 505.266.5004

FEMA Flood Hazard Areas  
Solaris Midstream -  
Eddy State Recycling Facility

Figure 6  
April 2020

### **Distance to Surface Water**

*Figure 7 and 7a and the site visit demonstrate the proximity of the area of interest to a continuously flowing watercourse, lakebed, sinkhole, playa lake (measured from the ordinary high-water mark) or spring.*

- The proposed location for the Eddy State Recycling Facility is about 260 feet from the nearest mapped intermittent streams
- As shown in the site photographs (Appendix X), numerous small drainages *without* a defined bed or bank flow into the mapped watercourse from within the footprint of the proposed containment.
- Many of the natural drainages shown in Google Earth images prior to August 8, 2008 have been disturbed by
  - A pipeline installed prior to 5/8/2009
  - Additional pipeline(s) installed prior to 11/5/2015
  - The lease road installed prior to the 4/22/2017 spud of the Eddy State SWD

All of these small channels that originate on a small alluvial fan at the foot of the small caliche-topped hill to the east of the proposed containment become effectively “lost” as the slope decreases to the west and some small depressions with vegetation effectively capture the overland flow. Thus, there are no drainages with a defined bed and bank that connect to the mapped watercourse.

Regardless of the fact that these small drainages that exist within the footprint of the containments are not “significant watercourses” as defined by the Rule, the stamped plans of the NM Registered Engineer will provide for a diversion of overland flow via engineered swales and erosion of the levee around the containments is effectively mitigated.

### **Distance to Permanent Residences or Structures**

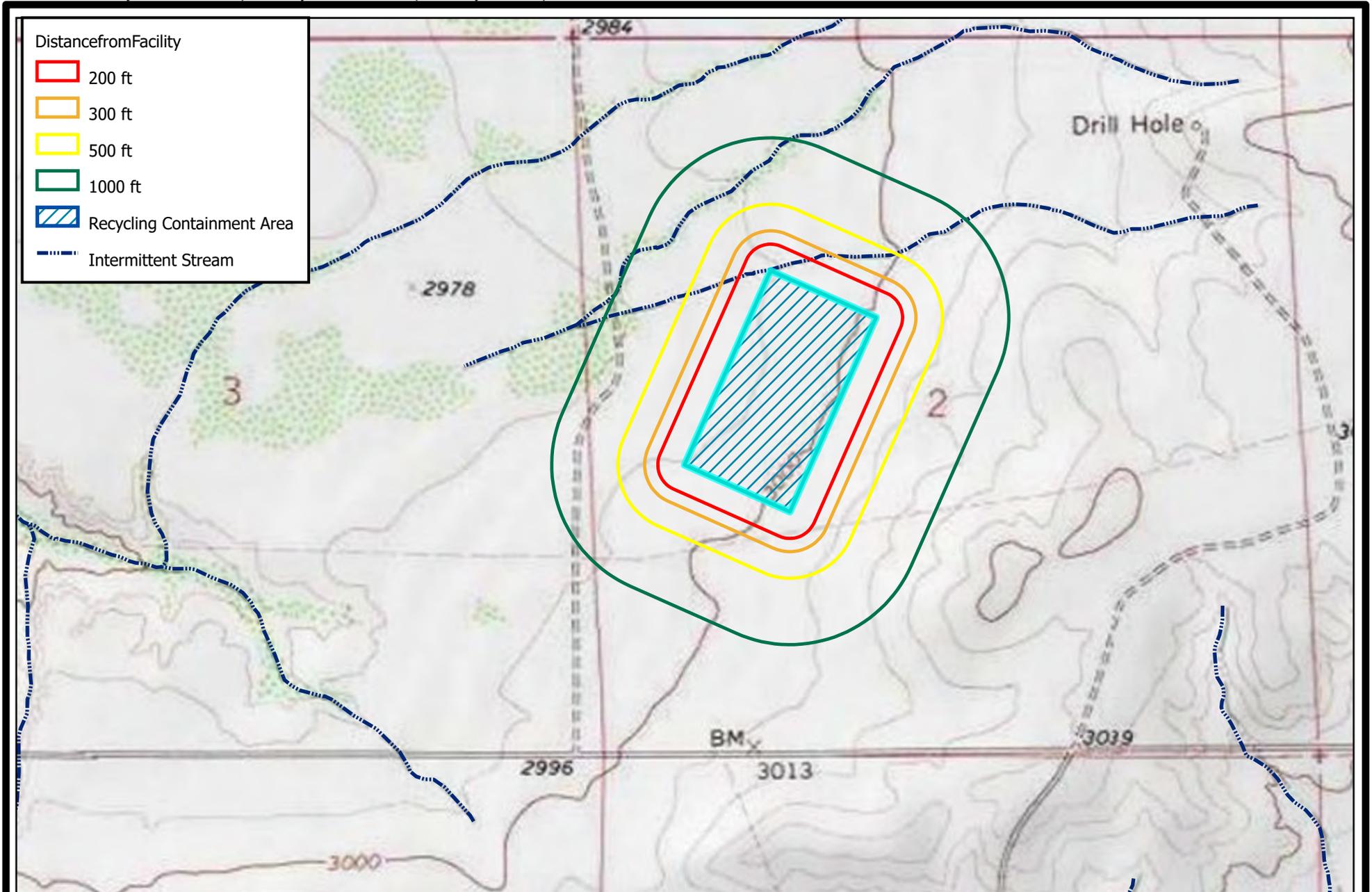
*Figure 8 demonstrates the proximity of the proposed site for the Eddy State Recycling Facility to an occupied permanent residence, school, hospital, institution, church or other structure at the time of the initial application.*

- The only structures near the proposed site are well pads and tank batteries.

### **Distance to Non-Public Water Supply**

*Figures 1, 7, and 7a demonstrate the area of interest’s proximity to a spring or freshwater well used for domestic or stock watering purposes, in existence at the time of initial application.*

- Figure 1 shows the location of all area water wells. The nearest well is located just over 1700 feet to the south of the proposed site (MISC-395).
  - During the site visit, we encountered the lease owners and spoke with them about the well.
- No springs were identified in the area.

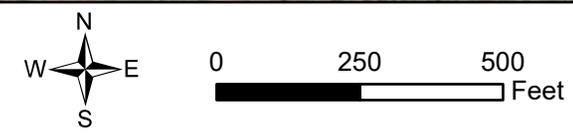


0 0.13 0.25  
Miles

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901 Rio Grande Blvd NW Suite F-142  
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Nearby Surface Water  
Solaris Midstream -  
Eddy State Recycling Facility

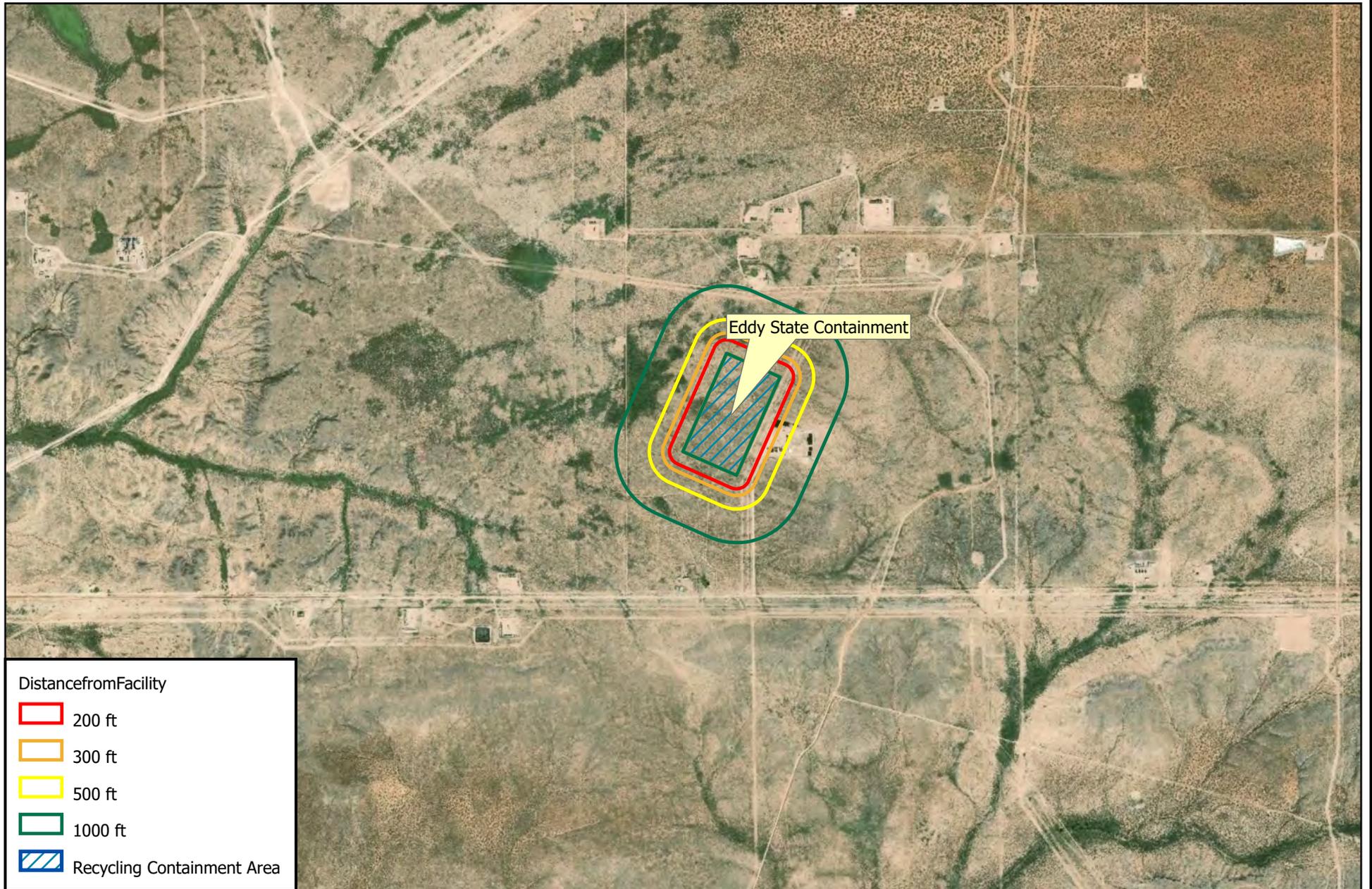
Figure 7  
April 2020



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901 Rio Grande Blvd NW Suite F-142  
Albuquerque, NM 87104  
Ph: 505.266.5004

Nearby Surface Water  
with Ponds and AST  
Solaris Midstream -  
Eddy State Recycling Facility

Figure 7a  
April 2020



DistancefromFacility	
	200 ft
	300 ft
	500 ft
	1000 ft
	Recycling Containment Area



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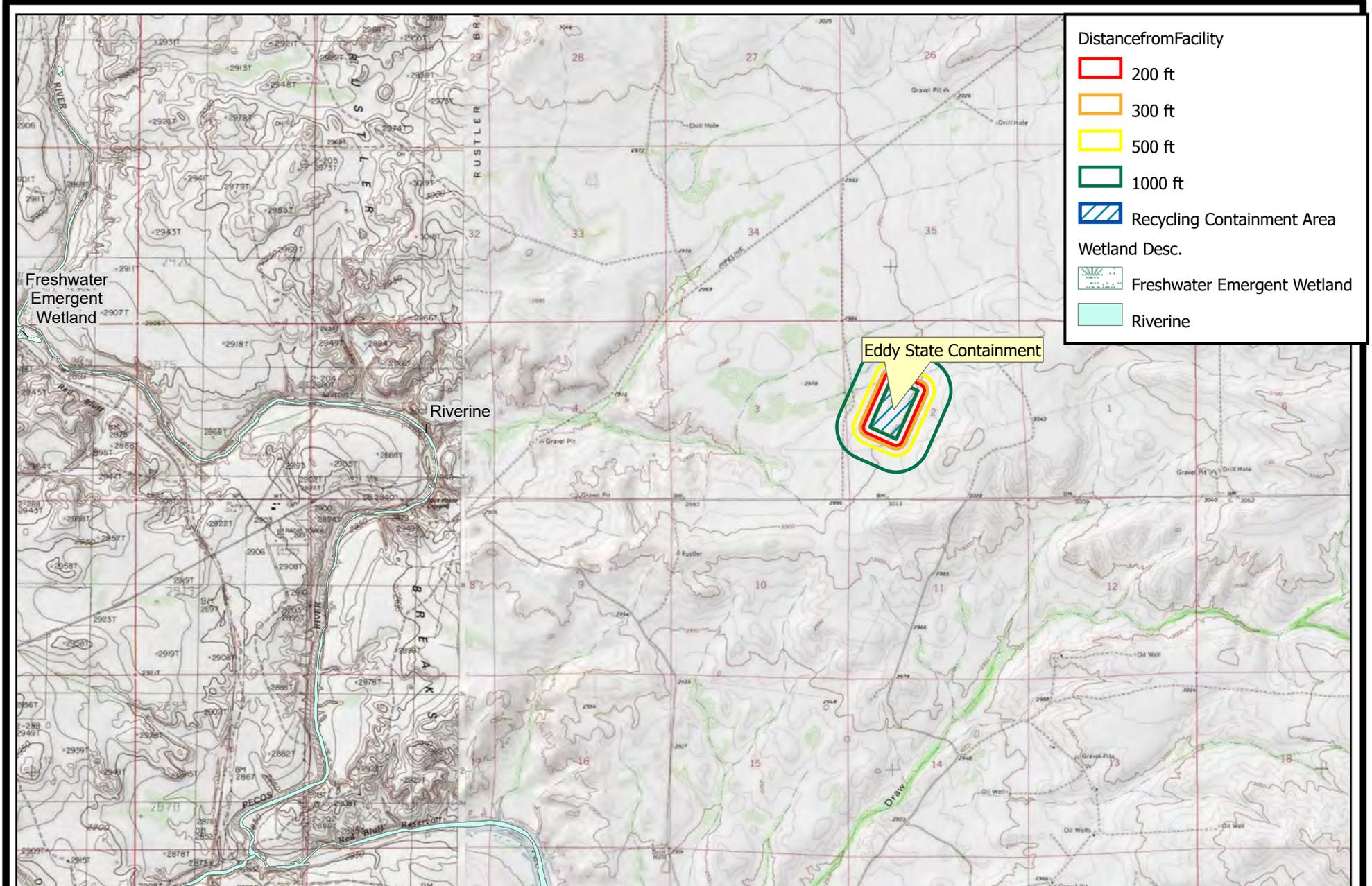
Nearby Structures
Solaris Midstream - Eddy State Recycling Facility

Figure 8
April 2020

### **Distance to Wetlands**

*Figure 9 demonstrates the proximity of wetlands to the proposed site of the Eddy State Recycling Facility.*

- The nearest mapped wetland is a riverine wetland that is approximately 2 miles due west from the proposed location of the recycling facility.



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 901 Rio Grande Blvd NW Suite F-142  
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 Ph: 505.266.5004

Nearby Mapped Wetlands  
 Solaris Midstream -  
 Eddy State Recycling Facility

Figure 9  
 April 2020

## APPENDIX OSE WELL LOGS



# WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

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1. GENERAL AND WELL LOCATION	POD NUMBER (WELL NUMBER) <b>C-3483-POD1</b>				OSE FILE NUMBER(S) <b>C-3483</b>									
	WELL OWNER NAME(S) <b>Gregory Rockhouse Ranch Inc. &amp; BLM.</b>				PHONE (OPTIONAL)									
	WELL OWNER MAILING ADDRESS <b>1108 W Pierce CARLSBAD, NM 88220</b>				CITY <b>CARLSBAD</b>		STATE <b>NM</b>		ZIP <b>88220</b>					
	WELL LOCATION (FROM GPS)		DEGREES <b>32</b>	MINUTES <b>03</b>	SECONDS <b>56.50</b>	N		* ACCURACY REQUIRED: ONE TENTH OF A SECOND						
		LONGITUDE <b>103</b>	<b>53</b>	<b>42.20</b>	W		* DATUM REQUIRED: WGS 84							
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS <b>0.5 miles east of EPNG well C-1361 Well Located on North Side of Pipeline Road, just east of oil/gas Pad</b>														
2. OPTIONAL	(2.5 ACRE) <b>NE 1/4</b>		(10 ACRE) <b>SE 1/4</b>		(40 ACRE) <b>SE 1/4</b>		(160 ACRE) <b>SE 1/4</b>		SECTION <b>05</b>	TOWNSHIP <b>26S</b>	RANGE <b>30</b>		<input type="checkbox"/> NORTH <input checked="" type="checkbox"/> SOUTH <input type="checkbox"/> WEST	
	SUBDIVISION NAME					LOT NUMBER		BLOCK NUMBER		UNIT/TRACT				
	HYDROGRAPHIC SURVEY							MAP NUMBER		TRACT NUMBER				
3. DRILLING INFORMATION	LICENSE NUMBER <b>WD-1509</b>		NAME OF LICENSED DRILLER <b>JOE ROYBAL &amp; RICHARD BEUREGARD</b>				NAME OF WELL DRILLING COMPANY <b>BMS DRLG</b>							
	DRILLING STARTED <b>06-03-11</b>		DRILLING ENDED <b>06-08-11</b>		DEPTH OF COMPLETED WELL (FT) <b>700'</b>		BORE HOLE DEPTH (FT) <b>700'</b>		DEPTH WATER FIRST ENCOUNTERED (FT) <b>200'</b>					
	COMPLETED WELL IS: <input type="checkbox"/> ARTESIAN <input type="checkbox"/> DRY HOLE <input type="checkbox"/> SHALLOW (UNCONFINED)								STATIC WATER LEVEL IN COMPLETED WELL (FT) <b>200</b>					
	DRILLING FLUID: <input type="checkbox"/> AIR <input checked="" type="checkbox"/> MUD <input type="checkbox"/> ADDITIVES - SPECIFY:													
	DRILLING METHOD: <input type="checkbox"/> ROTARY <input type="checkbox"/> HAMMER <input type="checkbox"/> CABLE TOOL <input type="checkbox"/> OTHER - SPECIFY: <b>TOP HEAD DRIVE</b>													
	DEPTH (FT)		BORE HOLE DIA. (IN)		CASING MATERIAL		CONNECTION TYPE (CASING)		INSIDE DIA. CASING (IN)		CASING WALL THICKNESS (IN)		SLOT SIZE (IN)	
	FROM	TO												
<b>0</b>	<b>700</b>	<b>12"</b>	<b>PVC (SCH 40)</b>	<b>GLUED</b>	<b>8"</b>	<b>1/2"</b>	<b>3000</b>							
DEPTH (FT)		THICKNESS (FT)		FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)						YIELD (GPM)				
FROM	TO													
<b>200</b>	<b>255</b>	<b>55</b>	<b>SAND STONE WITH FRACTURES</b>						<b>35</b>					
<b>285</b>	<b>320</b>	<b>45</b>	<b>&amp; SAND</b>											
<b>320</b>	<b>360</b>	<b>40</b>	<b>SAME FORMATION FRACTURES</b>						<b>30</b>					
<b>510</b>	<b>650</b>	<b>140</b>	<b>MIX GRAVEL GREEN CLAY - NOT MUCH WATER IN THIS FORMATION</b>											
METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA <b>BAILER</b>								TOTAL ESTIMATED WELL YIELD (GPM) <b>50+</b>						

STATE ENGINEER OFFICE  
ROSWELL, NM 87050

FOR OSE INTERNAL USE		WELL RECORD & LOG (Version 6/9/08)	
FILE NUMBER <b>C-3483</b>	POD NUMBER <b>C-3483-POD1</b>	TRN NUMBER <b>476565</b>	PAGE 1 OF 2
LOCATION <b>26.30.5.4442423</b>			

5. SEAL AND PUMP	TYPE OF PUMP: <input checked="" type="checkbox"/> SUBMERSIBLE <input type="checkbox"/> JET <input type="checkbox"/> NO PUMP - WELL NOT EQUIPPED <input type="checkbox"/> TURBINE <input type="checkbox"/> CYLINDER <input type="checkbox"/> OTHER - SPECIFY:						
	ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT)		BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
		FROM	TO				
	0	700	12"	3/8 ROUND GRAVEL		SHOVEL	

6. GEOLOGIC LOG OF WELL	DEPTH (FT)		THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?	
	FROM	TO			YES	NO
	0	180	180'	SAND + BROWN CLAY	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	180	200	20'	SAND STONE LAYER	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	200	255	55'	HARD SAND STONE FRACTURES	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
	255	265	10'	GRAY CLAY SHALE	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	265	275	10'	SAND GRAVEL	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
	275	285	10'	GRAY CLAY WITH GRAVEL	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	285	320	35'	HARD SAND STONE FRACTURES	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
	320	360	40'	SAME FORMATION	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
	360	445	85'	BROWN CLAY SHALE	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	445	510	65'	SAME FORMATION	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	510	650	40'	GRAVEL MIXED WITH CLAY (GREEN)	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
	650	700	50'		<input type="checkbox"/> YES	<input type="checkbox"/> NO
				PERFS 180' TO 260'	<input type="checkbox"/> YES	<input type="checkbox"/> NO
				280 TO 360'	<input type="checkbox"/> YES	<input type="checkbox"/> NO
				500 TO 680'	<input type="checkbox"/> YES	<input type="checkbox"/> NO
					<input type="checkbox"/> YES	<input type="checkbox"/> NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO	WELL TEST	METHOD: <input checked="" type="checkbox"/> BAILER <input type="checkbox"/> PUMP <input type="checkbox"/> AIR LIFT <input type="checkbox"/> OTHER - SPECIFY:
		TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.
	ADDITIONAL STATEMENTS OR EXPLANATIONS:	
Well Location: North side of Pipeline Road, 0.5 miles east of El Paso Natural Gas well C-1361.		

8. SIGNATURE	THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:	
		7-14-11
	SIGNATURE OF DRILLER	DATE

FOR OSE INTERNAL USE ONLY	STATE ENGINEER OFFICE ROSWELL, NEW MEXICO	WELL RECORD & LOG (Version 6/9/08)
FILE NUMBER	C-3483	POD NUMBER C-23483-POD1
LOCATION	26-30-S-442423	TRN NUMBER 476565
		PAGE 2 OF 2



# WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

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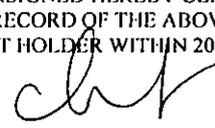
STATE ENGINEER OFFICE  
ROSWELL, NEW MEXICO

1. GENERAL AND WELL LOCATION	POD NUMBER (WELL NUMBER) <b>2: C-03507-POD1</b>				OSE FILE NUMBER(S) <b>2011 SEP 12 1P 2:35</b> C 03507				
	WELL OWNER NAME(S) <b>M. BRAD BENNETT</b>				PHONE (OPTIONAL)				
	WELL OWNER MAILING ADDRESS <b>P.O. BOX 51510</b>				CITY <b>MIDLAND</b>	STATE <b>TX</b>	ZIP <b>79710</b>		
	WELL LOCATION (FROM GPS)	DEGREES LATITUDE <b>32</b>	MINUTES <b>4</b>	SECONDS <b>2.04</b> N	* ACCURACY REQUIRED: ONE TENTH OF A SECOND * DATUM REQUIRED: WGS 84				
LONGITUDE <b>104</b> <b>0</b> <b>50.52</b> W								DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS	
2. OPTIONAL	(2.5 ACRE) <b>NW 1/4</b>	(10 ACRE) <b>NW 1/4</b>	(40 ACRE) <b>SW 1/4</b>	(160 ACRE) <b>SW 1/4</b>	SECTION <b>5</b>	TOWNSHIP <b>26</b>	<input type="checkbox"/> NORTH <input checked="" type="checkbox"/> SOUTH	RANGE <b>29</b>	<input checked="" type="checkbox"/> EAST <input type="checkbox"/> WEST
	SUBDIVISION NAME				LOT NUMBER	BLOCK NUMBER	UNIT/TRACT		
	HYDROGRAPHIC SURVEY					MAP NUMBER	TRACT NUMBER		
3. DRILLING INFORMATION	LICENSE NUMBER <b>WD 1058</b>	NAME OF LICENSED DRILLER <b>CLINTON KEY</b>			NAME OF WELL DRILLING COMPANY <b>KEYS DRILLING AND PUMP SVC.</b>				
	DRILLING STARTED <b>8/26/11</b>	DRILLING ENDED <b>8/26/11</b>	DEPTH OF COMPLETED WELL (FT) <b>140</b>	BORE HOLE DEPTH (FT) <b>140</b>	DEPTH WATER FIRST ENCOUNTERED (FT) <b>78</b>				
	COMPLETED WELL IS: <input type="checkbox"/> ARTESIAN <input type="checkbox"/> DRY HOLE <input checked="" type="checkbox"/> SHALLOW (UNCONFINED)				STATIC WATER LEVEL IN COMPLETED WELL (FT) <b>78</b>				
	DRILLING FLUID: <input checked="" type="checkbox"/> AIR <input type="checkbox"/> MUD <input type="checkbox"/> ADDITIVES - SPECIFY:								
	DRILLING METHOD: <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> HAMMER <input type="checkbox"/> CABLE TOOL <input type="checkbox"/> OTHER - SPECIFY:								
	DEPTH (FT)		BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)	
	FROM	TO							
	-2	20	12 1/4	PVC		10"	1/4		
	-2	72	8 3/4	PVC	SPLINE	6"	SCH40	BLANK	
	75	112	8 3/4	PVC	SPLINE	6"	SCH40	.030	
112	140	8 3/4	PVC	SPLINE	6"	SCH40	BLANK		
4. WATER BEARING STRATA	DEPTH (FT)		THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)				YIELD (GPM)	
	FROM	TO							
	78	79	1	GRAY SHALE				15	
	105	106	1	CONGLOMERATE				20	
	METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA <b>AIR</b>							TOTAL ESTIMATED WELL YIELD (GPM) <b>35</b>	

FOR OSE INTERNAL USE

WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER <b>C-3507</b>	POD NUMBER <b>C-03507-POD1</b>	TRN NUMBER <b>482722</b>
LOCATION <b>26.29.5.331144</b>	PAGE 1 OF 2	

<b>5. SEAL AND PUMP</b>	TYPE OF PUMP: <input type="checkbox"/> SUBMERSIBLE <input type="checkbox"/> JET <input checked="" type="checkbox"/> NO PUMP - WELL NOT EQUIPPED <input type="checkbox"/> TURBINE <input type="checkbox"/> CYLINDER <input type="checkbox"/> OTHER - SPECIFY:						
	ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT)		BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
		FROM	TO				
		0	20	12-1/4"	CEMENT		HAND
<b>6. GEOLOGIC LOG OF WELL</b>	DEPTH (FT)		THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?		
	FROM	TO					
	0	5	5	TOP SOIL	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
	5	10	5	RED SAND	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
	10	25	15	CALICHE	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
	25	50	25	RED CLAY	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
	50	106	56	GRAY SHALE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	
	106	110	4	GRAY CLAY	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
	110	140	25	RED CLAY	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
					<input type="checkbox"/> YES	<input type="checkbox"/> NO	
					<input type="checkbox"/> YES	<input type="checkbox"/> NO	
					<input type="checkbox"/> YES	<input type="checkbox"/> NO	
					<input type="checkbox"/> YES	<input type="checkbox"/> NO	
					<input type="checkbox"/> YES	<input type="checkbox"/> NO	
	ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL						
<b>7. TEST &amp; ADDITIONAL INFO</b>	WELL TEST	METHOD: <input type="checkbox"/> BAILER <input type="checkbox"/> PUMP <input checked="" type="checkbox"/> AIR LIFT <input type="checkbox"/> OTHER - SPECIFY:					
		TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.					
	ADDITIONAL STATEMENTS OR EXPLANATIONS:						
<b>8. SIGNATURE</b>	THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:						
	 _____ SIGNATURE OF DRILLER			9-12-11 _____ DATE			

FOR USE INTERNAL USE

WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER <b>C-3507</b>	POD NUMBER <b>C-03507-Pod1</b>	TRN NUMBER <b>482722</b>
LOCATION <b>26.29.5.331144</b>	PAGE 2 OF 2	

## Locator Tool Report

### General Information:

Application ID:29                      Date: 10-19-2011                      Time: 13:47:26

WR File Number: C-03507-POD1  
Purpose: POINT OF DIVERSION

Applicant First Name: BRAD BENNETT  
Applicant Last Name: STOCK WELL #2 (WELL LOG COORDINATES)

GW Basin: CARLSBAD  
County: EDDY

Critical Management Area Name(s): NONE  
Special Condition Area Name(s): NONE  
Land Grant Name: NON GRANT

### PLSS Description (New Mexico Principal Meridian):

NW 1/4 of NW 1/4 of SW 1/4 of SW 1/4 of Section 05, Township 26S, Range 29E.

### Coordinate System Details:

#### Geographic Coordinates:

Latitude:        32 Degrees    4 Minutes    2.0 Seconds    N  
Longitude:      104 Degrees   0 Minutes   50.5 Seconds   W

#### Universal Transverse Mercator Zone: 13N

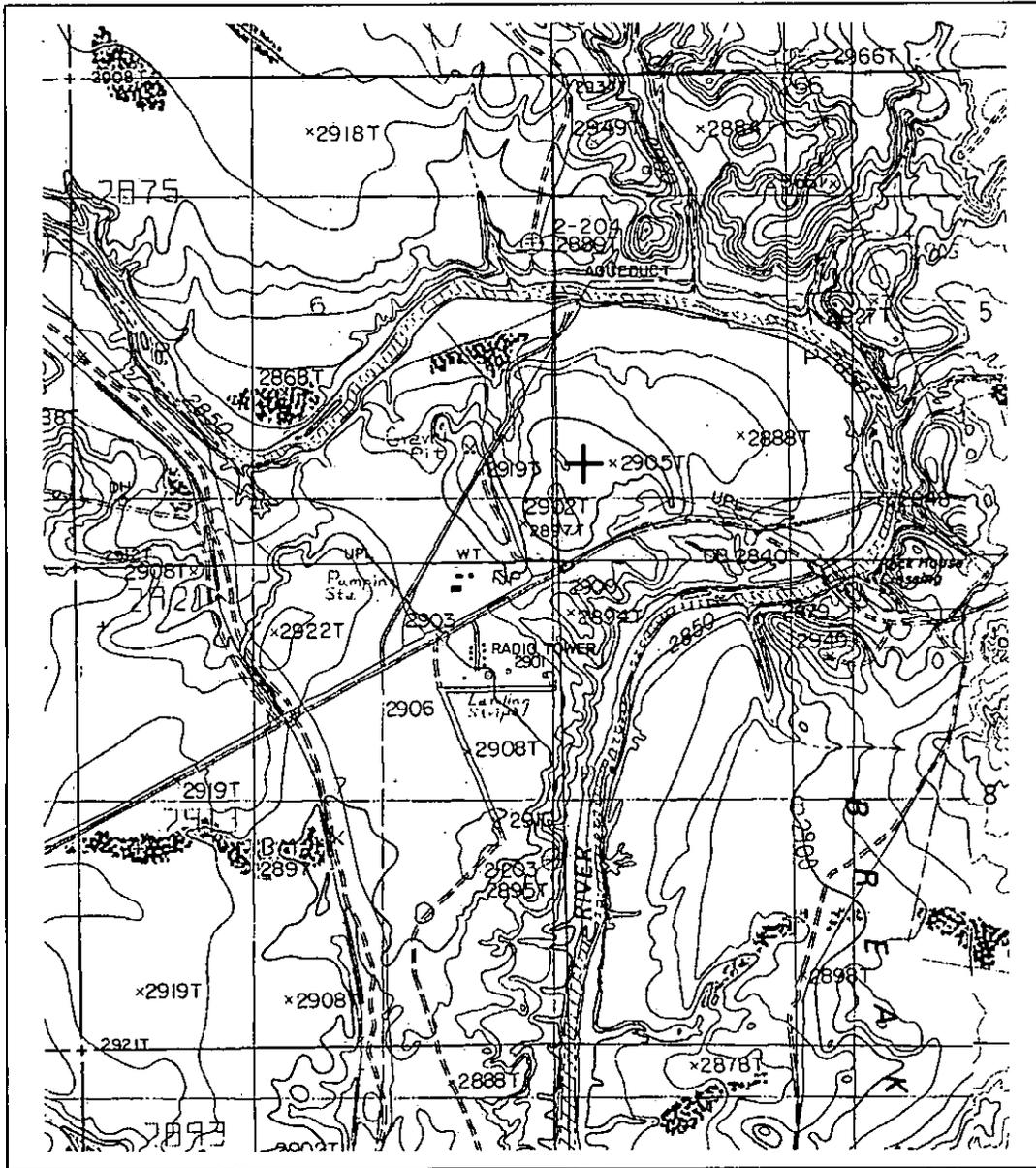
NAD 1983(92) (Meters)	N: 3,548,313	E: 593,064
NAD 1983(92) (Survey Feet)	N: 11,641,424	E: 1,945,744
NAD 1927 (Meters)	N: 3,548,112	E: 593,112
NAD 1927 (Survey Feet)	N: 11,640,764	E: 1,945,901

#### State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 118,367	E: 195,147
NAD 1983(92) (Survey Feet)	N: 388,343	E: 640,245
NAD 1927 (Meters)	N: 118,350	E: 182,594
NAD 1927 (Survey Feet)	N: 388,286	E: 599,059

**NEW MEXICO OFFICE OF STATE ENGINEER**

**Locator Tool Report**



WR File Number: C-03507-POD1 Scale: 1:24,574

Northing/Easting: UTM83(92) (Meter): N: 3,548,313 E: 593,064

Northing/Easting: SPCS83(92) (Feet): N: 388,343 E: 640,245

GW Basin: Carlsbad



# WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

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STATE ENGINEER OFFICE  
ROSWELL, NEW MEXICO

1. GENERAL AND WELL LOCATION	POD NUMBER (WELL NUMBER) 1: C-03508-POD1				OSE FILE NUMBER(S) C 03508 2011 SEP 12 P 2: 35				
	WELL OWNER NAME(S) M. BRAD BENNETT				PHONE (OPTIONAL)				
	WELL OWNER MAILING ADDRESS P.O. BOX 51510				CITY MIDLAND	STATE TX	ZIP 79710		
	WELL LOCATION (FROM GPS)	DEGREES LATITUDE 32	MINUTES 4	SECONDS 3.60 N	* ACCURACY REQUIRED: ONE TENTH OF A SECOND * DATUM REQUIRED: WGS 84				
LONGITUDE 104 0 50.52 W									
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS									
2. OPTIONAL	(2.5 ACRE) NW 1/4	(10 ACRE) NW 1/4	(40 ACRE) SW 1/4	(160 ACRE) SW 1/4	SECTION 5	TOWNSHIP 26	<input type="checkbox"/> NORTH <input checked="" type="checkbox"/> SOUTH	RANGE 29	<input checked="" type="checkbox"/> EAST <input type="checkbox"/> WEST
	SUBDIVISION NAME				LOT NUMBER	BLOCK NUMBER	UNIT/TRACT		
	HYDROGRAPHIC SURVEY					MAP NUMBER	TRACT NUMBER		
3. DRILLING INFORMATION	LICENSE NUMBER WD 1058	NAME OF LICENSED DRILLER CLINTON KEY			NAME OF WELL DRILLING COMPANY KEYS DRILLING AND PUMP SVC.				
	DRILLING STARTED 8/24/11	DRILLING ENDED 8/24/11	DEPTH OF COMPLETED WELL (FT) 140	BORE HOLE DEPTH (FT) 140	DEPTH WATER FIRST ENCOUNTERED (FT) 75				
	COMPLETED WELL IS: <input type="checkbox"/> ARTESIAN <input type="checkbox"/> DRY HOLE <input checked="" type="checkbox"/> SHALLOW (UNCONFINED)					STATIC WATER LEVEL IN COMPLETED WELL (FT) 75			
	DRILLING FLUID: <input checked="" type="checkbox"/> AIR <input type="checkbox"/> MUD <input type="checkbox"/> ADDITIVES - SPECIFY:								
	DRILLING METHOD: <input checked="" type="checkbox"/> ROTARY <input type="checkbox"/> HAMMER <input type="checkbox"/> CABLE TOOL <input type="checkbox"/> OTHER - SPECIFY:								
	DEPTH (FT)		BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)	
	FROM	TO							
	-2	20	12 1/4	PVC		10"	1/4		
	-2	65	8 3/4	PVC	SPLINE	6"	SCH40	BLANK	
	65	105	8 3/4	PVC	SPLINE	6"	SCH40	.030	
105	140	8 3/4	PVC	SPLINE	6"	SCH40	BLANK		
4. WATER BEARING STRATA	DEPTH (FT)		THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)				YIELD (GPM)	
	FROM	TO							
	75	76	1	GRAY SHALE				40	
METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA AIR						TOTAL ESTIMATED WELL YIELD (GPM) 40			

FOR OSE INTERNAL USE

WELL RECORD & LOG (Version 6/9/08)

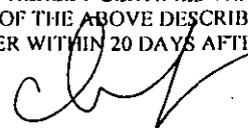
FILE NUMBER C-3508	POD NUMBER C-03508-POD1	TRN NUMBER 482723
LOCATION 26.29.5.331123		PAGE 1 OF 2

5. SEAL AND PUMP	TYPE OF PUMP: <input checked="" type="checkbox"/> SUBMERSIBLE <input type="checkbox"/> JET <input type="checkbox"/> NO PUMP - WELL NOT EQUIPPED <input type="checkbox"/> TURBINE <input type="checkbox"/> CYLINDER <input type="checkbox"/> OTHER - SPECIFY:						
	ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT)		BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
		FROM	TO				
		0	20	12-1/4"	CEMENT		HAND

6. GEOLOGIC LOG OF WELL	DEPTH (FT)		THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?	
	FROM	TO			<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	0	5	5	TOP SOIL	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	5	10	5	RED SAND	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	10	20	10	CALICHE	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	20	45	25	RED CLAY	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	45	95	50	GRAY SHALE	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
	95	115	20	CONGLOMERATE	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	115	140	25	RED CLAY	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
					<input type="checkbox"/> YES	<input type="checkbox"/> NO
					<input type="checkbox"/> YES	<input type="checkbox"/> NO
					<input type="checkbox"/> YES	<input type="checkbox"/> NO
					<input type="checkbox"/> YES	<input type="checkbox"/> NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO	WELL TEST	METHOD: <input type="checkbox"/> BAILER <input type="checkbox"/> PUMP <input checked="" type="checkbox"/> AIR LIFT <input type="checkbox"/> OTHER - SPECIFY:
	TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.	
	ADDITIONAL STATEMENTS OR EXPLANATIONS:	

8. SIGNATURE	THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:	
	 _____ SIGNATURE OF DRILLER	9-9-11 _____ DATE

## Locator Tool Report

### General Information:

Application ID: 29                      Date: 10-19-2011                      Time: 13:51:29

WR File Number: C-03508-POD1  
Purpose: POINT OF DIVERSION

Applicant First Name: BRAD BENNETT  
Applicant Last Name: STOCK WELL #1 (WELL LOG COORDINATES)

GW Basin: CARLSBAD  
County: EDDY

Critical Management Area Name(s): NONE  
Special Condition Area Name(s): NONE  
Land Grant Name: NON GRANT

### PLSS Description (New Mexico Principal Meridian):

NW 1/4 of NW 1/4 of SW 1/4 of SW 1/4 of Section 05, Township 26S, Range 29E.

### Coordinate System Details:

#### Geographic Coordinates:

Latitude:        32 Degrees    4 Minutes    3.6 Seconds    N  
Longitude:      104 Degrees   0 Minutes   50.5 Seconds   W

#### Universal Transverse Mercator Zone: 13N

NAD 1983(92) (Meters)	N: 3,548,361	E: 593,063
NAD 1983(92) (Survey Feet)	N: 11,641,582	E: 1,945,742
NAD 1927 (Meters)	N: 3,548,160	E: 593,111
NAD 1927 (Survey Feet)	N: 11,640,922	E: 1,945,899

#### State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 118,415	E: 195,147
NAD 1983(92) (Survey Feet)	N: 388,501	E: 640,244
NAD 1927 (Meters)	N: 118,398	E: 182,594
NAD 1927 (Survey Feet)	N: 388,443	E: 599,059

**NEW MEXICO OFFICE OF STATE ENGINEER**

**Locator Tool Report**



WR File Number: C-03508-POD1 Scale: 1:30,245

Northing/Easting: UTM83(92) (Meter): N: 3,548,361 E: 593,063

Northing/Easting: SPCS83(92) (Feet): N: 388,501 E: 640,244

GW Basin: Carlsbad



# WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

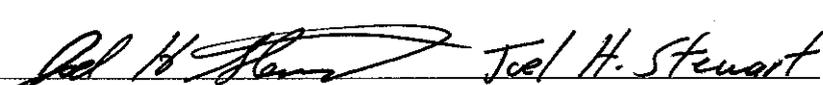
[www.ose.state.nm.us](http://www.ose.state.nm.us)

1. GENERAL AND WELL LOCATION	OSE POD NUMBER (WELL NUMBER) POD-1 <i>Renumbered C-3832-POD 2</i>			OSE FILE NUMBER(S) C 3782 ( <i>exploratory</i> ) <i>Renumbered C-3832</i>		
	WELL OWNER NAME(S) BOPCO, L.P.			PHONE (OPTIONAL) (817) 390-8662		
	WELL OWNER MAILING ADDRESS 201 N Main St Suite 2900			CITY Fort Worth	STATE TX	ZIP 76102
	WELL LOCATION (FROM GPS)	DEGREES LATITUDE 32	MINUTES 05	SECONDS 40.1	* ACCURACY REQUIRED: ONE TENTH OF A SECOND	
		LONGITUDE 103	53	32.2	* DATUM REQUIRED: WGS 84	
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS - PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE SW1/4SE1/4SW1/4SW1/4 of Section 28, Township 25 South, Range 30 East, in the NE corner of a well pad.						

2. DRILLING & CASING INFORMATION	LICENSE NUMBER 331	NAME OF LICENSED DRILLER Joel H. Stewart			NAME OF WELL DRILLING COMPANY SBQ Drilling, LLC			
	DRILLING STARTED 01-16-15	DRILLING ENDED 01-17-15	DEPTH OF COMPLETED WELL (FT) 805	BORE HOLE DEPTH (FT) ±805	DEPTH WATER FIRST ENCOUNTERED (FT)			
	COMPLETED WELL IS: <input checked="" type="radio"/> ARTESIAN <input type="radio"/> DRY HOLE <input type="radio"/> SHALLOW (UNCONFINED)				STATIC WATER LEVEL IN COMPLETED WELL (FT) 277			
	DRILLING FLUID: <input type="radio"/> AIR <input checked="" type="radio"/> MUD ADDITIVES - SPECIFY:							
	DRILLING METHOD: <input checked="" type="radio"/> ROTARY <input type="radio"/> HAMMER <input type="radio"/> CABLE TOOL <input type="radio"/> OTHER - SPECIFY:							
	DEPTH (feet bgl)		BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
	FROM	TO						
	0	270	14.75	AS1M A53B	Welded	8.625	0.322	1 1/2
	270	805	14.75	304 Stainless Steel	Welded	8.625	0.25	1 1/2
	0	15	19	AS1M A53B	---	16	0.25	1 1/2

3. ANNULAR MATERIAL	DEPTH (feet bgl)		BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
	FROM	TO				
	0	120	14.75	Sand Mix Ready Mix	90.36	grav. tremie meas.
	120	170	14.75	Hydrated Bentonite Chips	35.90	grav. tremie meas.
	170	805	14.75	6/9 Silica Sand	455.95	I remie Pipe

FOR USE INTERNAL USE <i>Renumbered from C-3782-POD1</i>			WR-20 WELL RECORD & LOG (Version 06/08/2012)		
FILE NUMBER	<i>C-3832</i>	POD NUMBER	<i>POD 2</i>	TRN NUMBER	<i>555125</i>
LOCATION	<i>25.30.28.3343</i>				PAGE 1 OF 2

DEPTH (feet bgl)	THICKNESS (feet)		COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
	FROM	TO			
0	30	30	Cemented Sand, light tan, sub-angular	<input type="radio"/> Y <input type="radio"/> N	
30	40	10	Sandy Silt, light brown, sub-angular	<input type="radio"/> Y <input type="radio"/> N	
40	60	20	Sandy clay, reddish brown	<input type="radio"/> Y <input type="radio"/> N	
60	80	20	Silty Sand, light brown, sub-angular	<input type="radio"/> Y <input type="radio"/> N	
80	250	170	Fine to Medium Sand, light tan, sub-angular to rounded	<input type="radio"/> Y <input type="radio"/> N	
250	260	10	Clayey Sand, brown, sub-angular	<input type="radio"/> Y <input type="radio"/> N	
260	320	60	Fine Sand, light tan, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
320	380	60	Silty Sand, brownish gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
380	410	30	Fine Sand, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
410	530	120	Clayey Fine Sand, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
530	590	60	Sandy Clay, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
590	600	10	Clayey Fine Sand, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
600	630	30	Sandy Clay, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
630	650	20	Clayey Sand, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
650	700	50	Sandy Clay, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
700	710	10	Clayey Sand, brown and gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
710	760	50	Sandy Clay, dark gray, sub-angular	<input checked="" type="radio"/> Y <input type="radio"/> N	
760	770	10	Clay, 75% gray, 25% red	<input checked="" type="radio"/> Y <input type="radio"/> N	
770	780	10	Clay, 50% gray, 50% red	<input checked="" type="radio"/> Y <input type="radio"/> N	
780	790	10	Clay, 25% gray, 75% red	<input checked="" type="radio"/> Y <input type="radio"/> N	
790	805	15	Sandy Clay, Grayish red, 10% white sand.	<input checked="" type="radio"/> Y <input type="radio"/> N	
METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA: <input type="radio"/> PUMP <input type="radio"/> AIR LIFT <input type="radio"/> BAILER <input checked="" type="radio"/> OTHER - SPECIFY: TBD by pump test				TOTAL ESTIMATED WELL YIELD (gpm): TBD	
5. TEST; RIG SUPERVISION	WELL TEST	TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD			
	MISCELLANEOUS INFORMATION: Pump test will be performed at a later time. Hydrated Bentonite Chips and Sand Mix Ready Mix were placed by gravity and tagged with tremie pipe.				
	PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE: Silverio Galindo, Gabriel Armijo, Pedro Pizano				
6. SIGNATURE	THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:				
				2-13-15	
SIGNATURE OF DRILLER / PRINT SIGNEE NAME			DATE		

STATE ENGINEER OFFICE  
 605 W. WELL, NEW MEXICO  
 2015 FEB 19 PM 2:35

## Locator Tool Report

### General Information:

Application ID:27                      Date: 05-28-2015                      Time: 12:01:24

WR File Number: C-03782-POD1  
Purpose: POINT OF DIVERSION

Applicant First Name: BOPCO EXPLORATORY WELL DRILLERS RECORD  
Applicant Last Name: RENUMBERED C-3832-POD2

GW Basin: CARLSBAD  
County: EDDY

Critical Management Area Name(s): NONE  
Special Condition Area Name(s): NONE  
Land Grant Name: NON GRANT

### PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SE 1/4 of SW 1/4 of SW 1/4 of Section 28, Township 25S, Range 30E.

### Coordinate System Details:

#### Geographic Coordinates:

Latitude:        32 Degrees    5 Minutes    40.1 Seconds    N  
Longitude:      103 Degrees   53 Minutes   32.2 Seconds    W

#### Universal Transverse Mercator Zone: 13N

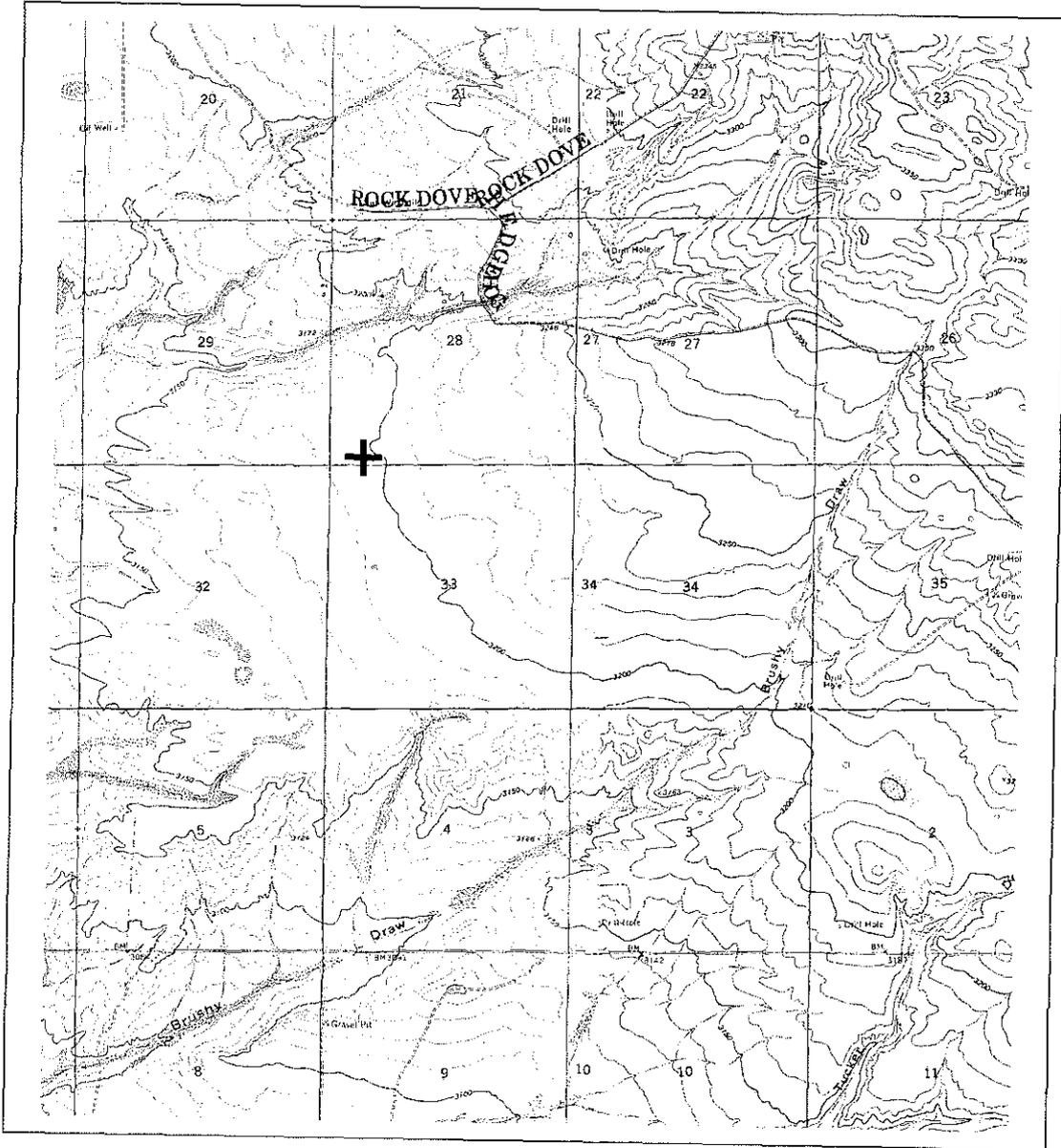
NAD 1983(92) (Meters)	N: 3,551,444	E: 604,526
NAD 1983(92) (Survey Feet)	N: 11,651,697	E: 1,983,348
NAD 1927 (Meters)	N: 3,551,243	E: 604,573
NAD 1927 (Survey Feet)	N: 11,651,036	E: 1,983,505

#### State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 121,428	E: 206,630
NAD 1983(92) (Survey Feet)	N: 398,385	E: 677,920
NAD 1927 (Meters)	N: 121,410	E: 194,077
NAD 1927 (Survey Feet)	N: 398,327	E: 636,734

**NEW MEXICO OFFICE OF STATE ENGINEER**

**Locator Tool Report**



WR File Number: C-03782-POD1 Scale: 1:47,832

Northing/Easting: UTM83(92) (Meter): N: 3,551,444

E: 604,526

Northing/Easting: SPCS83(92) (Feet): N: 398,385

E: 677,920

GW Basin: Carlsbad

**NM OIL CONSERVATION  
ARTESIA DISTRICT**

Submit To Appropriate District Office Two Copies District I 1625 N. French Dr., Hobbs, NM 88240 District II 811 S. First St., Artesia, NM 88210 District III 1000 Rio Brazos Rd., Aztec, NM 87410 District IV 1220 S. St. Francis Dr., Santa Fe, NM 87505	State of New Mexico Energy, Minerals and Natural Resources  Oil Conservation Division 1220 South St. Francis Dr. Santa Fe, NM 87505	JUN 30 2018  <b>RECEIVED</b>	Form C-105 Revised August 1, 2011
		1. WELL API NO. 30-015-44001	
		2. Type of Lease <input checked="" type="checkbox"/> STATE <input type="checkbox"/> FEE <input type="checkbox"/> FED/INDIAN	
		3. State Oil & Gas Lease No.	

**WELL COMPLETION OR RECOMPLETION REPORT AND LOG**

4. Reason for filing:  <input checked="" type="checkbox"/> <b>COMPLETION REPORT</b> (Fill in boxes #1 through #31 for State and Fee wells only)  <input type="checkbox"/> <b>C-144 CLOSURE ATTACHMENT</b> (Fill in boxes #1 through #9, #15 Date Rig Released and #32 and/or #33; attach this and the plat to the C-144 closure report in accordance with 19.15.17.13.K NMAC)	5. Lease Name or Unit Agreement Name Solaris Eddy State  6. Well Number: No.2
---	---

7. Type of Completion:  
 NEW WELL  WORKOVER  DEEPENING  PLUGBACK  DIFFERENT RESERVOIR  OTHER

8. Name of Operator Solaris Water Midstream, LLC	9. OGRID 371643
---	--------------------

10. Address of Operator 9811 Katy Freeway, Ste.900, Houston, TX 77024	11. Pool name or Wildcat SWD; Devonian (96101)
--	---

12. Location	Unit Ltr	Section	Township	Range	Lot	Feet from the	N/S Line	Feet from the	E/W Line	County
Surface:	K	2	26-S	29-E		2267'	FSL	2469'	FWL	Eddy
BH:										

13. Date Spudded 4/22/2017	14. Date T.D. Reached 12/26/2017	15. Date Rig Released 4/29/2018	16. Date Completed (Ready to Produce) 4/29/2018	17. Elevations (DF and RKB, RT, GR, etc.) 3022' G.R.
-------------------------------	-------------------------------------	------------------------------------	--	---

18. Total Measured Depth of Well 16,876'	19. Plug Back Measured Depth	20. Was Directional Survey Made? No	21. Type Electric and Other Logs Run Mudlog, CET, CBL, CNL
---	------------------------------	--	---

22. Producing Interval(s), of this completion - Top, Bottom, Name  
 15,663' to 16,876' - Devonian

**23. CASING RECORD (Report all strings set in well)**

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
20.0"	94.0#	575'	26.0"	900 sx	
13.375"	68.0#	3177'	17.5"	1300 sx	
9.875"	62.8#	11,492'	12.25"	2300 sx	
7.625"	39.0#	13,940'	8.5"	525 sx	

**24. LINER RECORD**

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN	SIZE	DEPTH SET	PACKER SET
5.5"	13,622'	15,586'	380 sx		5.5"	0-8650'	
4.25" (Xpand)	15,539'	15,657'	50 sx		5.0"	8650'-13550'	
					3.5"	13550'-15525'	15,530'

26. Perforation record (interval, size, and number)  Perfs: 15,663' to 15,647' (6 jsfp) Open hole 15,657' to 16,876'	27. ACID, SHOT, FRACTURE, CEMENT, SQUEEZE, ETC. I DEPTH INTERVAL      AMOUNT AND KIND MATERIAL USED  _____ _____
---	--

**28. PRODUCTION**

Date First Production N/A	Production Method (Flowing, gas lift, pumping - Size and type pump)	Well Status (Prod. or Shu-in) Active SWD
------------------------------	---	---

Date of Test	Hours Tested	Choke Size	Prod'n For Test Period	Oil - Bbl	Gas - MCF	Water - Bbl.	Gas - Oil Ratio
--------------	--------------	------------	------------------------	-----------	-----------	--------------	-----------------

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate	Oil - Bbl.	Gas - MCF	Water - Bbl.	Oil Gravity - API - (Corr.)
--------------------	-----------------	-------------------------	------------	-----------	--------------	-----------------------------

29. Disposition of Gas (Sold, used for fuel, vented, etc.)	30. Test Witnessed By
--	-----------------------

31. List Attachments  
 Current wellbore schematic; Mudlog *TD-Mudlog Rec'd 10/26/18 RUS*

32. If a temporary pit was used at the well, attach a plat with the location of the temporary pit.

33. If an on-site burial was used at the well, report the exact location of the on-site burial:

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_ NAD 1927 1983

*I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief*

Signature <i>Ben Stone</i>	Printed Name Ben Stone	Title Agent for Solaris Water Midstream, LLC	Date 6/29/2018
E-mail Address ben@sbsconsulting.us			

# INSTRUCTIONS

This form is to be filed with the appropriate District Office of the Division not later than 20 days after the completion of any newly-drilled or deepened well and not later than 60 days after completion of closure. When submitted as a completion report, this shall be accompanied by one copy of all electrical and radio-activity logs run on the well and a summary of all special tests conducted, including drill stem tests. All depths reported shall be measured depths. In the case of directionally drilled wells, true vertical depths shall also be reported. For multiple completions, items 11, 12 and 26-31 shall be reported for each zone.

## INDICATE FORMATION TOPS IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE

Southeastern New Mexico		Northwestern New Mexico	
T. Anhy 1732'	T. Canyon 12800'	T. Ojo Alamo	T. Penn "A"
T. Salt	T. Strawn 13042'	T. Kirtland	T. Penn. "B"
B. Salt 2425'	T. Atoka 13326'	T. Fruitland	T. Penn. "C"
T. Yates	T. Miss 15330'	T. Pictured Cliffs	T. Penn. "D"
T. 7 Rivers	T. Devonian 15625'	T. Cliff House	T. Leadville
T. Queen	T. Silurian	T. Menefee	T. Madison
T. Grayburg	T. Montoya 17500' est	T. Point Lookout	T. Elbert
T. San Andres	T. Simpson	T. Mancos	T. McCracken
T. Glorieta	T. McKee	T. Gallup	T. Ignacio Otzte
T. Paddock	T. Ellenburger	Base Greenhorn	T. Granite
T. Blinebry	T. Gr. Wash	T. Dakota	
T. Tubb	T. Delaware Lime 3177'	T. Morrison	
T. Drinkard	T. Bone Springs 6932'	T. Todilto	
T. Abo	T. Morrow Lime 13618'	T. Entrada	
T. Wolfcamp 10160'	T. Chester Sh. 14520'	T. Wingate	
T. Penn	T. Barnett Sh. 14130'	T. Chinle	
T. Cisco (Bough C)	T. Woodford Sh. 15490'	T. Permian	

### OIL OR GAS SANDS OR ZONES

No. 1, from.....to..... No. 3, from.....to.....  
 No. 2, from.....to..... No. 4, from.....to.....

### IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from.....to..... feet.....  
 No. 2, from.....to..... feet.....  
 No. 3, from.....to..... feet.....

### LITHOLOGY RECORD (Attach additional sheet if necessary)

From	To	Thickness In Feet	Lithology	From	To	Thickness In Feet	Lithology
13000	13330	330	LIMESTONE: OFF WH-BUF-GY				
13330	13380	50	LS/SS: WHT-CLR-MLKY-FRSTD-VFN/SLTY				
13380	13520	140	LS/SHALE: WHT-OFF WT-GY-LT GY/ BLK-DRK GY				
13520	13730	210	LIMESTONE: MOTT-LT GY-OFF WHT				
13730	14050	320	LS/SH: MOTT-WHT-OFF WT/ BLK-DRK GY-BRN				
14050	14110	60	LS/SS/SH: LT GY-OF WT-/CLR-TRNS/DRK GY-BLK				
14110	14320	210	SHALE/LS: CHRCL-BLK-DRK GY/MOTT-LT GY/BT				
14320	14360	40	SHALE/SS: DRK GR-DRK BRN/TRNSL-OFF WH				
14360	14520	160	SHALE/LS: BLK-DRK GY/OFF WHT-GY-BT				
14520	14760	240	SHALE: BLK-DRK GR-DRK GY-LT GY/VFN MICA				
14760	15100	340	SHALE/LS: LT GY-DRK GY/WHT-OFF WHT-CRM				
15100	15400	300	LS/SHALE: DRK GY-GY-OF WHT/BLK-DRK GY				
15400	15490	90	LIMESTONE: DRK GY-LT GY-OFF WHT/FN-VFN				
15490	15620	130	SHALE: BLK-DRK GR-DRK GY-LT GY/CRB-SLTY				
15620	LTD	30+	DOL: WHT-OFF WHT-TAN-BGE-CRMY/FN-VFN				

## APPENDIX SITE PHOTOGRAPHS

# Site Photographs



Index of photograph locations.

## Site Photographs



Figure 1 – The mapped watercourse is more distinguished at slightly higher elevations. This view is to the west from the lease road/pipeline road north of the proposed containments. Maximum depth of the channel is 12 inches. Location is 32 4 29.73, -103 57 18.97



Figure 2 – About 1500 feet downhill from Figure 1, the mapped watercourse becomes braided. This image shows one of the more defined channels, which is a few inches deep. This channel may not meet the criteria of a “significant watercourse”, but it does channel stormwater. Location: 32 4 26.57, -103 57 36.62

## Site Photographs



Figure 3 – View downhill, east-northeast showing “tributaries” of mapped watercourse. This dendritic pattern is typical throughout the area. Inspection was performed on a rainy day, but no water flowed through the mapped watercourse or these channels that we do not consider meeting the definition of a significant watercourse. Location: 32 4 22.33, -103 57 37.94



Figure 4 – The drainage channel shown in Figure 5 becomes “lost” as the gradient changes and vegetation increases slightly. Green moss occupies small patches of the flat areas – suggesting puddling and stagnant water. Location: 32 4 9.64, -103 57 36.41

## Site Photographs



Figure 5 – A small drainage channel that appears to originate at a low spot of the 2-track/fence line (see 5/18/2011 Google Earth image). This view north shows the most-defined channel segment. As shown in Figure 4, this channel terminates approximately 150 feet northwest where topography flattens.

Location: 32 4 7.54, -103 57 30.59



Figure 6 – View east-southeast from the center of a drainage channel that is disturbed due to pipeline construction. The tanks of the Eddy State SWD are at the right edge of the image. All along the pipeline, the small drainage channels have been disturbed with uphill channels appearing to carry more water than the extension of these channels downhill from the pipeline. Location: 32 4 20.60, -103 57 19.08