February 2021

C-147 REGISTRATION PACKAGE FOR EKG CONTAINMENT

Section 29, T24S, R28E, Eddy County

Existing containment stripped of previous liners. View is North.

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

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996

February 26, 2021

Mr. Mike Bratcher
NMOCD - District 2, Supervisor
811 S. First St.
Artesia, NM 88210
Via E-Mail

Ms. Victoria Venegas
NMOCD - District 2
811 S. First St.
Artesia, NM 88210
Via E-Mail

RE: Solaris Water Midstream - EKG Recycling Containment Registration Package
EKG Satellite Containment of Landes Recycling Facility 2RF-134

Dear Mr. Bratcher and Ms. Venegas:

On behalf of Solaris Water Midstream, R.T. Hicks Consultants is pleased submit a registration for the above-referenced project. Rule 34 requires no variances for this facility. Specifically:

- Solaris will install a 4-strand barbed wire fence over the proposed game fence to comply with the specific language of the Rule if requested by the District Office
- The 40-mil HDPE secondary liner is "equivalent with a hydraulic conductivity no greater than 1 x 10-9 cm/sec" and meets or exceeds the "EPA SW-846 method 9090A or subsequent relevant publications" and is therefore consistent with the criteria of the Rule. The equivalency demonstration is attached to this letter.
- The Mega Blaster Pro Sonic Bird Repeller "is otherwise protective of wildlife, including migratory birds" and is therefore consistent with the criteria of the Rule. This avian hazing equipment is used at numerous OCD-approved projects and Solaris has ordered a unit specific to the Pecos River Valley.
- Hicks Consultants affirms that
    - the location meets all siting criteria in the Rule and the location meets the specified setback criteria
    - the Design/Construction Plan, Operation and Maintenance Plan and Closure Plan are consistent with the Rule.
- Unless instructed by OCD, we will employ the analytical tests for closure listed in the Rule

The closure cost estimate is provided under separate cover.

In compliance with 19.15.34.10 of the Rule, this submission is copied to COG, LLC who is the owner of the surface upon which the containments will be constructed.

Please note that the C-147 form correctly lists the location of Landes Recycling Facility and we placed the RF number for Landes in box 1. If this is not the correct format, let me know if I need to make a change.

If you have any questions or concerns regarding this registration or the attached C-147, please contact me. As always, we appreciate your work ethic and attention to detail.

Sincerely,
R.T. Hicks Consultants

Randall T. Hicks PG
Principal

Copy: Solaris Water Midstream
COG, LLC Cole.clark@conocophillips.com

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): EKG Produced Water Containment

OCD Permit Number: 2RF-149 (For new facilities the permit number will be assigned by the district office)

U/L or Qtr/Qtr F Section 29 Township 24S Range 28E County: Eddy

Surface Owner: ☐ Federal ☐ State ☒ Private ☐ Tribal Trust or Indian Allotment

2.

☐ **Recycling Facility:**

Location of (if applicable): Latitude 32.117435 Longitude -104.075971 . Landes Recycling Facility °

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:**

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

Center of Recycling Containment (if applicable) Lat 32.1893287°N Long 104.1132493°W

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

☒ Lined ☐ Liner type: Thickness See Drawings ☐ LLDPE ☐ HDPE ☐ PVC ☐ Other _____

☐ String-Reinforced

Liner Seams: ☐ Welded ☐ Factory ☐ Other Volume: See Drawings Dimensions _____

☐ 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_____

6.

Signs:

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

☐ Signed in compliance with 19.15.16.8 NMAC

7.

Variances:

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

Check the below box only if a variance is requested:

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

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

8.

Siting Criteria for Recycling Containment

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

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 5a, 5b, and 5c.	☐ 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: Todd Carpenter Date: 01/19/21

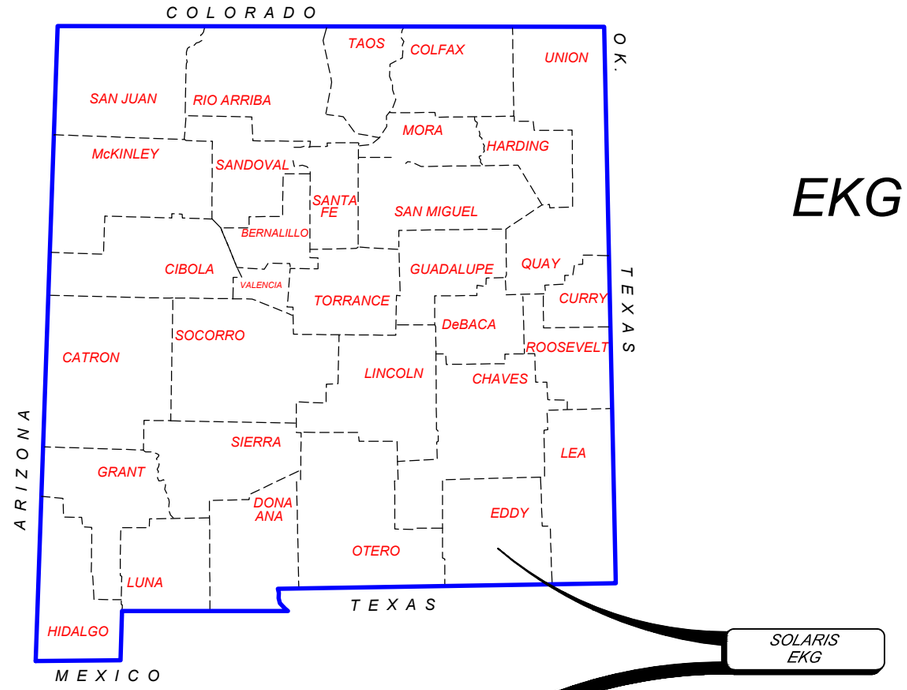
e-mail address: todd.carpenter@solarismidstream.com Telephone: (432) 203-9020

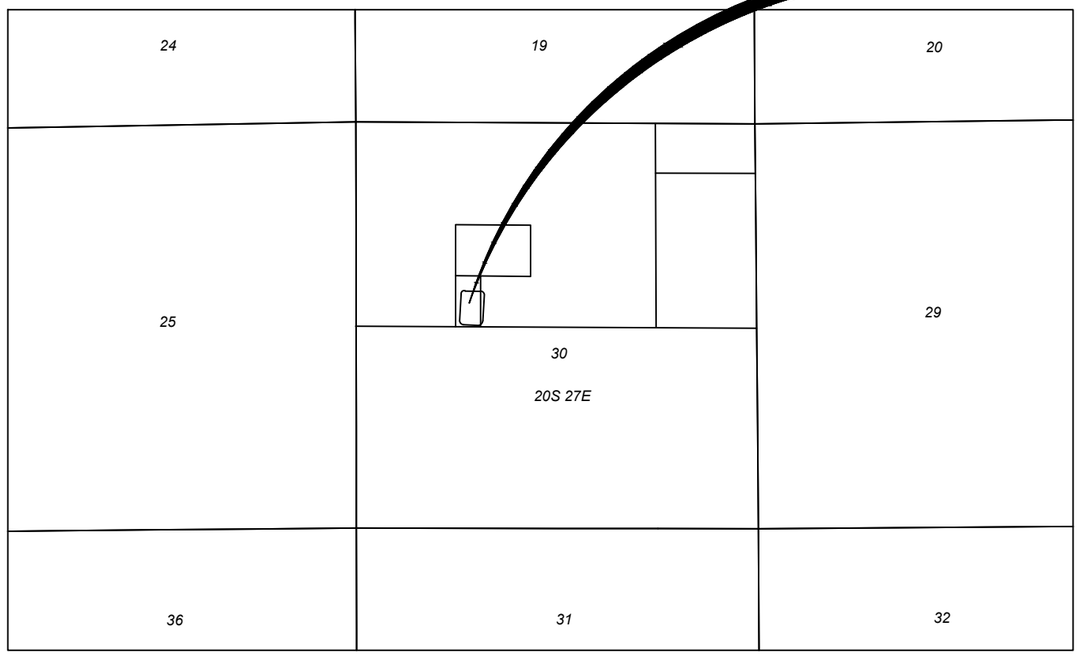
11.
OCD Representative Signature: _____ **Approval Date:** _____

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

☐ OCD Conditions _____
☐ Additional OCD Conditions on Attachment

Recycling Containment Design Drawings and Avian Species Hazing Equipment





SOLARIS WATER MIDSTREAM, LLC
EKG PRODUCED WATER RECYCLING FACILITY
S29, T24S, R28E
EDDY COUNTY, NEW MEXICO

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
02/25/2021

INDEX OF SHEETS

MAGRYM
TBPELS F-19848
Magrym Consulting, Inc.
110 W. Louisiana Ave. Ste 314
Midland, TX 79701
(432) 999-2737
www.magrym.com

IFC	ISSUED FOR CONSTRUCTION	2/25/21	CSC
IFR	ISSUED FOR REGULATORY REVIEW	1/13/21	CSC
R-X	DESCRIPTION	DATE	BY

REVISIONS (OR CHANGE NOTICES)

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

EKG WATER TREATMENT AND REUSE FACILITY
S02, T26S, R29E
EDDY COUNTY, NEW MEXICO
SOLARIS WATER MIDSTREAM, LLC.

COVER SHEET

HORIZONTAL SCALE:NTS	VERTICAL SCALE: NTS
PRINT DATE: 2/25/2021	DESIGNED BY: EG
PROJECT NO. 21-100	CHECKED BY: CSC/EMH
SUBSET: CIVIL	SHEET: C-100

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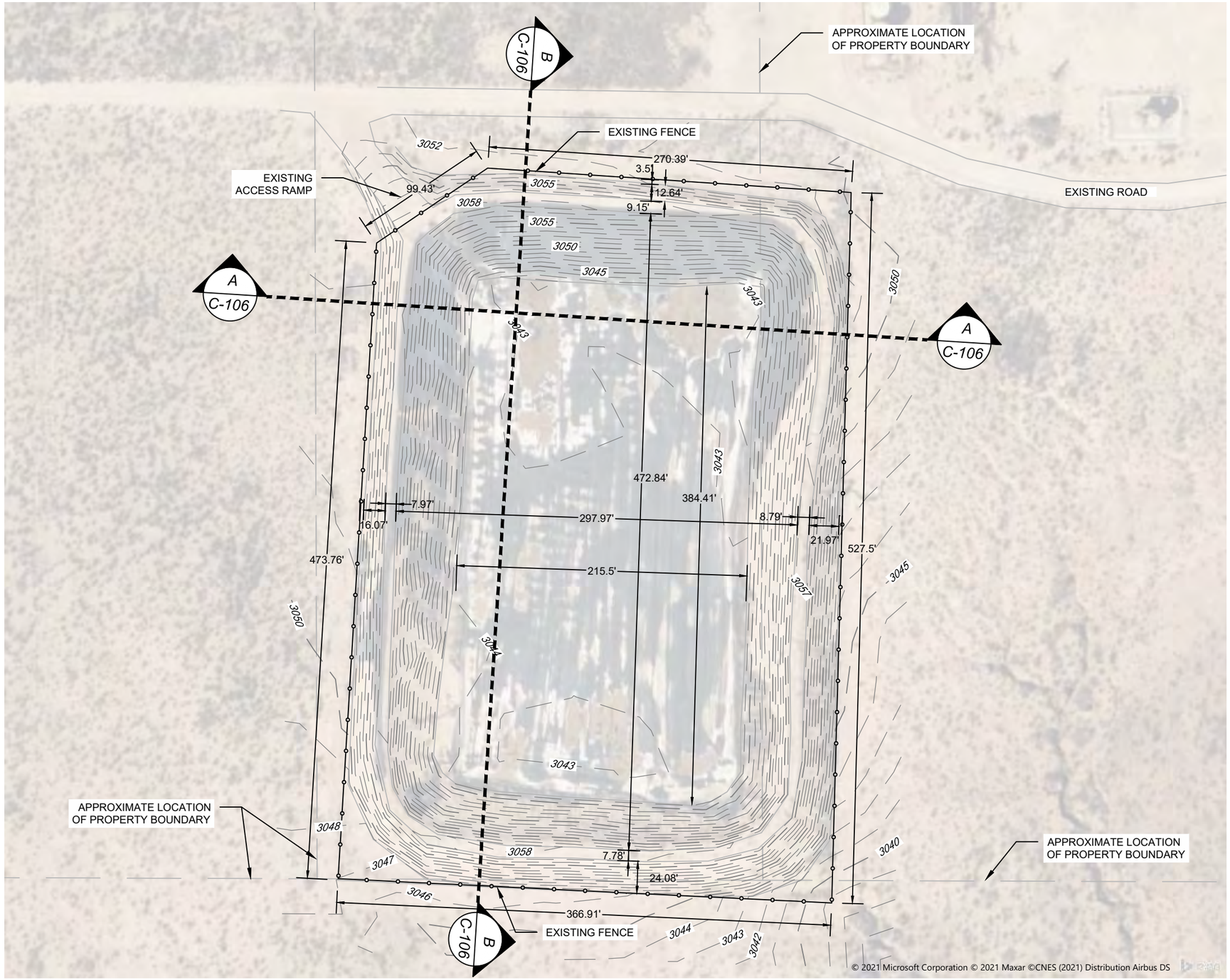

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
02/25/2021

LEGEND

EXISTING FENCE
EXISTING CONTOURS

N

SCALE 1"=80'
0 40' 80' 160'

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EKG WATER TREATMENT AND REUSE FACILITY
S02, T26S, R29E
EDDY COUNTY, NEW MEXICO
SOLARIS WATER MIDSTREAM, LLC.

EXISTING SITE PLAN

HORIZONTAL SCALE:1"=80'	VERTICAL SCALE: NTS
PRINT DATE: 2/25/2021	DESIGNED BY: EG
PROJECT NO. 21-100	CHECKED BY: CSC/EMH
SUBSET: CIVIL	SHEET: C-101

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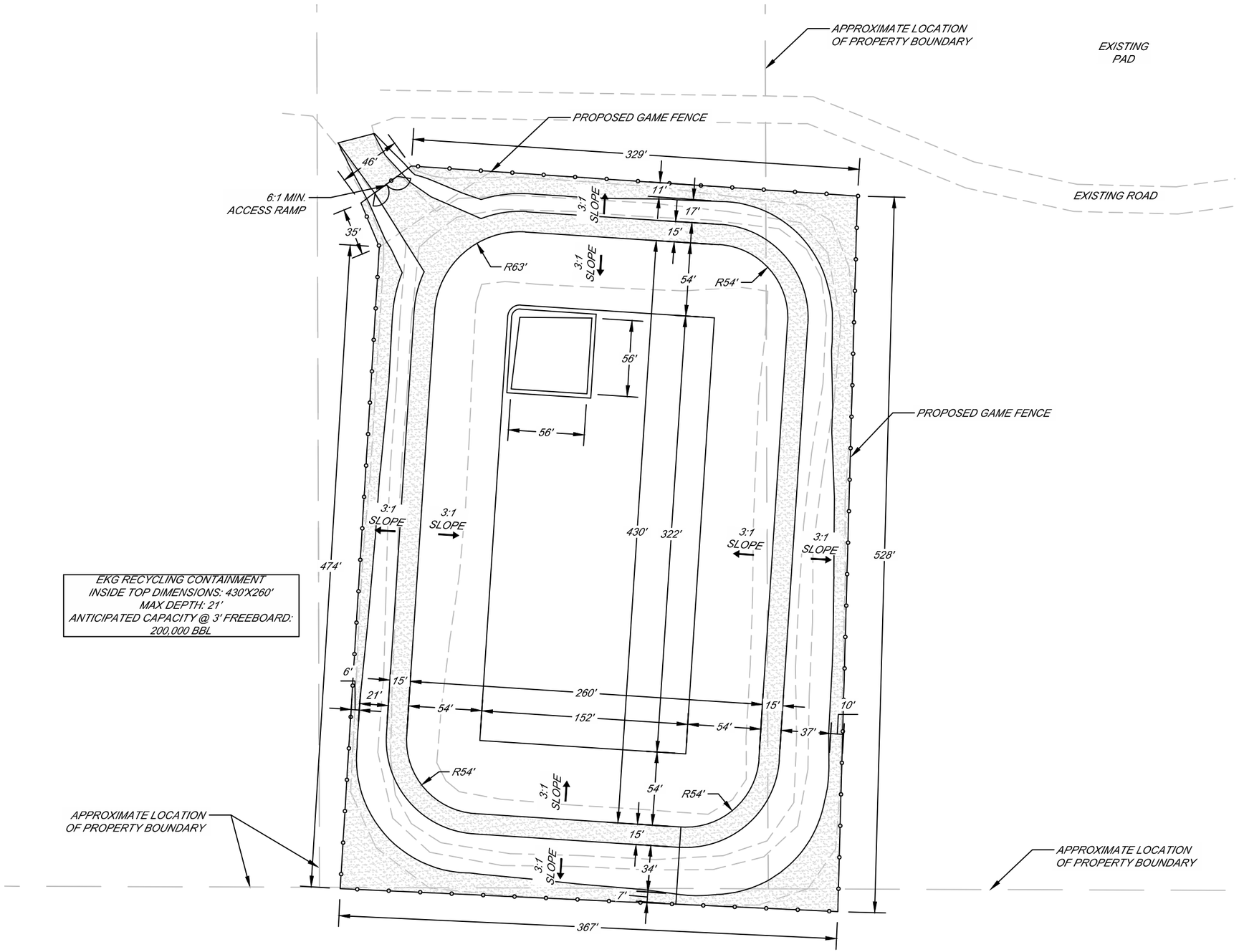

PROJECT DESCRIPTION

1. THE PROJECT CONSISTS OF CONVERTING AN EXISTING FRESHWATER POND INTO A PRODUCED WATER RECYCLING CONTAINMENT IN ACCORDANCE WITH NEW MEXICO ADMINISTRATIVE CODE TITLE 19, CHAPTER 15, PART 34, DESIGN CRITERIA FOR RECYCLING CONTAINMENTS.
2. ALL BOUNDARY, TOPOGRAPHIC AND UTILITY INFORMATION SHOWN ARE BASED ON INFORMATION OBTAINED FROM THE OWNER.

SUGGESTED CONSTRUCTION SEQUENCE

1. REMOVE EXISTING FENCE.
2. CLEAR EXISTING VEGETATION AND DEBRIS, AND DISPOSE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.
3. PERFORM EARTHWORK OPERATIONS:
   - 3.1. PERFORM CUT AND FILL OPERATIONS TO THE DIMENSIONS SHOWN ON THIS PLAN.
   - 3.2. RESHAPE INSIDE SLOPES TO A 3 TO 1 RATIO.
   - 3.3. ESTABLISH A TOP OF BERM WIDTH OF 15 FEET.
   - 3.4. RESHAPE OUTER SLOPES TO A 3 TO 1 RATIO.
   - 3.5. DIG ANCHOR TRENCH.
4. INSTALL NEW GAME FENCE.
5. INSTALL GEOMEMBRANES:
   - 5.1. INSTALL GEOTEXTILE AS NEEDED, SECONDARY LINER, GEONET, LEAK DETECTION SYSTEM AND PRIMARY LINER.
   - 5.2. INSTALL RUB SHEETS AND WATER LEVEL GAGE/LADDER.
   - 5.3. BACKFILL AND COMPACT ANCHOR TRENCH.

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
02/25/2021

LEGEND

PROPOSED 8' GAME FENCE
PROPOSED DRIVING SURFACE
EXISTING FEATURES

N

SCALE 1"=80'
0 40' 80' 160'

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

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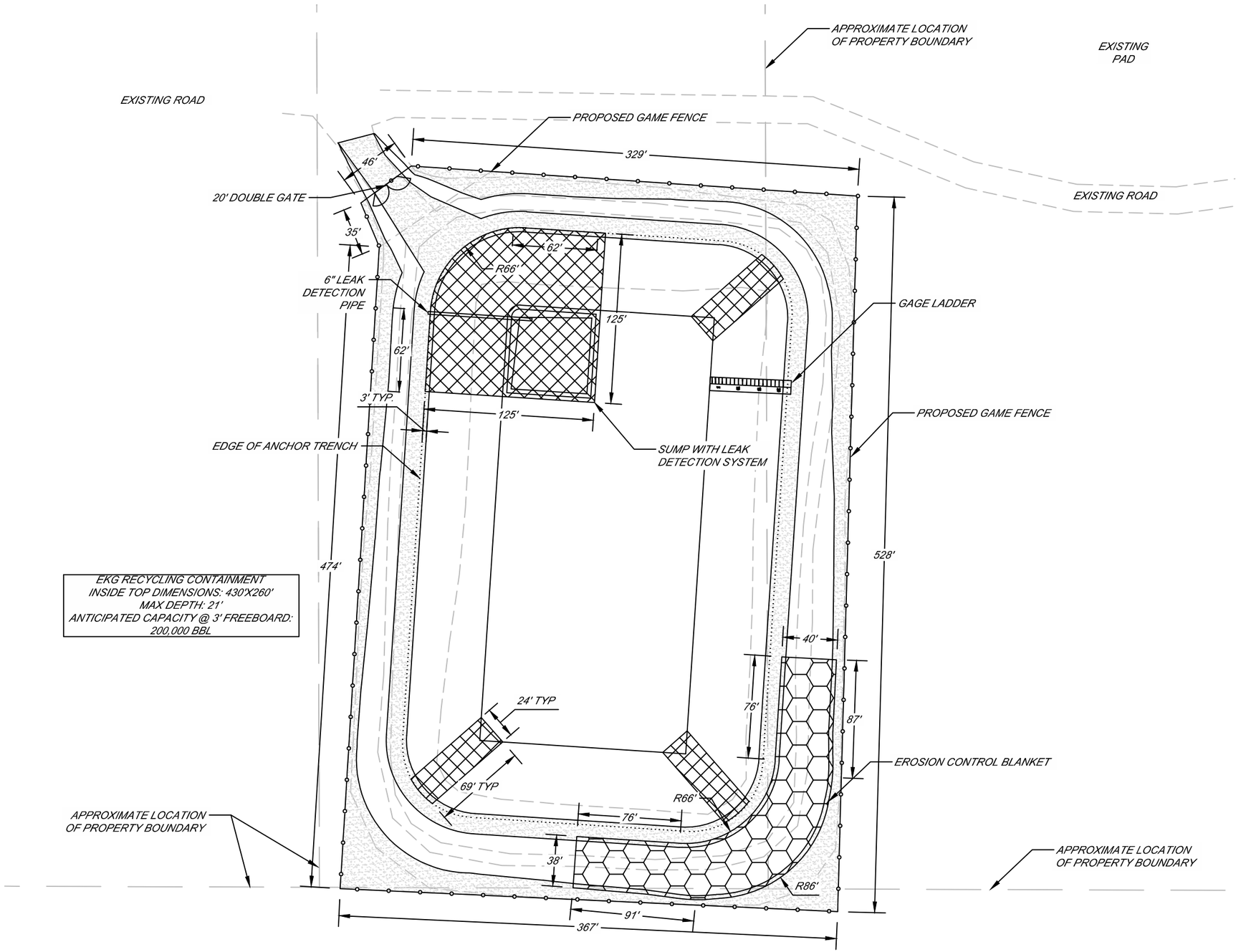
S02, T26S, R29E
EDDY COUNTY, NEW MEXICO
SOLARIS WATER MIDSTREAM, LLC.

PROPOSED SITE PLAN

HORIZONTAL SCALE:1"=80'	VERTICAL SCALE: NTS
PRINT DATE: 2/25/2021	DESIGNED BY: EG
PROJECT NO. 21-100	CHECKED BY: CSC/EMH
SUBSET: CIVIL	SHEET: C-102

Drawing File: Z:\Shared\Projects\21-100 Solaris EKG Pond\04_CIVIL\Design\Drawings\21-100 Site.dwg



CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER

02/25/2021

LEGEND

- PROPOSED 8' GAME FENCE
- PROPOSED DRIVING SURFACE
- PROPOSED RUB SHEET
- EROSION CONTROL BLANKET
- EDGE OF ANCHOR TRENCH
- EXISTING FEATURES

N

SCALE 1"=80'

0 40' 80' 160'

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SOLARIS WATER MIDSTREAM

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EKG WATER TREATMENT AND REUSE FACILITY
S02, T26S, R29E
EDDY COUNTY, NEW MEXICO
SOLARIS WATER MIDSTREAM, LLC.

PROPOSED LINER AND FENCE PLAN

HORIZONTAL SCALE:1"=80'	VERTICAL SCALE: NTS
PRINT DATE: 2/25/2021	DESIGNED BY: EG
PROJECT NO. 21-100	CHECKED BY: CSC/EMH
SUBSET: CIVIL	SHEET: C-103

Drawing File: Z:\Shared\Projects\21-100 Solaris EKG Pond\04_CIVIL\Design\Drawings\21-100 Site - L&F.dwg

GENERAL NOTES

1. NEW MEXICO ADMINISTRATIVE CODE TITLE 19, CHAPTER 15, PART 34, DESIGN CRITERIA FOR RECYCLING CONTAINMENTS SHALL APPLY TO THIS PROJECT.
2. ALL BOUNDARY, TOPOGRAPHIC AND UTILITY INFORMATION SHOWN ARE BASED ON SURVEY INFORMATION FURNISHED BY SOLARIS WATER MIDSTREAM, LLC.
3. THE CONTRACTOR SHALL IDENTIFY AND LOCATE UTILITY LINES, MONITORING WELLS, SURVEY MONUMENTS, AND OTHER NEARBY STRUCTURES PRIOR TO PERFORMING WORK.
4. 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

1. INSTALLER TO SIGN SUBGRADE ACCEPTANCE FORM (PROVIDED BY OWNER REPRESENTATIVE) DAILY PRIOR TO INSTALLATION.
2. CONTRACTOR TO PROVIDE SUBMITTAL OF LINER PANEL LAYOUT.
3. A 3' DIAMETER MINIMUM PIECE OF 40MIL LINER SHALL BE EXTRUDED WELDED WHERE THE PIE SHAPED CORNER SECTIONS MEET FOR SEAM REINFORCEMENT.
4. 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.
5. CONTRACTOR SHALL PLACE SANDBAGS ON LINER DURING INSTALLATION AS REQUIRED TO PREVENT WIND UPLIFT UNTIL POND IS FILLED TO A DEPTH OF 3 FEET.
6. CONTRACTOR SHALL INSPECT GRADED SURFACE FOR DEBRIS, ROCKS OR OTHER MATERIAL THAT MAY DAMAGE THE LINER.
7. CONTRACTOR SHALL ROLL SURFACE WITH A SMOOTH ROLLER TO ELIMINATE RUTS.
8. CONTRACTOR SHALL USE BLACK 60 MIL HDPE SMOOTH GEOMEMBRANE AS THE PRIMARY LINER AND BLACK 40 MIL HDPE SMOOTH GEOMEMBRANE AS THE SECONDARY LINER.
9. LINER TO BE INSTALLED PER MANUFACTURER'S RECOMMENDING PROCEDURES (GSI INSTALLATION QUALITY ASSURANCE MANUAL AND THE GSI DROP-IN SPECIFICATIONS FOR GEOMEMBRANES.)
10. ALL SEAMS MUST BE WELDED WITH A 6" MINIMUM OVERLAP.
11. 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.
12. FOR AIR PRESSURE TESTING (ASTM 5820), THE FOLLOWING PROCEDURES ARE APPLICABLE TO THE SEAMS WELD WITH DOUBLE SEAM FUSION WELDER.
    a. THE EQUIPMENT USED SHALL CONSIST OF AN AIR TANK OR PUMP CAPABLE OF PRODUCING A MINIMUM 35 PSI AND A SHARP NEEDLE WITH A PRESSURE GAUGE ATTACHED TO INSERT INTO THE AIR CHAMBER.
    b. 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).
    c. CUT OPPOSITE SEAM END AND LISTEN FOR PRESSURE RELEASE TO VERIFY FULL SEAM HAS BEEN TESTED.
    d. IF THE TEST FAILS, FOLLOW THESE PROCEDURES.
        i. WHILE CHANNEL IS UNDER PRESSURE WALK THE LENGTH OF THE SEAM LISTENING FOR A LEAK.
        ii. WHILE CHANNEL IS UNDER PRESSURE APPLY A SOAPY SOLUTION TO THE SEAM EDGE AND LOOK FOR BUBBLES FORMED BY AIR ESCAPING.
        iii. RE-TEST THE SEAM IN SMALLER INCREMENTS UNTIL THE LEAK IS FOUND.
    e. 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.
    f. REPAIR THE LEAK WITH A PATCH AND VACUUM TEST.
13. ALL NON-DESTRUCTIVE TESTS WILL BE NOTED IN THE NON-DESTRUCTIVE LOGS.
14. LINER SHALL BE PROTECTED WITH A 8 OZ. NONWOVEN GEOTEXTILE IF ROCK OR OTHER ANGULAR MATERIALS WITH A DIMENSION GREATER THAN 3/4 INCH ARE PRESENT.
15. SUMPS SHALL BE BACKFILLED WITH NON-ANGULAR MAXIMUM 3/8 INCH SIZED PEA GRAVEL.
16. LINER GAS VENTS SHALL BE SPACED ALONG THE INSIDE SLOPE AT APPROXIMATELY 100 FEET ON CENTER OR MINIMUM 2 VENTS PER SIDE.
17. 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.
18. LAY BOTH LINERS IN ANCHOR TRENCH. BACKFILL ANCHOR TRENCH IN 2 LIFTS AND COMPACT.

EARTHWORK NOTES

1. FILL FOR LEVEES 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.
2. 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.
3. PERFORM ONE NUCLEAR DENSITY GAGE TEST PER 2500 CY OR AS DIRECTED BY ENGINEER.
4. EARTHWORK CONTRACTOR SHALL PERFORM A VISUAL INSPECTION OF THE FINISHED COMPACTED POND BOTTOM AND SIDE SLOPES BEFORE HDPE LINER INSTALLATION, REMOVING ALL DEBRIS, SHARP OBJECTS AND GRAVEL LARGER THAN 3/4 INCH.

STAGE STORAGE	
PRODUCED WATER POND ELEVATION (FT)	PRODUCED WATER POND VOLUME (BBL)
3036	0
3037	186
3038	805
3039	4,809
3040	13,775
3041	23,257
3042	33,262
3043	43,803
3044	54,888
3045	66,527
3046	78,732
3047	91,511
3048	104,876
3049	118,835
3050	133,400
3051	148,580
3052	164,385
3053	180,825
3054	197,911
3055	215,652
3056	234,059
3057	253,142

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
02/25/2021

SUMMARY OF QUANTITIES

ITEM NUMBER	ITEM	UNIT	QTY
1	REMOVE EXISTING FENCE	LUMP SUM	1
2	CLEAR EXISTING VEGETATION AND DEBRIS	LUMP SUM	1
3	ESTIMATED CUT (BELOW EXISTING GRADE)	CUBIC YARD	16,173
4	ESTIMATED FILL (ABOVE EXISTING GRADE)*	CUBIC YARD	15,667
5	8' GAME FENCE	LINEAR FEET	1,797
6	20' DOUBLE GATE	LINEAR FEET	1
7	EROSION CONTROL BLANKET	SQUARE FEET	13,103
8	RUB SHEET 60 MIL HDPE GEOMEMBRANE (TEXTURED)**	SQUARE FEET	20,701
9	PRIMARY 60 MIL HDPE GEOMEMBRANE (SMOOTH)**	SQUARE FEET	118,277
10	200 MIL GEONET**	SQUARE FEET	118,277
11	SECONDARY 40 MIL HDPE GEOMEMBRANE (SMOOTH)**	SQUARE FEET	118,277
12	8 OZ. GEOTEXTILE**	SQUARE FEET	118,277
13	6" HDPE DR11 PIPE WITH PERFORATIONS IN SUMP	LINEAR FEET	77
14	GAGE LADDER	EACH	1
15	DRAIN ROCK	CUBIC YARD	1
16	ANCHOR TRENCH***	LINEAR FEET	1,990

NOTES:
* 25% FILL FACTOR APPLIED. CUT AND FILL QUANTITIES PERTAIN TO THE ENTIRE SITE. PAD AND LEVEE MATERIAL ARE INCLUDED IN FILL QUANTITY.
** COMPLETE-IN-PLACE QUANTITIES. OVERLAP, SCRAPS AND/OR SPOIL QUANTITIES NOT INCLUDED.
*** ANCHOR TRENCH LENGTH INCLUDES LINERS AND EROSION BLANKET.

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IFR	ISSUED FOR REGULATORY REVIEW	1/13/21	CSC

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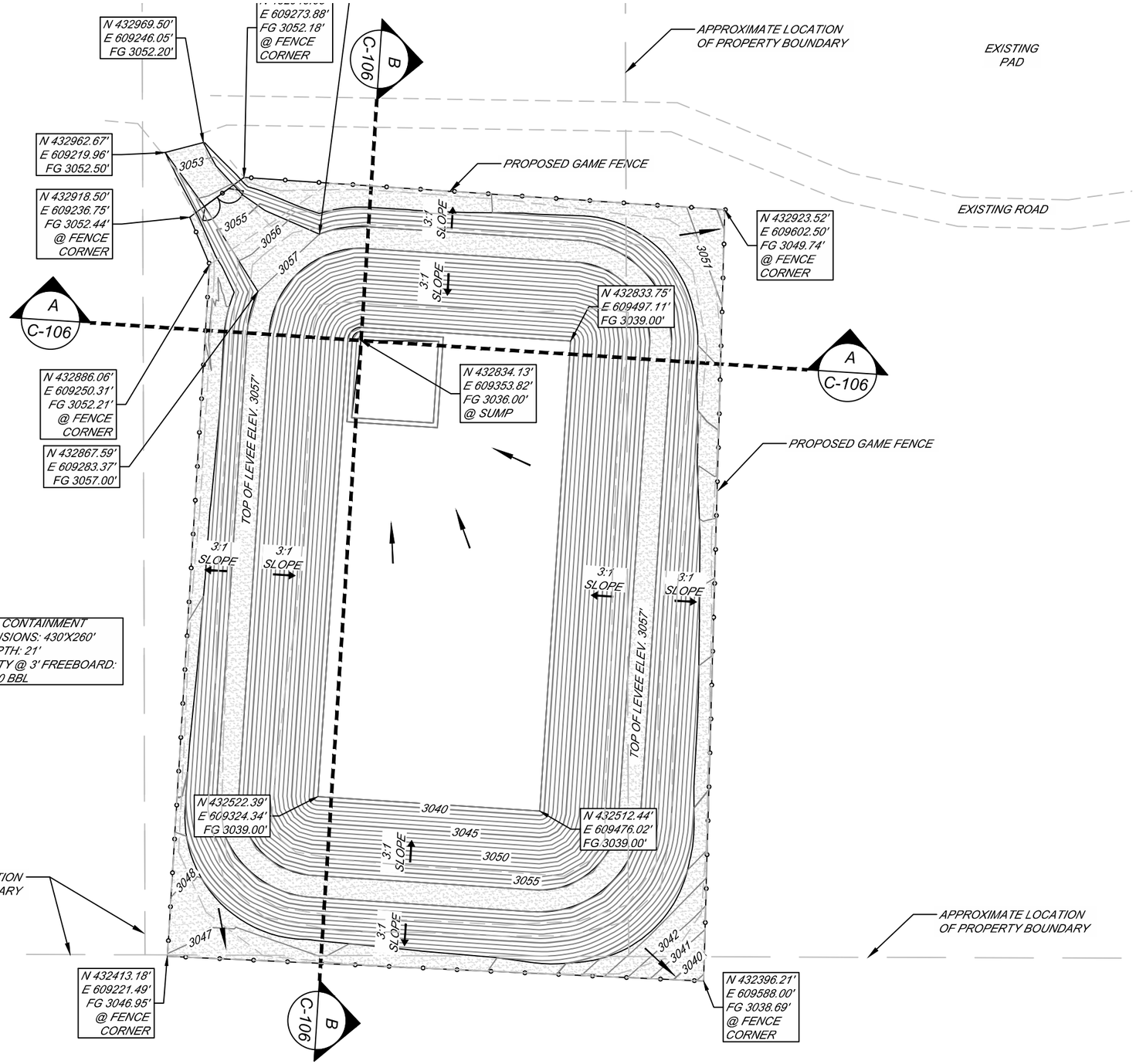
SUMMARY OF QUANTITIES AND GENERAL NOTES

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 2/25/2021	DESIGNED BY: EG
PROJECT NO. 21-100	CHECKED BY: CSC/EMH
SUBSET: CIVIL	SHEET: C-104

Drawing File: Z:\Shared\Projects\21-100 Solaris EKG Pond\04_CIVIL\Design\Drawings\21-100 Site.dwg



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02/25/2021

IFC	ISSUED FOR CONSTRUCTION	2/25/21	CSC
IFR	ISSUED FOR REGULATORY REVIEW	1/13/21	CSC
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GRADING PLAN

HORIZONTAL SCALE:1"=80'	VERTICAL SCALE: NTS
PRINT DATE: 2/25/2021	DESIGNED BY: EG
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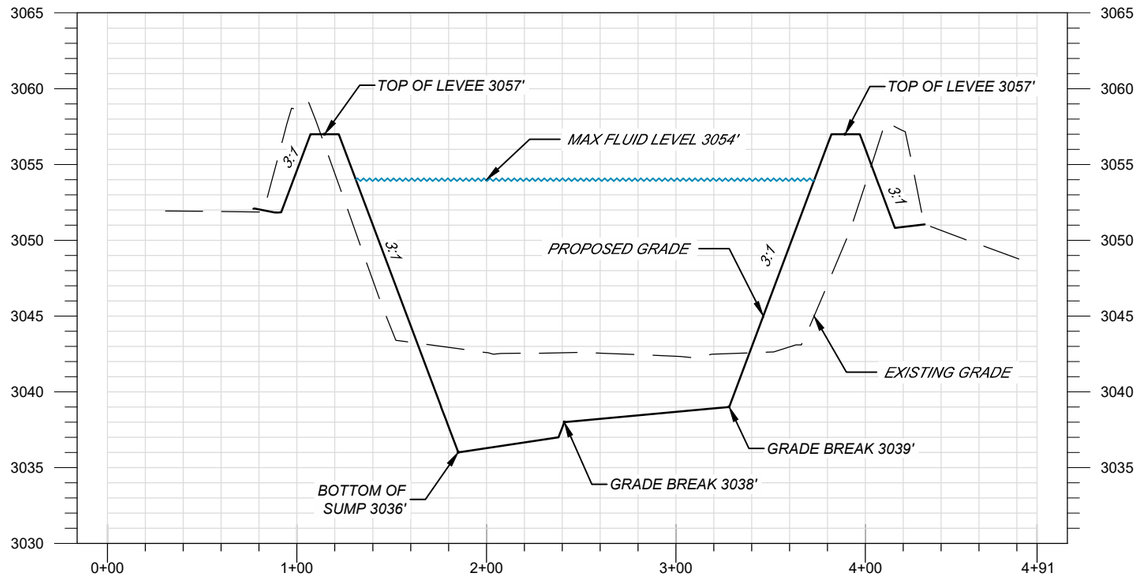
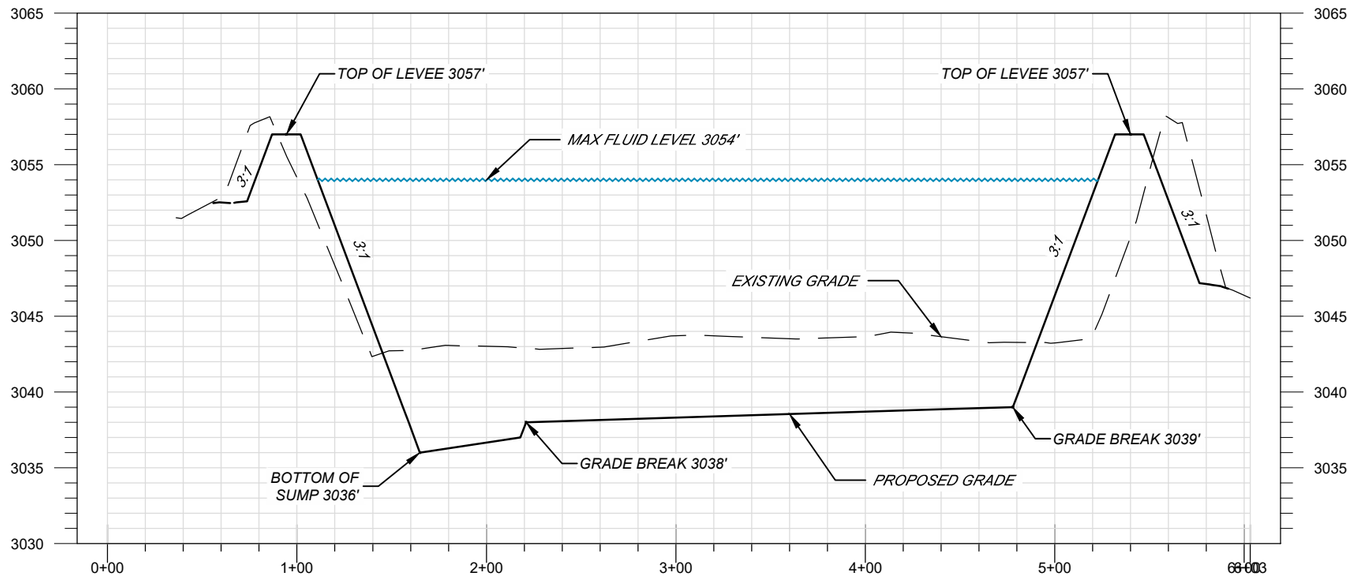
SUBSET: CIVIL	SHEET: C-105

Drawing File: Z:\Shared\Projects\21-100 Solaris EKG Pond\04_CIVIL\Design\Drawings\21-100 Grading.dwg

SECTION A



SECTION B



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CROSS SECTIONS

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SUBSET: CIVIL	SHEET: C-106

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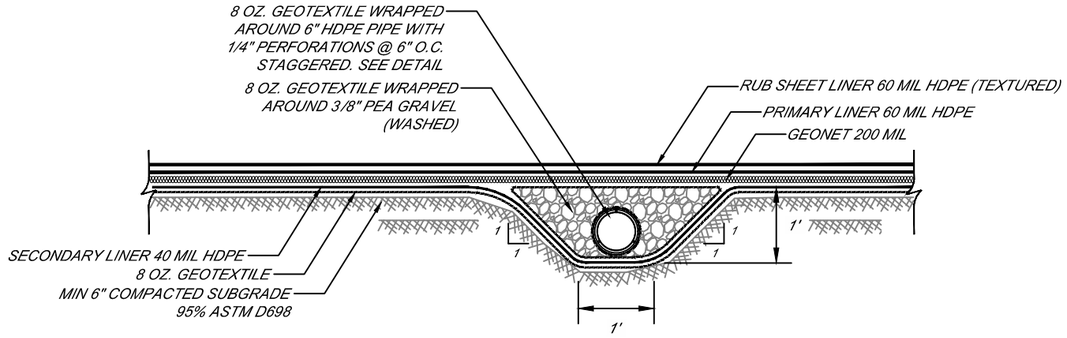
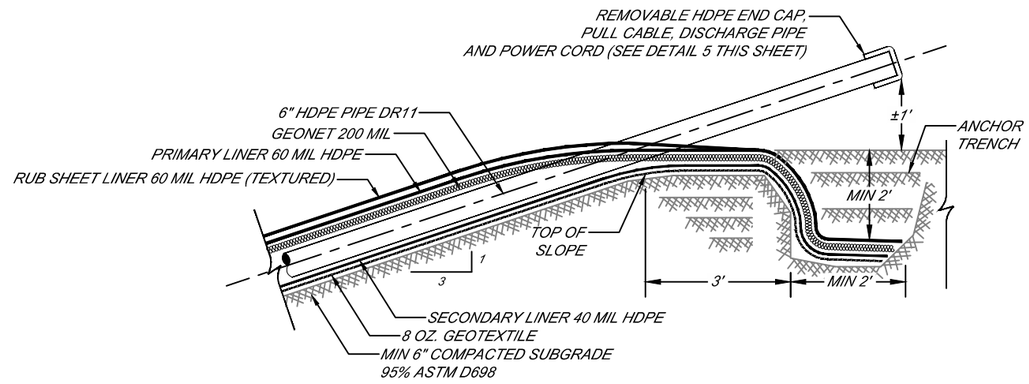
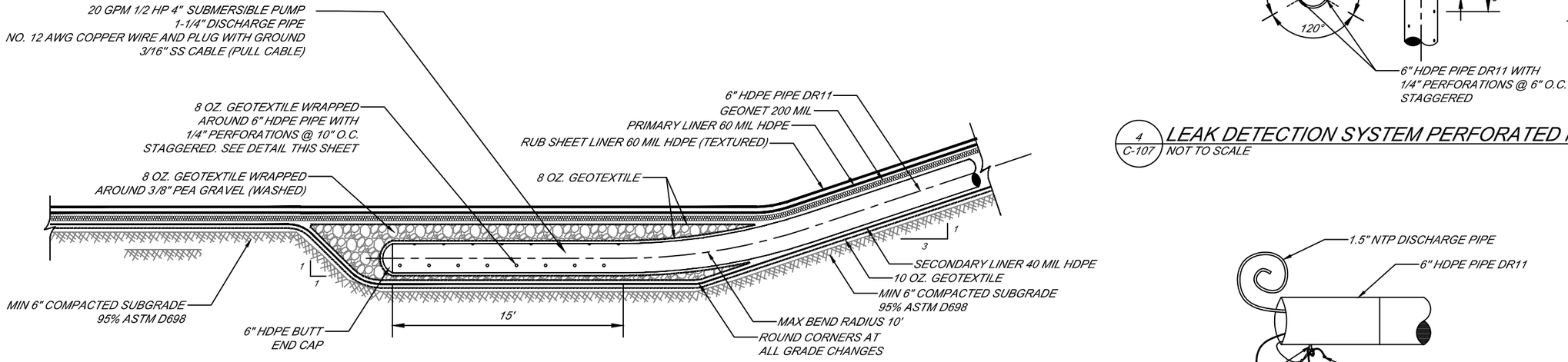


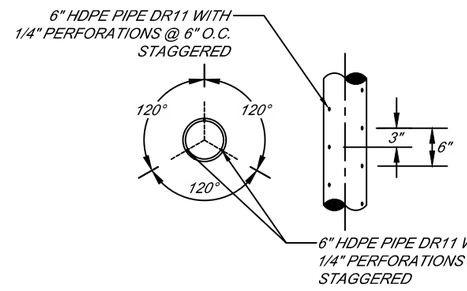
1 C-107 **LEAK DETECTION SYSTEM SECTION A**
NOT TO SCALE



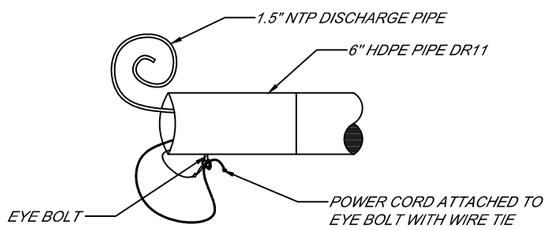
2 C-107 **LEAK DETECTION SYSTEM PIPE RISER**
NOT TO SCALE



3 C-107 **LEAK DETECTION SYSTEM SECTION B**
NOT TO SCALE



4 C-107 **LEAK DETECTION SYSTEM PERFORATED PIPE**
NOT TO SCALE



5 C-107 **DISCHARGE PIPE, PULL CABLE AND POWER CORD**
NOT TO SCALE

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LEAK DETECTION SYSTEM DETAILS

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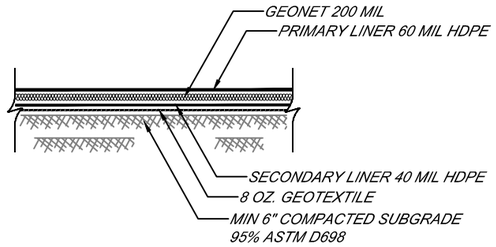
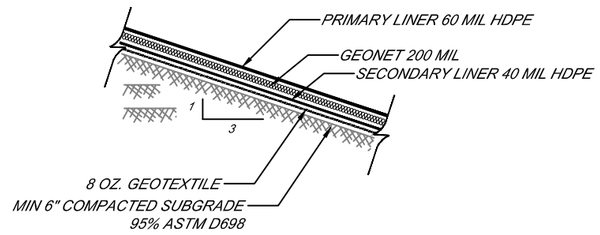
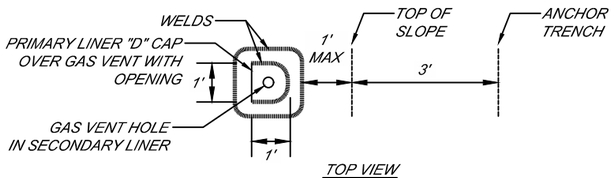


1 / C-108 **TYPICAL POND BOTTOM LINER**
NOT TO SCALE

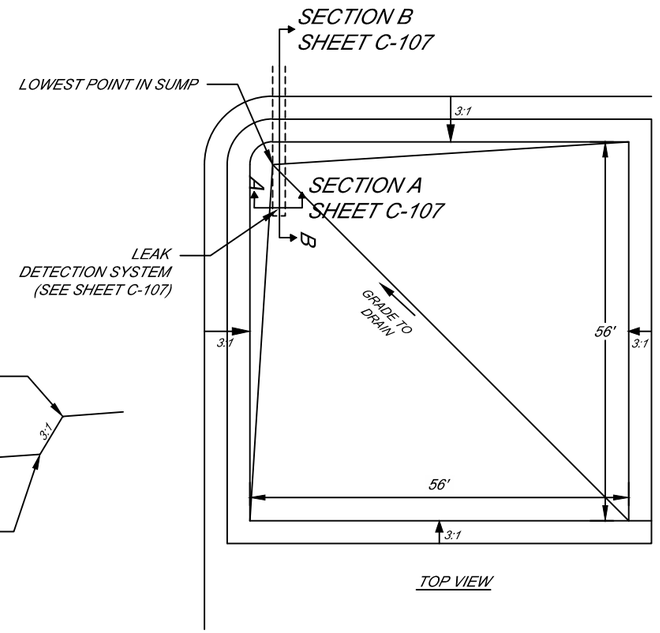


2 / C-108 **TYPICAL POND SLOPE LINER**
NOT TO SCALE



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

3 / C-108 **TYPICAL GAS VENT**
NOT TO SCALE



4 / C-108 **SUMP DETAIL**
NOT TO SCALE

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MISCELLANEOUS DETAILS

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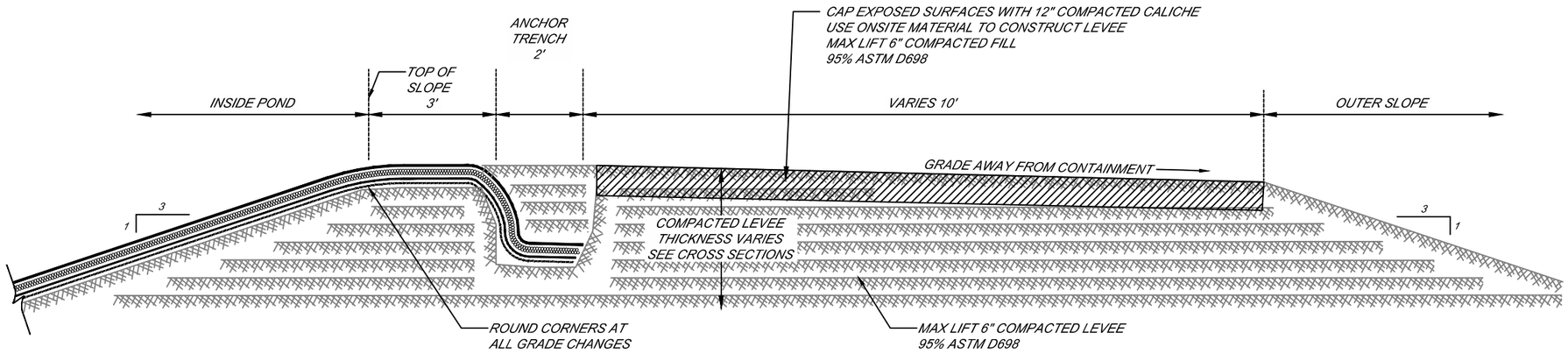
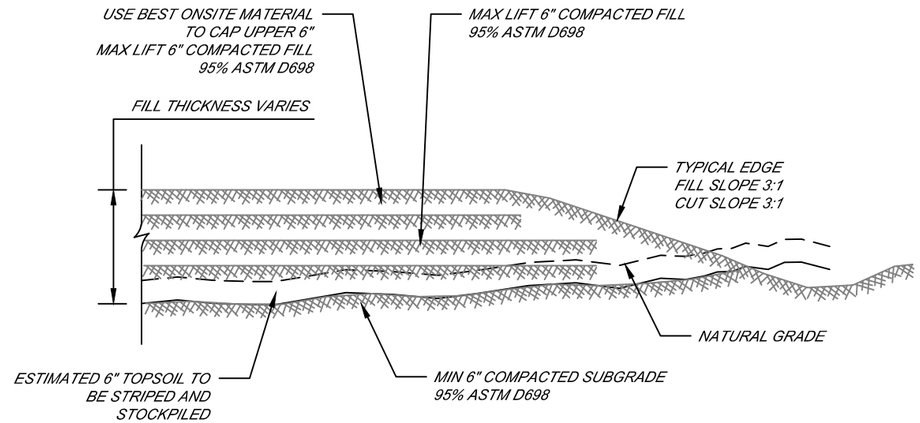


1 / C-109 **TYPICAL LEVEE SECTION**
NOT TO SCALE



2 / C-109 **TYPICAL PAD EDGE SECTION**
NOT TO SCALE

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LEVEE AND PAD DETAILS

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PROJECT NO. 21-100	CHECKED BY: CSC/EMH
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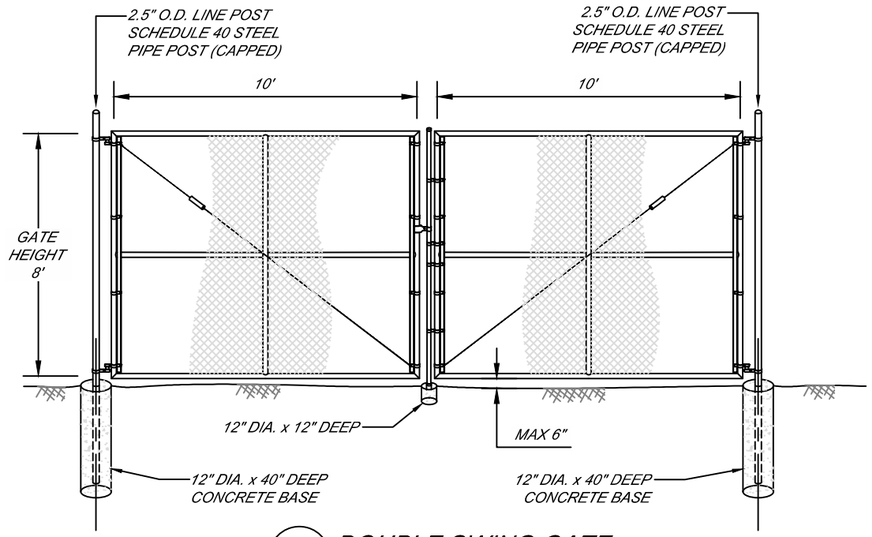
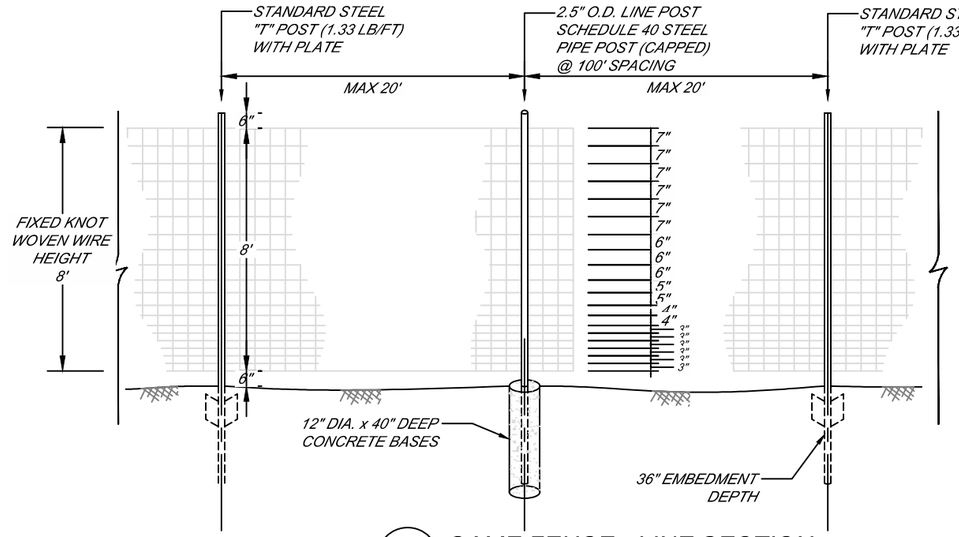
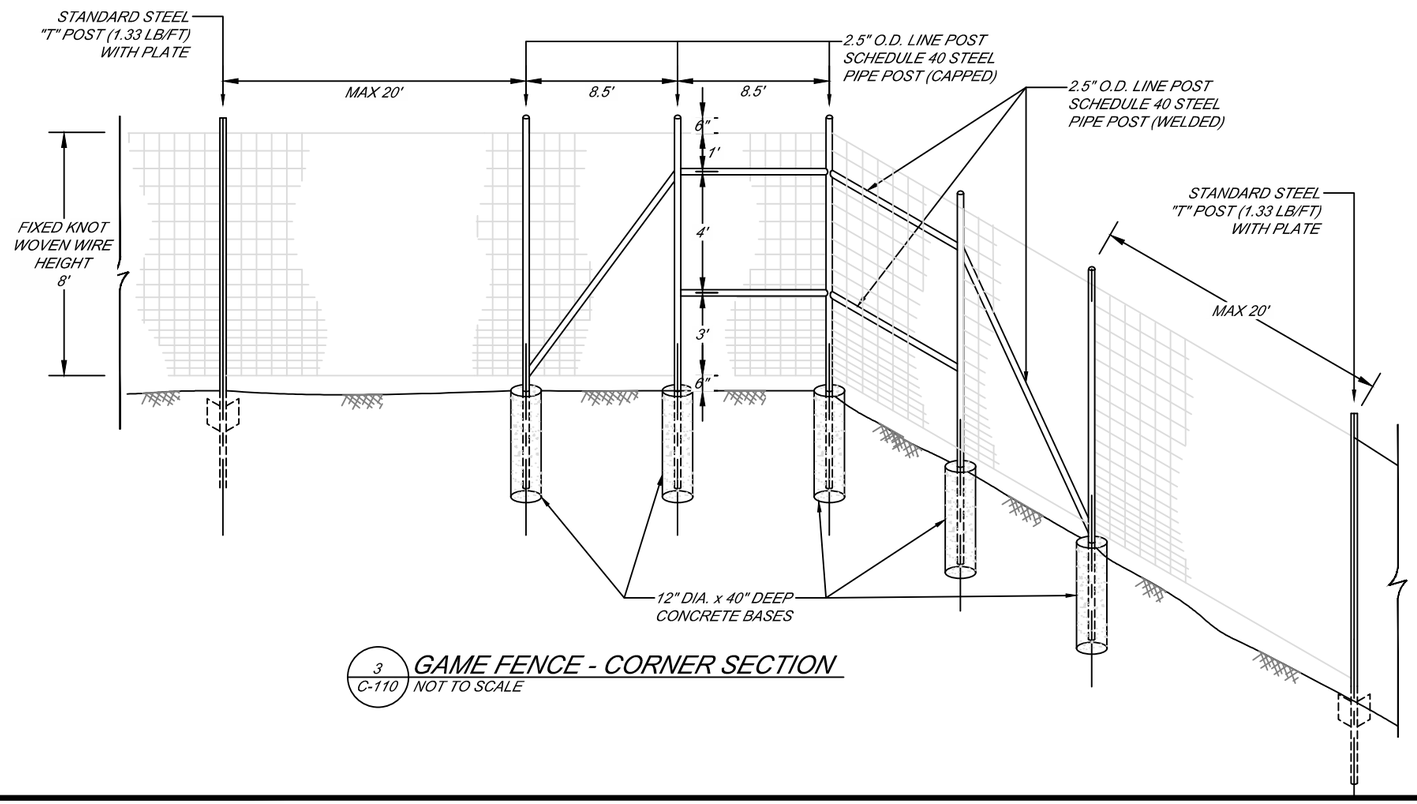


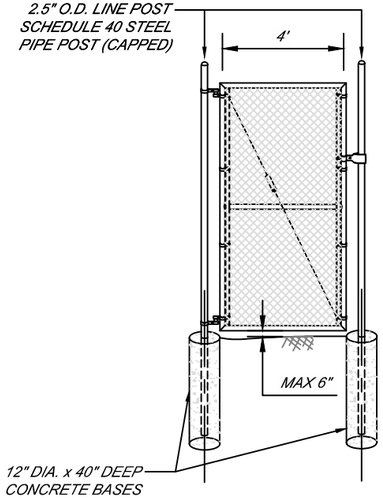
1 C-110 **DOUBLE SWING GATE**
NOT TO SCALE



2 C-110 **GAME FENCE - LINE SECTION**
NOT TO SCALE



3 C-110 **GAME FENCE - CORNER SECTION**
NOT TO SCALE



4 C-110 **WALK GATE**
NOT TO SCALE

NOTES:
1. FOR WOVEN WIRE, TOP AND BOTTOM STRANDS SHALL BE 12½ GAUGE OR HEAVIER; INTERMEDIATE STRANDS SHALL BE 14½ 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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FENCE DETAILS	
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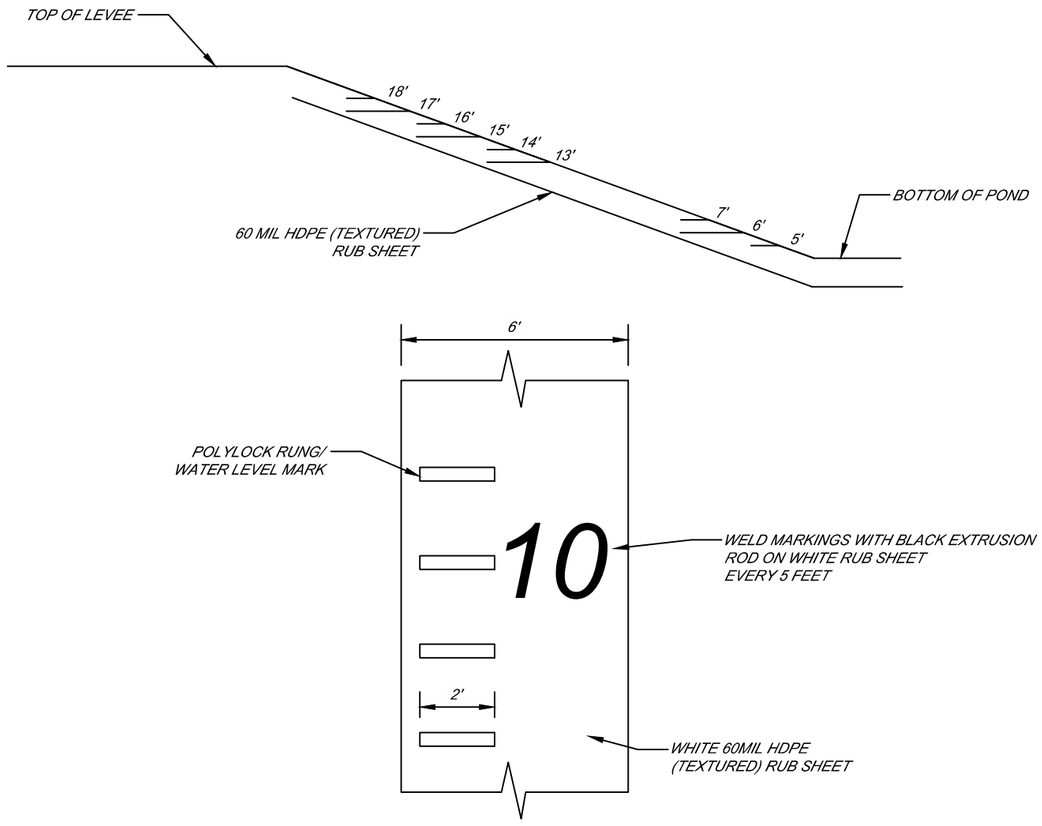
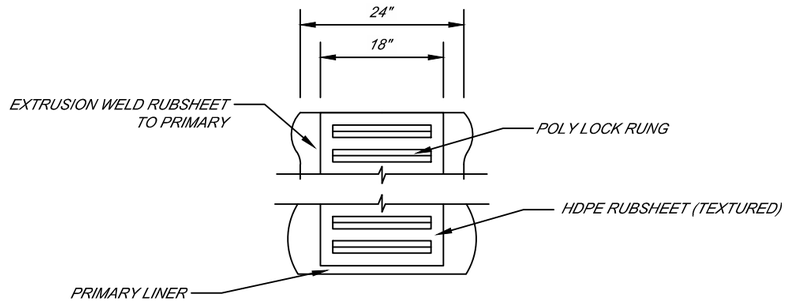
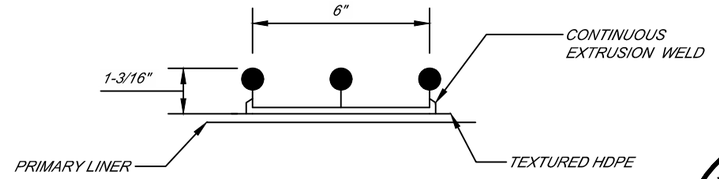


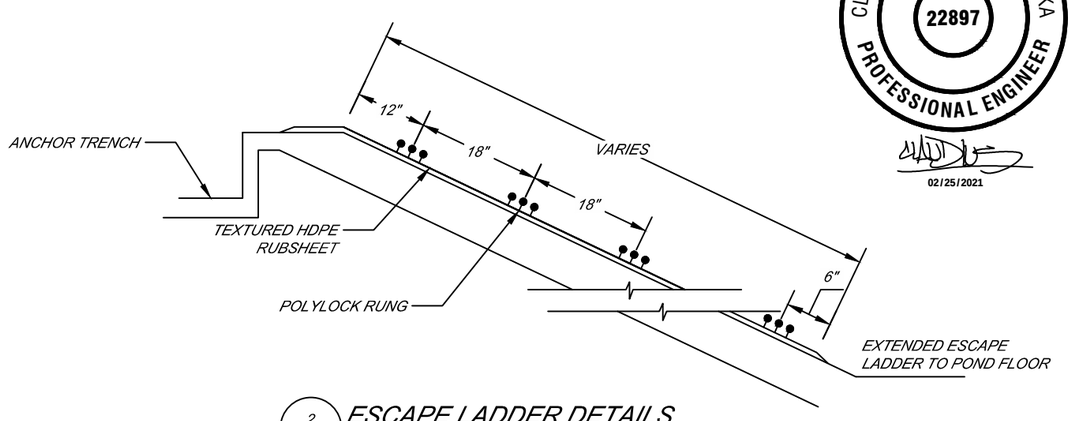
1 C-111 **WATER LEVEL MARKS**
NOT TO SCALE



ESCAPE LADDER FRONT VIEW



POLY LOCK RUNG



2 C-111 **ESCAPE LADDER DETAILS**
NOT TO SCALE

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
02/25/2021

GAGE/LADDER NOTES:
1. INSTALL GAGE NUMBERING STARTING FROM THE TOP OF SLOPE AT 21'.
2. INSTALL A POLY LOCK RUNG AT EVERY WATER LEVEL MARK.

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ESCAPE LADDER AND GAGE DETAILS

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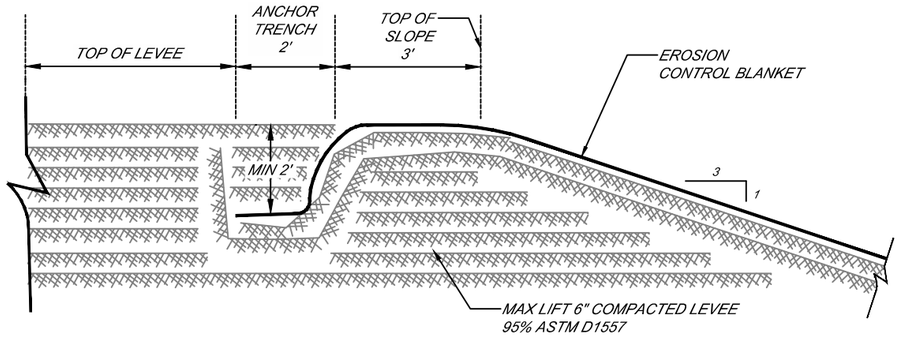
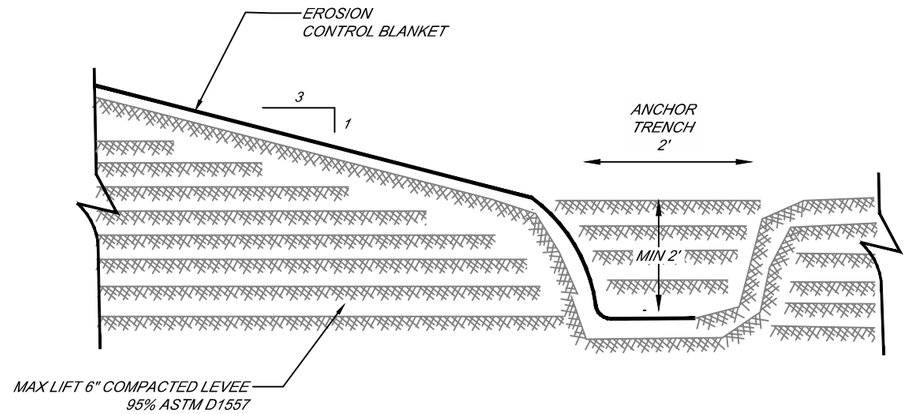


1 C-112 **EROSION CONTROL BLANKET DETAIL - TOP OF LEVEE**
NOT TO SCALE



2 C-112 **EROSION CONTROL BLANKET DETAIL - BOTTOM OF LEVEE**
NOT TO SCALE

EROSION CONTROL BLANKET NOTES:

1. THE FOLLOWING EROSION CONTROL BLANKET PRODUCTS OR APPROVED EQUAL MAY BE USED:
   ECS S-1 STANDARD STRAW
   LANDLOK BON-TERRA S2, ENS2 OR ENCS2
   NORTH AMERICAN GREEN S75, S75BN, S150, S150BN, OR SC150
2. BURY THE UPSLOPE END OF EACH BLANKET AT LEAST 6 INCHES IN A VERTICAL TRENCH WITH THE SOIL PRESSED FIRMLY AGAINST THE EMBEDDED MAT.
3. STAPLE STRIP ENDS AND END OVERLAPS WITH NOT MORE THAN 20 INCHES BETWEEN STAPLES. STAPLE ALL OTHER JOINTS AND EDGES AT 40 INCH INTERVALS.
4. USE U-SHAPED STAPLES TO ANCHOR BLANKETS THAT ARE 11 GAUGE OR HEAVIER STEEL WIRE HAVING A SPANWIDTH OF 1 INCH AND A LENGTH OF 6 INCHES OR MORE FROM TOP TO BOTTOM AFTER BENDING.

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EROSION CONTROL BLANKET DETAILS

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EFFECTIVE WIDE-AREA BIRD CONTROL!

Mega Blaster PRO
sonic bird repeller
covers 30 acres!

- NEMA Rated Case
- Crystal-Clear Digital Sounds

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.

- *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.

CONFIGURATIONS AVAILABLE:

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

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.

BIRD-X

The Bird Control 'X'-Perts

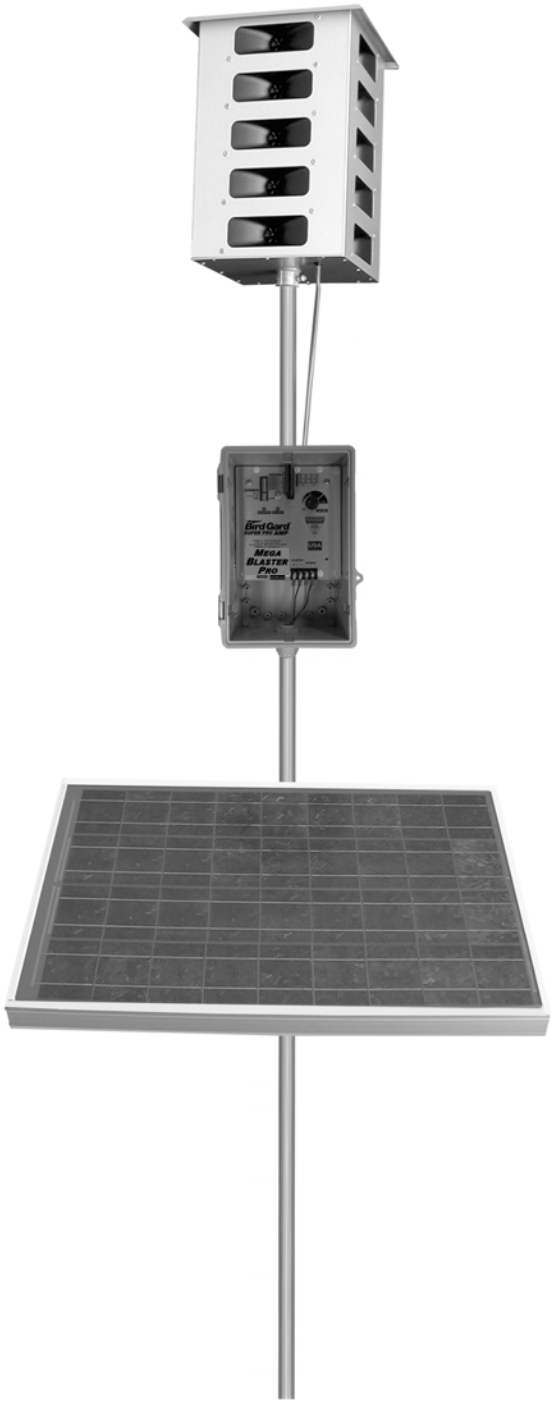
NOTE: This unit is capable of sound output up to 125 decibels. **HEARING PROTECTION IS RECOMMENDED.**

HEARING PROTECTION RECOMMENDED

MEGA BLASTER PRO

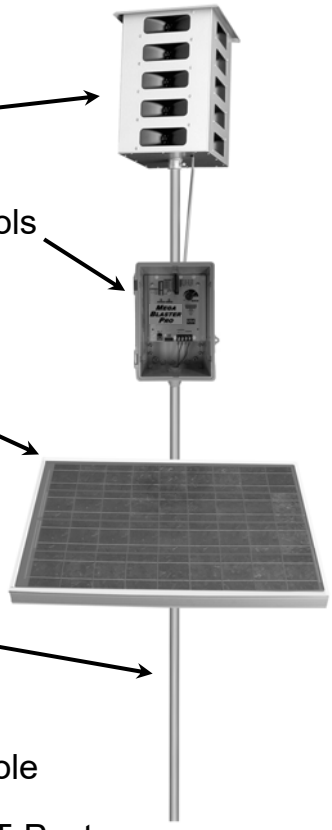
BIRD-X

User's Manual



Overview

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



Your Bird-X Mega Blaster Pro system consists of:

20-Speaker Tower broadcasts the bird sounds

Control Unit produces the bird sounds and contains all operational controls

Solar Panel recharges the 12-volt deep cycle battery

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

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

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

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

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

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

Bird Control Management Guidelines

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

For best results:

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

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

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.

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

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.

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

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

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

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 transmittal letter and design drawings, the operator will employ a chain-link or game fence rather than 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. The specification for fencing provided in 19.15.34.12 D.2 contradicts D.1 because pigs will move beneath the lower strand of a 4-strand, 4-foot high barbed wire fence and deer will jump over. Thus, compliance with D.2 results in a violation of D.1. Compliance with D.1 is the critical component of the Rule and operators need not submit a variance request in order to follow Best Management Practices and comply with the Rule.

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.

As stated in the O&M plan, the operator will ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.

Netting and Protection of Wildlife

The 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).

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.

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[1] 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, will use a blank cartridge or shell in a handgun, starter pistol or shotgun as additional hazing. 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.

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.

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…

Appendix A 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)
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).

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

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.

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.

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 and is equivalent to 30-mil LLDPEr (in accordance with a previously approved variance) Liner compatibility meets or exceeds a subsequent relevant publication to EPA SW-846 method 9090A.

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.

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.

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.

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

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…

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

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.

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.

19.15.34.12 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.

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.

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.

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).

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.

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

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.

19.15.34.9 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.

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.

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.

19.15.34.13
(6) The containment shall be operated to prevent the collection of surface water run-on.

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.

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.

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.

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.

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.

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.

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. 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.

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.

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.

Closure Plan
In Ground Containments

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.

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.

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,

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.

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 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.

General Siting Criteria Demonstration and Site-Specific Groundwater Data

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

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

Within the area overlying a subsurface mine.
- Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division FIGURE 4

Within an unstable area.
- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; topographic map FIGURE 5

Within a 100-year floodplain. FEMA map FIGURE 6

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

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

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

Within 500 feet of a wetland. FIGURE 9
- US Fish and Wildlife Wetland Identification map; topographic map; visual inspection (certification) of the proposed site

Geology

According to the State of New Mexico Geologic Map[1], Permian Age Rustler Formation (Pr) is exposed at the location of the proposed EKG containment and throughout most of the mapped area displayed in Figure 1. Quaternary Alluvium (Qa) is the dominant mapped unit in the northern third of the mapped area. Older alluvium (Qoa), which can be the Gautuna Formation in this area of Eddy County, is exposed in the eastern and southeastern margins of Figure 1.

Figure 5a shows that all but the northwest corner of the EKG containment lies within an area mapped as High Karst Potential by the BLM. In order to provide additional clarity regarding compliance with Rule 34 stipulations associated with unstable ground, we employed the 7.5-minute geologic quadrangle map for Malaga[2] as a base map for Figures 5b (topographic base map) and 5c (recent air photo base map). We also performed field examination of exposed bedrock and drilled a boring using an air rotary drilling rig about 325 feet north of the EKG site (Figure 10).

Figures 5b and 5c, which are at a scale of 1:12,000, identifies the boundary between high and moderate karst about 50 feet northwest of former fresh water frac pond that will become the EKG containment. The 7.5-minute geologic map shows that most of the EKG containment lies on eolian deposits (Qe) rather than Permian Rustler Formation shown on the State map (Figure 1 and 2). These eolian deposits are similar in mapped exposure to the alluvial deposits shown on Figures 1 and 2. Examination of the lithologic log (Appendix Well Logs and summarized below) and photos (Appendix SP) of the cuttings show to our satisfaction that eolian sands are present to a depth of 24 feet and the State Map incorrectly shows these sands as alluvium.

Figures 5b, 5c and our field examination show that the Los Medaños Member of the Rustler underlies the eolian deposits described above. The Los Medaños is exposed in several gullies south and east of the EKG site and outside of the gully systems bedrock is covered by slope wash or eolian sand. The description of the Los Medaños provided in the legend of the 7.5-minute quadrangle is reproduced in part below:

> *Los Medaños Member of the Rustler Formation—Interlayered mudstones, sandstones, and gypsum. Reddish yellow, laminated to thinly bedded, poorly indurated silty mudstones dominate. Pale red, very thinly bedded, moderately indurated, sparry calcite-cemented coarse-grained siltstones/very fine-grained sandstones and laminated to thinly bedded, nodular or crystalline, moderately indurated gypsum beds are both rare and approximately subequal in abundance. Gypsum also occurs as irregular masses up to 60 cm in diameter. Trace thin laminae of waxy claystones are the least common lithology. Colors of 5YR 6/6-7/6 (mudstones, claystones) and 2.5YR 7/2-7/1 (siltstones/very fine-grained sandstones) were measured. Unit is generally poorly exposed and often identified by abundant reddish muds with trace irregular gypsum masses in colluvial/residuum slopes.*

[1] https://geoinfo.nmt.edu/publications/maps/geologic/state/home.cfml

[2] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj6mPP_0LTuAhVHWq0KHYSkBJMQFjAAegQIAxAC&url=https%3A%2F%2Fgeoinfo.nmt.edu%2Fpublications%2Fmaps%2Fgeologic%2Fofgm%2Fdownloads%2F277%2FMalaga.pdf&usg=AOvVaw0jdCvww6rfSMW16_d90ike

Our field examination in the area of the EKG containment demonstrates that the unit is very poorly indurated, as evidenced by headward erosion of the gully system to the east of the containment. The boring log and photos of cuttings confirm the nature of the Los Medaños as described above and observed in the gullies. The penetration rate of about 1 foot per minute in the boring is consistent with friable bedrock as the 3 foot/minute penetration rate is consistent with the uncemented eolian sand. We observed no voids during drilling and the gully system did not expose any solution cavities. We also did not observe any gypsum in the boring or in exposures to the south and east.

depth (ft BGS)	Moisture	Description	Time	Penetration ft/min
0-24	dry	Tan, fine sand, well-sorted	0820	3.0
24-47	dry	Brown, very fine sand, well-sorted	0828	1.5
47-60	dry	Pink-tan, very fine sand; 15% red clay bits	0844	0.4
60-65	dry	Red-brown, med.-fine sand; Air pocket @60	0917	1.7
65-78	dry	Red-brown, med.-fine sand; 10% brown silt/clay bits	0920	1.2
78-80	dry	Red, fine sand, well-sorted	0931	1.0
80	dry	Total Depth	0933	

The overlying Culebra Dolomite is exposed on small hills to the southeast and southwest of the containment site at the same elevations, more or less, as we observed the Los Medaños Member in the gullies. This relationship is strong evidence that the EKG containment lies within the uppermost portion of the Los Medaños. The legend of the 7.5 minute geologic map states that the thickness of the Los Medaños is about 48 meters thick within the mapped area. Thus, about 150 feet of friable silty mudstones, fine-grained sandstones and siltstone separate the EKG containment from the soluble gypsiferous mudstone members of the Rustler and evaporites of the Salado Formation.

Distance to Groundwater

Figures 1 and 2, the associated legends, a dry borehole that is 80 feet in depth, along with the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 100 feet beneath the containment.

Figure 1a is topographic map with the New Mexico state geologic map that shows:

1. The EKG containment identified by the blue square.
2. Water wells from the OSE database as a triangle inside colored circles that indicate well depth (C representing the Carlsbad Basin). OSE wells are often miss-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range.
3. Water wells from the USGS database as large triangles color-coded to the formation from which the well draws water.
4. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares (MISC).
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

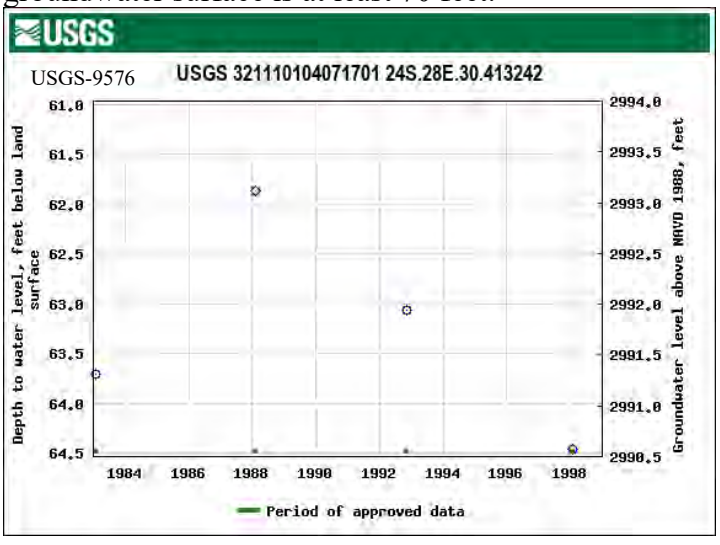
Hydrogeology

The site for the EKG Recycling Containment is located approximately 3.4 miles southwest of Malaga, New Mexico. Willow Lake is 2.2 miles to the east, and the Black River is approximately 2.5 miles to the north. The construction of the EKG recycling containment will be on the site of a fresh water frac pond that once held water but is not in use (see Figure 8). According to the New Mexico state geologic map, the surface unit at the EKG site is the Permian-age Rustler Formation. The Rustler formation is described as siltstone, gypsum, sandstone, and dolomite. Figure 1b shows the more detailed Geologic Map of the Malaga 7.5-minute quadrangle. The site straddles the contact between the units Prl (Los Los Medaños member of the Rustler Formation), which is described above, and Qe which is described as follows:

> Qe – Eolian deposits – Slope-blanketing windblown very pale brown silts and fine sands variably reworked by slopewash transport. Deposits are loose and poorly exposed. No evidence of notable soil development was observed. A sediment color of 10YR 7/3 was measured. Deposits are 0 to perhaps 2 m thick.

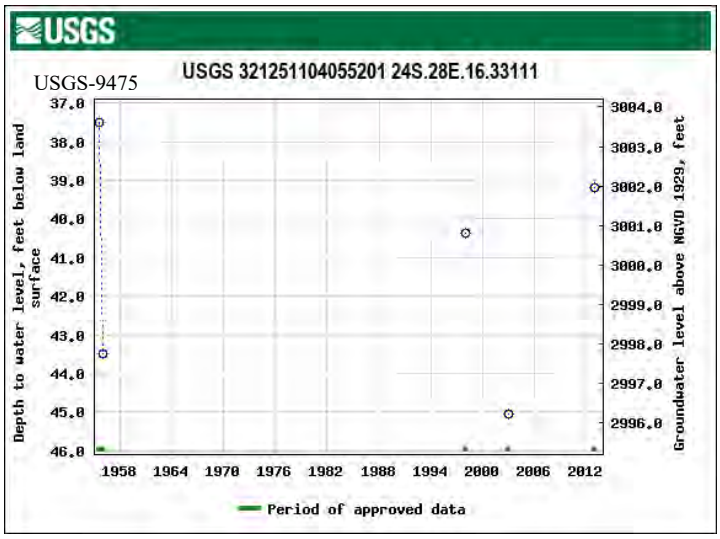
The USGS database suggests that the nearby windmill, USGS-09576 draws water from the Castile Formation, and others draw water from the Seven Rivers Formation or Rustler Formation. We believe all these wells draw water from the Rustler.

Most of the wells in the view of Figures 1 and 2 report having a depth to water that is less than 100 feet. However, an exploratory hole was drilled on December 10, 2020 near the EKG site to a depth of 80 feet and the EKG site is higher in elevation than the measured wells shown in Figure 1. The exploratory hole was dry to 80 feet. The log for the hole is located in the Well Log Appendix. The drilling site is 328 feet north of the EKG location and the bottom of the excavation into which the EKG containment is 7.75 feet below the surface elevation of the borehole. This implies that there is no water within 70 feet of the bottom of the proposed containment. Given the estimated elevation of the EKG containment, the elevation of the groundwater surface is lower than (3051-80=) 2961 feet above mean sea level. From these data we conclude that the distance from the bottom of a 10-foot-deep EKG containment to the groundwater surface is at least 70 feet.



Because much of the groundwater elevation data is a decade or more old, we examined historical groundwater elevation data associated with a few USGS wells near the EKG site. To the left is historical data from USGS-9576, which is approximately 0.6 miles southwest of the site. The elevation of the ground water in this well has varied about 2.6 feet over 14 years. Based on this historical data, we can infer that the groundwater elevation in this well, and wells that draw water from the same aquifer, will not experience large or frequent fluctuations.

The graph to the right is a graph of historical data from USGS-9475. It shows fluctuations of 6-7 feet at most over 54 years of data. We can also infer from this data that the groundwater elevation will not experience large or frequent fluctuations.



Distance to Municipal Boundaries and Fresh Water Fields

Figure 3 demonstrates that the location is not within incorporated municipal boundaries or within defined municipal fresh water well fields covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended.

- The closest municipality is Malaga, NM approximately 2.3 miles to the northeast.
- The closest public well is CP-00259 and is located 9.4 miles to the northwest.
- The closest freshwater field is the City of Carlsbad's Sheep Draw well field, which is located 15.9 miles to the northwest.

Distance to Subsurface Mines

Figure 4 and our general reconnaissance of the area demonstrate the proximity of surface mines to the containment.

- This location is not within an area overlying a subsurface mine.
- The nearest mapped surface mine is approximately 8.72 miles to the southwest of the site.

Distance to High or Critical Karst Areas and Unstable Ground

The presence of karst features within an area proposed for the storage of treated recycle water for E&P uses (e.g., hydraulic stimulation) can be problematic for two reasons. First, as suggested in Part 34.11 of OCD Rules, a produced water recycling containment must be located within a stable area. A portion of Part 34 is presented below with **emphasis** added:

> *19.15.34.11 SITING REQUIREMENTS FOR RECYCLING CONTAINMENTS:*
> *A. An operator shall* ***not locate a recycling containment****:*
> *(8)* ***within an unstable area*** *unless the operator demonstrates that it has incorporated engineering measures into the design to ensure that the containment's integrity is not compromised…*
>
> *Unstable area is defined in 19.15.2.7 as*
> *U.(6) "Unstable area" means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a division-approved*

facility's structural components. ***Examples of unstable areas are*** *areas of poor foundation conditions, areas susceptible to mass earth movements and* ***karst terrain*** *areas where karst topography is developed as a result of dissolution of limestone, dolomite or other soluble rock. Characteristic physiographic features of karst terrain include sinkholes, sinking streams, caves, large springs and blind valleys.*

In addition to potential instability of the containment foundation, karst features, such as sinkholes, open fractures or other conduits can provide a direct link between the surface and groundwater. Thus, a release from the containment within an area of high karst could introduce a large volume of saline water to an underlying water table aquifer over a relatively short time.

Under the direction of Randall Hicks PG, Kristin Pope, a degreed geologist with more than 15 years' experience in Eddy and Lea counties, carefully examined the area around the proposed EKG containment for evidence of ground instability and karst features. Ms. Pope also logged the cuttings from air-rotary drilling of an 80-foot boring. Our findings are illustrated in Appendix Site Photos and are summarized below.

- The boring located about 320 feet north of the freshwater pond excavation did not encounter soluble rocks to a depth of 80 feet. In the cuttings, gypsum was not observed (see Figures 1SP-5SP).
- The exposed excavation for the EKG containment (the former fresh water frac pond) did not present any evidence of subsidence features due to karst or ground instability as shown in Figures 6SP and 7SP.
- The fresh water frac pond held some fresh water for many months.
- Several gully systems exist east of the proposed EKG containment that expose bedrock. Figures 8SP and 9SP show the gully closest to the proposed containment.
- Our examination of bedrock in gullies to the east and south of the EKG location did not detect any massive beds of gypsum, recent subsidence features or voids (Figure 10SP - 13SP). The layered clastic beds are dominantly siltstone interbedded with thin red mudstone with few fine sandstone beds.

The bedrock underlying the proposed EKG containment is the upper Los Medaños Member of the Rustler Formation, which in this area consists of clastic sediments. Neither unstable ground nor solution-caused pathways to groundwater exist. The headward erosion observed in the gully system is d

Distance to 100-Year Floodplain

Figure 6 demonstrates that the location is not located in a 100-year floodplain.

- The nearest 100-year floodplain is located approximately .24 miles to the southeast.

Distance to Surface Water

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

- The nearest mapped body of surface water is a small lake/pond that is approximately .44 miles to the northeast.

- The USGS maps an ephemeral stream about 2500 feet southwest of the proposed containment. This stream ends in the flat area that includes the above-referenced lake.

The gully system due east of the proposed containment described in the Site Photos Appendix is not a significant watercourse as defined by Rule 34. The gullies in the area transmit water and are subject to headward erosion. Examination of historic Google Earth images document to our satisfaction that the development of lease roads, production pads and the fresh water frac pond exacerbated the size of the natural gullies, probably by headward erosion. Solaris will submit final drawings for the containment that include a grading plan with diversion swales, erosion control measures and a specific Operation and Maintenance Plan to abate headward erosion over the lifetime of the containment.

Distance to Permanent Residence or Structures

Figure 8 and the site visit demonstrates that the location is not within 1000 feet from an occupied permanent residence, school, hospital, institution, church, or other structure in existence at the time of initial application.

- No occupied permanent residences, schools, hospitals, institutions, churches, or other structures are located within 1000 feet of the site.

Distance to Non-Public Water Supply

Figures 1 and 7 demonstrates that the location is not within 500 horizontal feet of a spring or fresh water well used for domestic or stock watering purposes, in existence at the time of initial application.

- Figure 1 shows the locations of all area water wells, active or plugged.
- The nearest well is USGS-9576/Misc-168, which is located .54 miles southwest of the site.
- There are no known domestic water wells located within 1,000 feet of the proposed pits.
- No springs were identified within the mapping area (see Figure 7)

Distance to Wetlands

Figure 9 demonstrates the location is within 300 feet of wetlands.

- The nearest designated wetland is a “freshwater emergent” wetland. It is approximately 1.81 miles due east of the site. This wetland is associated with the nearby Willow Lake.

Figures

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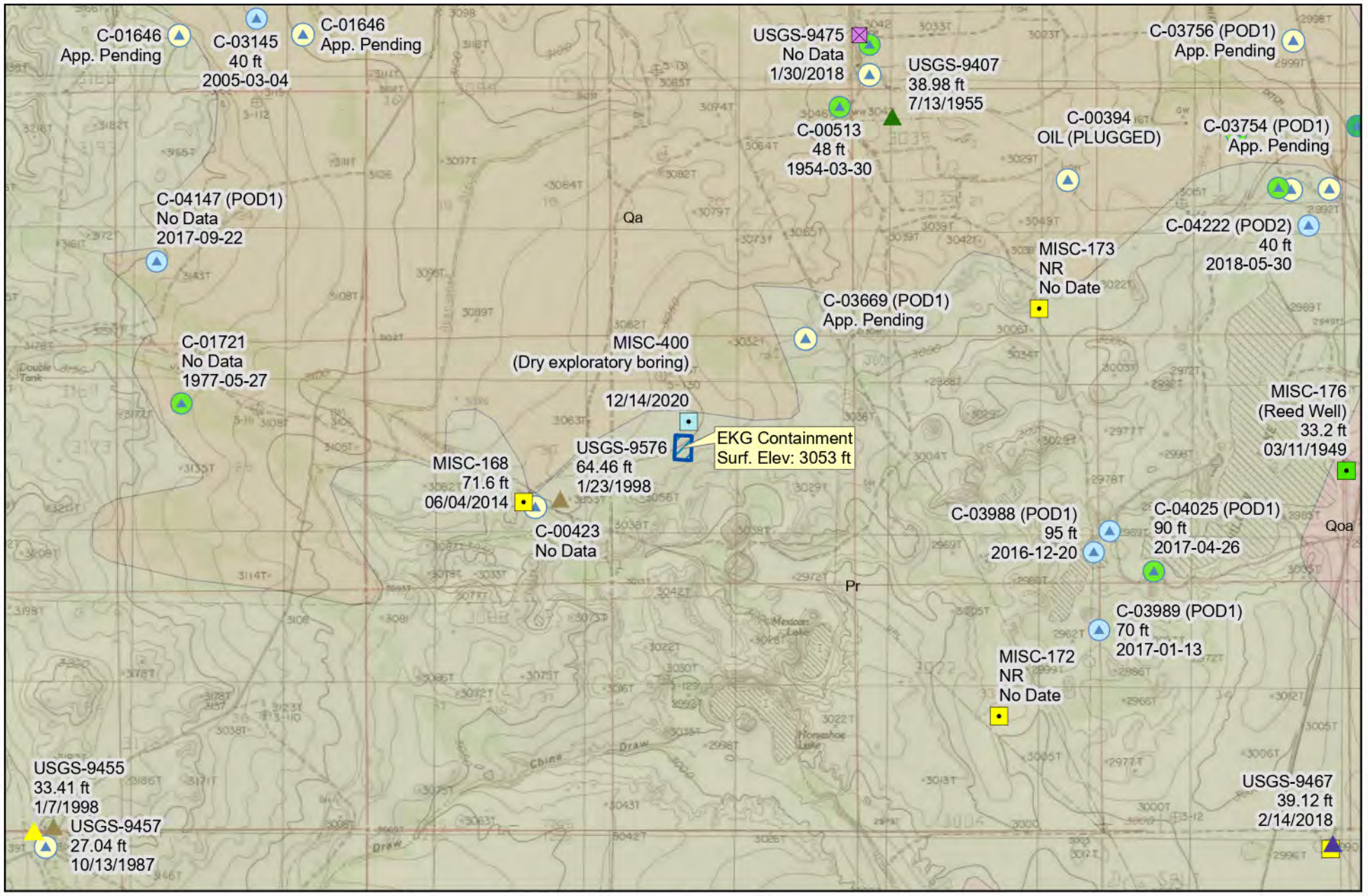

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Depth to Water and Geology	Figure 1
Solaris Water Midstream EKG Recycling Containment	Jan 2021

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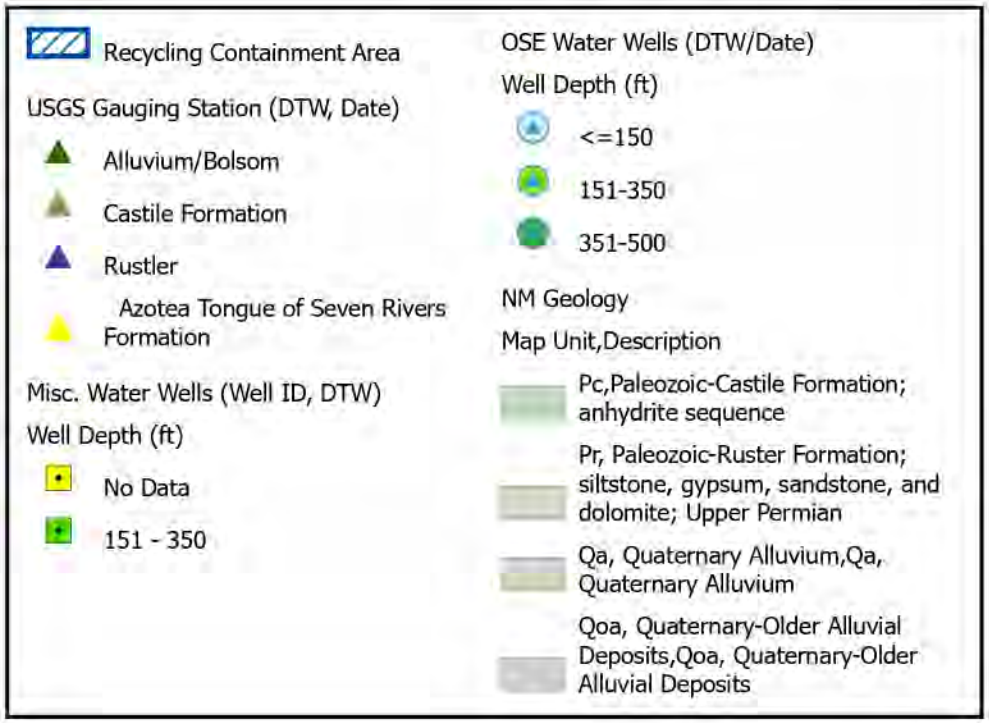

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Depth to Water and Geology Legend

Figure 1

Solaris Water Midstream EKG Recycling Containment

Jan 2021

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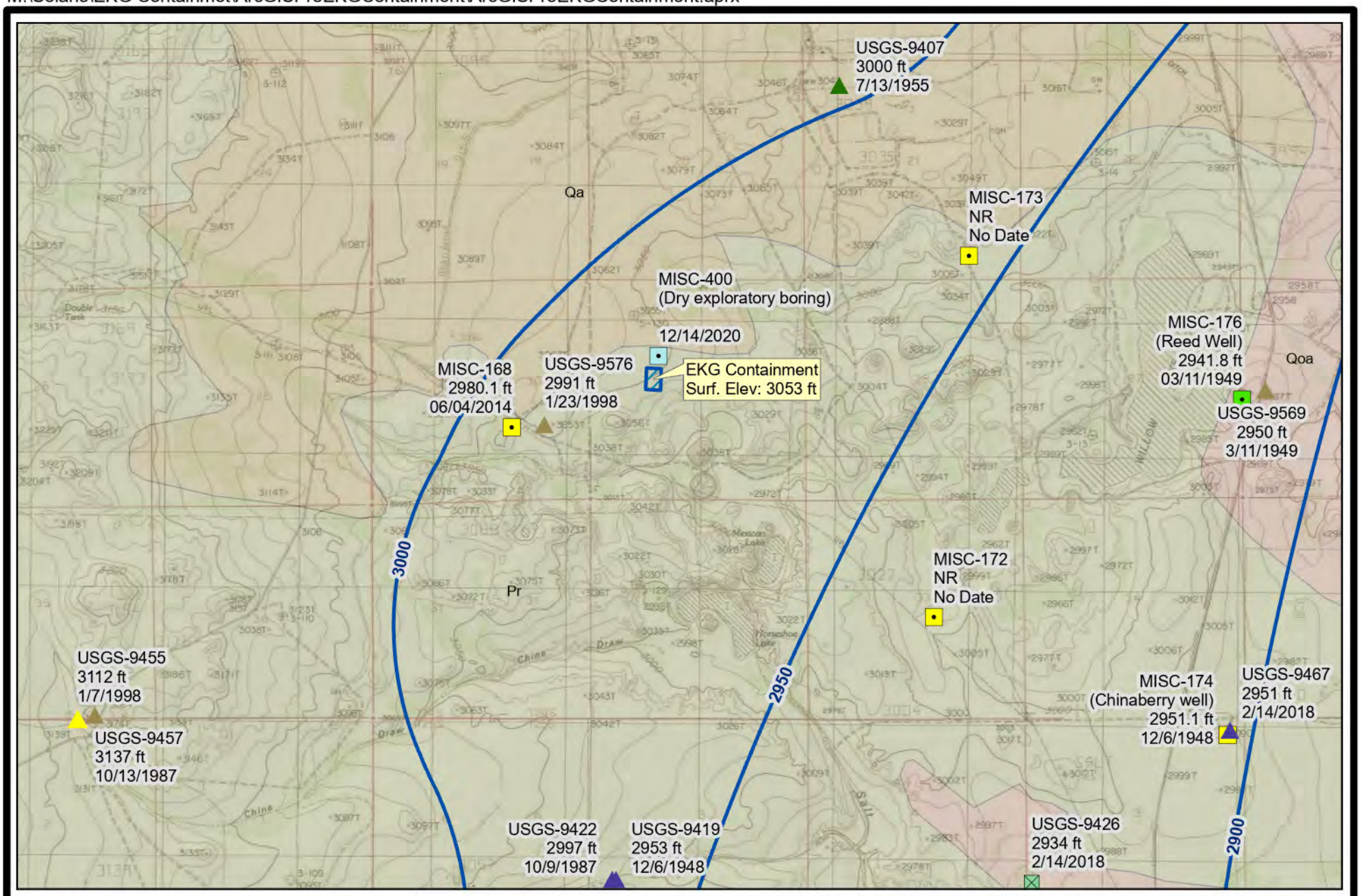

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Groundwater Elevation, Geology, and Potentiometric Surface

Figure 2

Solaris Water Midstream EKG Recycling Containment

Jan 2021

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Groundwater Elevation, Geology, and Potentiometric Surface Legend

Figure 2

Solaris Water Midstream EKG Recycling Containment

Jan 2021

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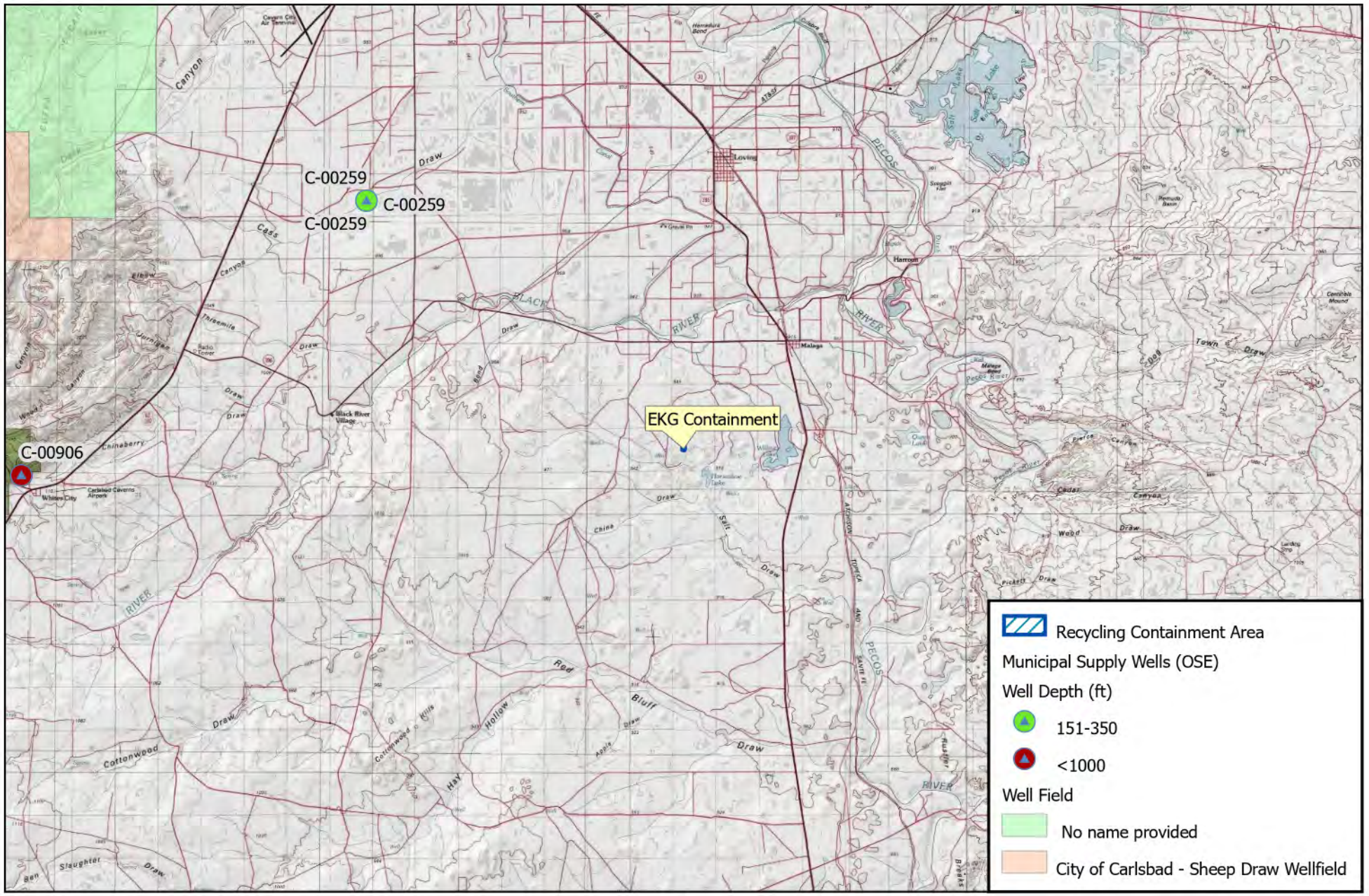

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Well Fields and Municipal Supply Wells	Figure 3
	Solaris Water Midstream EKG Recycling Containment	Jan 2021

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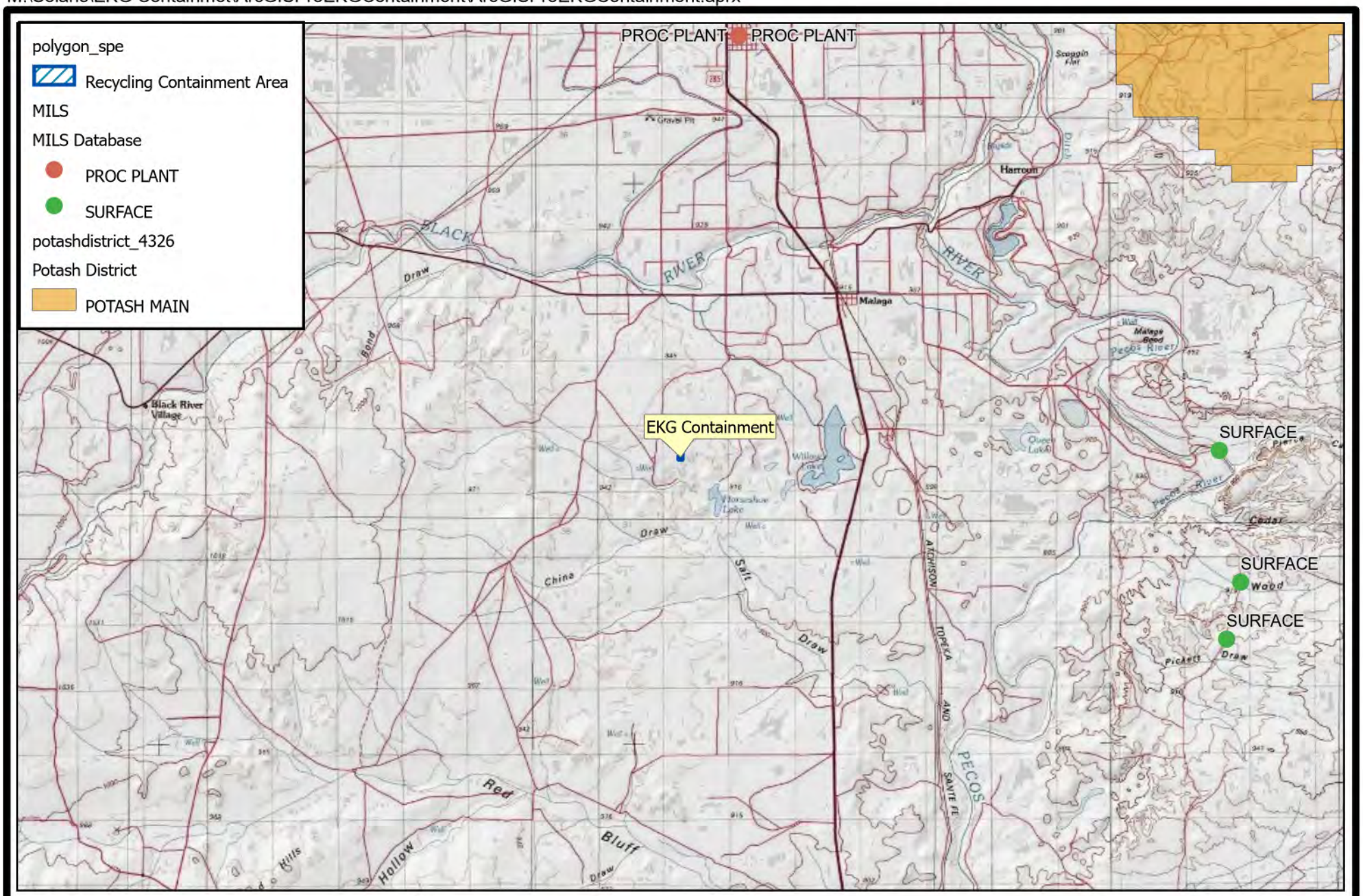

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Mines and Minerals	Figure 4
	Solaris Water Midstream EKG Recycling Containment	Jan 2021

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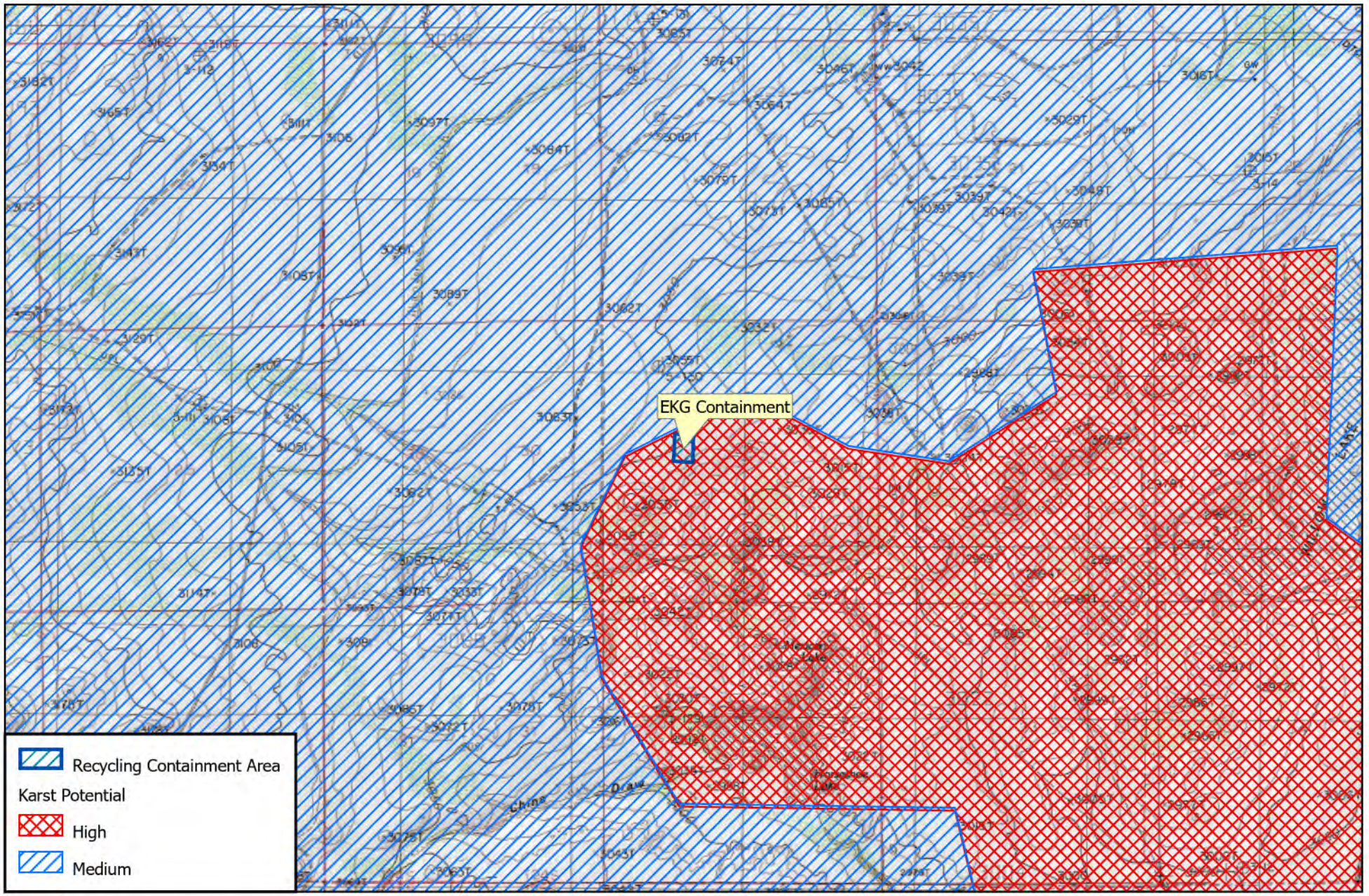

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Karst Potential

Figure 5a

Solaris Water Midstream EKG Recycling Containment

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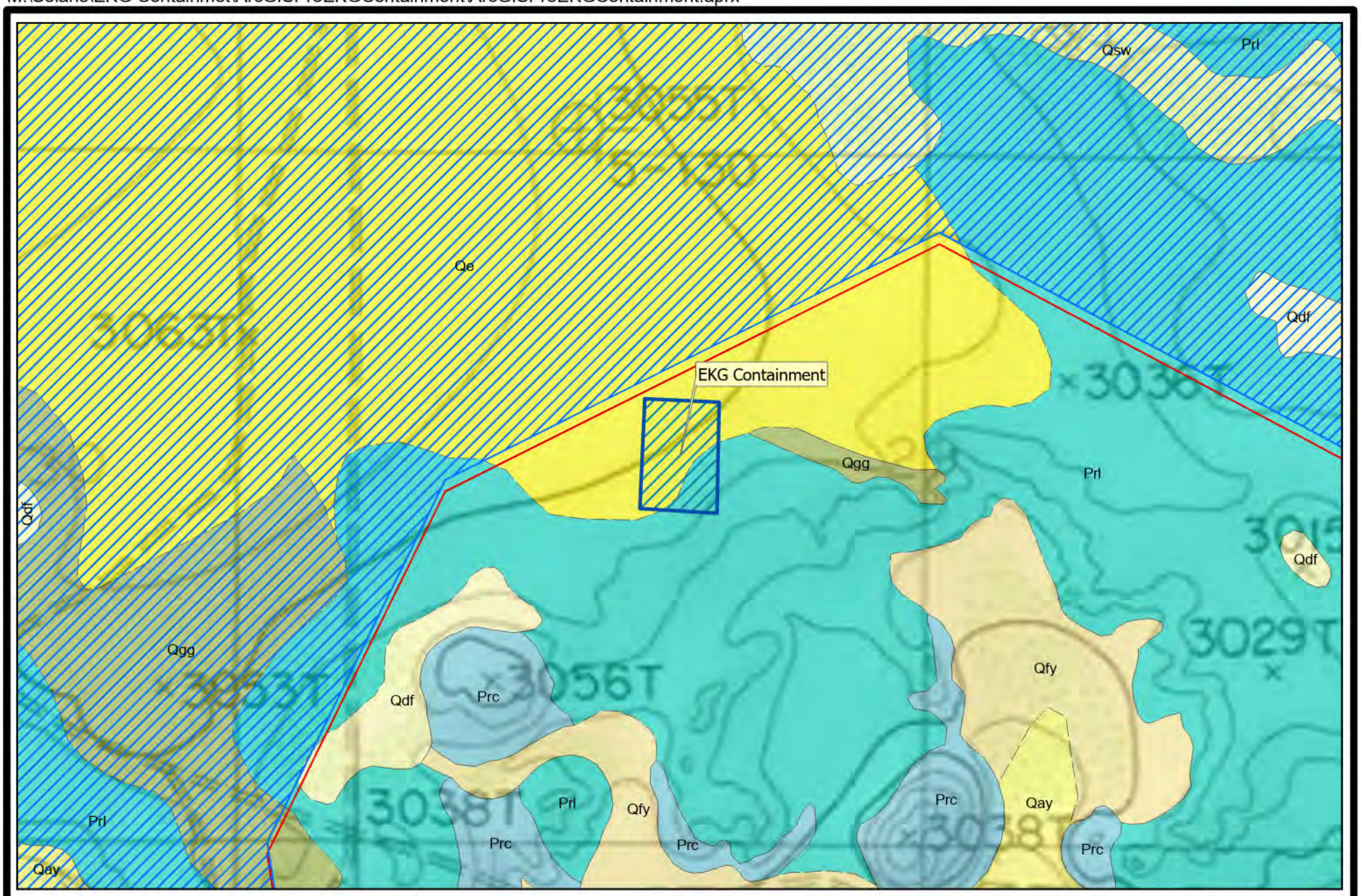

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Karst Potential with Geologic Map of Malaga 7.5-minute Quadrangle	Figure 5b
	Solaris Water Midstream EKG Recycling Containment	Jan 2021

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Recycling Containment Area

Karst Potential

High

Medium

ContactsAndFaults

1.1.1 Contact—Identity and existence certain, location accurate

1.1.3 Contact—Identity and existence certain, location approximate

MapUnitPolys

01-02-01-00-00—Qe—Slope-blanketing windblown very pale brown silts and fine sands variably reworked by slopewash transport. Deposits are loose and poorly exposed. No evidence of notable soil development was observed. A sediment color of 10YR 7/3 was measured. Deposits are 0 to perhaps 2 m thick.

01-02-03-00-00—Qdf—Silts, sands, and clays accumulating in closed or nearly closed depressions. Dominantly slopewash- and eolian-transported muds and very fine sands, with trace coarser material. Surface soils were not observed in outcrop, but no evidence of significant soil development was found. Deposits are 0 to perhaps 2 m or more thick.

01-03-02-02-00—Qay—Sands, muds, and gravels underlying low terraces and floodplains along active drainage channels. Includes historic alluvium that cannot be mapped separately at this scale. Deposits are unconsolidated, and no evidence of significant soil development was observed. Deposit thicknesses are 0 to perhaps 4 m.

01-03-03-01-00—Qfy—Sands, muds, and gravels underlying coalescing alluvial fans emanating from low-order drainages. Deposit characteristics vary with the nature of the materials exposed up-gradient. Deposits are unconsolidated and poorly exposed. No evidence of significant soil development was observed. Deposit thicknesses are 0 to perhaps 4 m.

01-03-03-02-00—Qsw—Sands, muds, and trace gravels transported by slopewash and eolian processes and blanketing low-gradient slopes. Deposit characteristics vary with the nature of the materials exposed up-gradient and underlying the deposit. Deposits are unconsolidated and poorly exposed. No evidence of significant soil development was observed. Deposit thicknesses are 0 to perhaps 4 m.

01-06-02-03-00—Qgg—Uncemented to poorly cemented siliceous pebble gravels underlying or in proximity to the Mescalero caliche. Gravels are poorly to very poorly sorted, rounded to well rounded, clast-supported pebbles with absent to rare cobbles of lithologies including chert, quartzite, felsic to intermediate volcanics, limestone, and lesser Culebra Dolomite, in cross-stratified, lenticular, medium-thickness beds, with a matrix of pink to white, poorly sorted, fine- to medium-grained siliceous sands. A matrix color of 5YR 8.5/2 was measured. Deposits are typically poorly exposed, and their presence and extent often inferred from the occurrence of low, rounded mounds or hills mantled by siliceous pebbles. Deposits are typically <1 to 1.5 m thick, but locally may be as much as 6 m thick.

02-01-01-03-00—Prc—Cream-colored to white, ledge-forming, conspicuously vuggy dolomite. Dolomite beds are thin, planar tabular, fine-grained, and internally massive. Abundant to rare vugs are fine in size (1 to 10 mm in diameter) and distinctive to the unit. Unit is locally highly fractured, with fractures variously filled with caliche/carbonate cement, particularly adjacent to map unit Qgmc. Preserved thickness up to about 7 to 9 m.

02-01-01-04-00—Prl—Interlayered mudstones, sandstones, and gypsum. Reddish yellow, laminated to thinly bedded, poorly indurated silty mudstones dominate. Pale red, very thinly bedded, moderately indurated, sparry calcite-cemented coarse-grained siltstones/very fine-grained sandstones and laminated to thinly bedded, nodular or crystalline, moderately indurated gypsum beds are both rare and approximately subequal in abundance. Gypsum also occurs as irregular masses up to 60 cm in diameter. Trace thin laminae of waxy claystones are the least common lithology. Colors of 5YR 6/6-7/6 (mudstones, claystones) and 2.5YR 7/2-7/1 (siltstones/very fine-grained sandstones) were measured. Unit is generally poorly exposed and often identified by abundant reddish muds with trace irregular gypsum masses in colluvial/residuum slopes. Unit is locally highly deformed/brecciated, and may incorporate brecciated blocks of Prc that subsided into the unit. The base of the unit is only exposed in deformed outcrops; Powers and Holt (1999) report a thickness of about 34.4 m in the type section, while cross-section interpretations suggest a thickness of about 48 m in this area.

N W E S

0 500 1,000 US Feet

R.T. Hicks Consultants, Ltd
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Albuquerque, NM 87104
Ph: 505.266.5004

Karst Potential with Geologic Map of Malaga 7.5-minute Quadrangle Legend

Figure 5b

Solaris Water Midstream EKG Recycling Containment

Jan 2021

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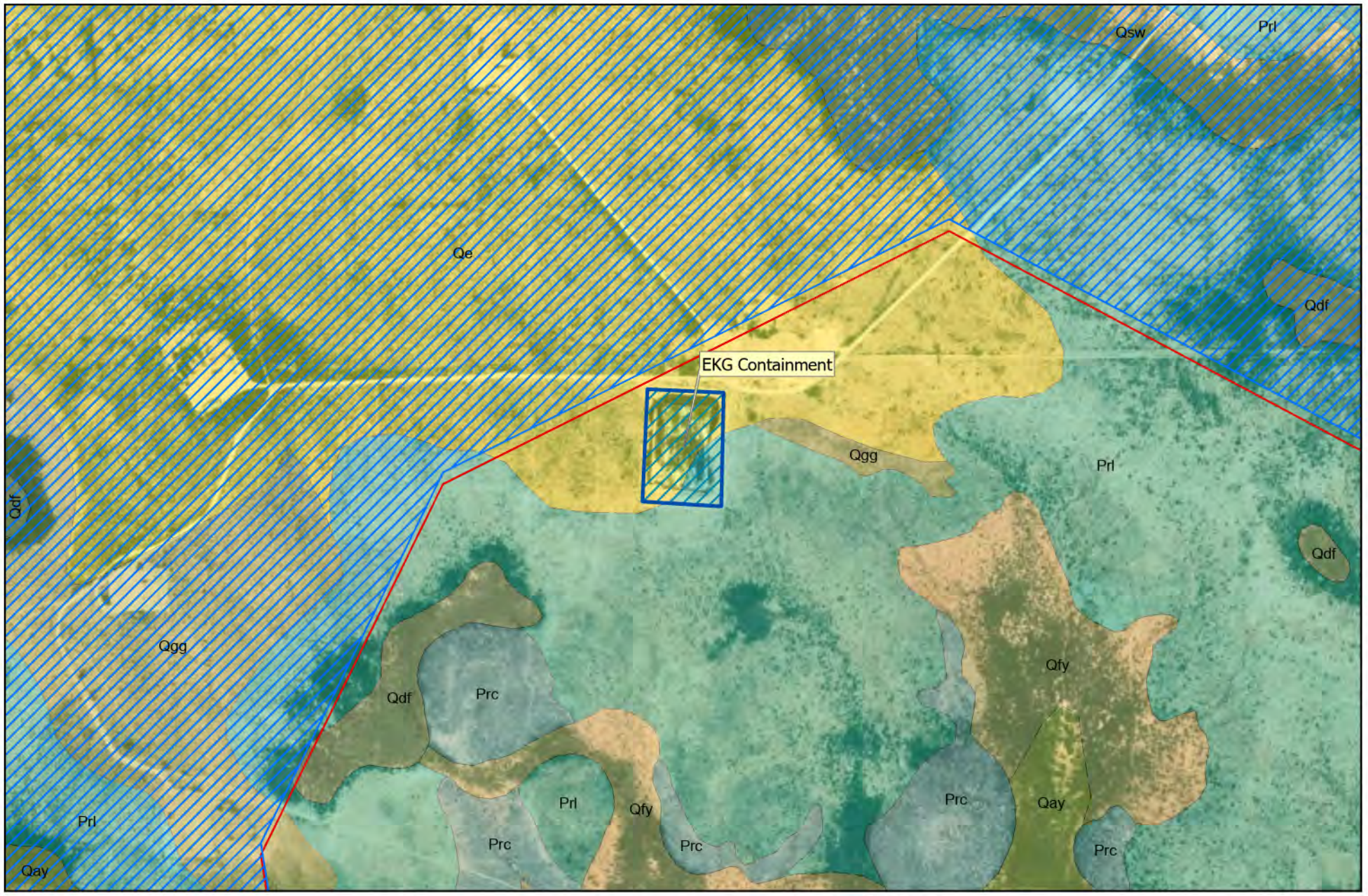

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Karst Potential with Geologic Map of Malaga 7.5-minute Quadrangle on Aerial Base Map

Figure 5c

Solaris Water Midstream EKG Recycling Containment

Jan 2021

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Recycling Containment Area

Karst Potential

High

Medium

ContactsAndFaults

1.1.1 Contact—Identity and existence certain, location accurate

1.1.3 Contact—Identity and existence certain, location approximate

MapUnitPolys

01-02-01-00-00—Qe—Slope-blanketing windblown very pale brown silts and fine sands variably reworked by slopewash transport. Deposits are loose and poorly exposed. No evidence of notable soil development was observed. A sediment color of 10YR 7/3 was measured. Deposits are 0 to perhaps 2 m thick.

01-02-03-00-00—Qdf—Silts, sands, and clays accumulating in closed or nearly closed depressions. Dominantly slopewash- and eolian-transported muds and very fine sands, with trace coarser material. Surface soils were not observed in outcrop, but no evidence of significant soil development was found. Deposits are 0 to perhaps 2 m or more thick.

01-03-02-02-00—Qay—Sands, muds, and gravels underlying low terraces and floodplains along active drainage channels. Includes historic alluvium that cannot be mapped separately at this scale. Deposits are unconsolidated, and no evidence of significant soil development was observed. Deposit thicknesses are 0 to perhaps 4 m.

01-03-03-01-00—Qfy—Sands, muds, and gravels underlying coalescing alluvial fans emanating from low-order drainages. Deposit characteristics vary with the nature of the materials exposed up-gradient. Deposits are unconsolidated and poorly exposed. No evidence of significant soil development was observed. Deposit thicknesses are 0 to perhaps 4 m.

01-03-03-02-00—Qsw—Sands, muds, and trace gravels transported by slopewash and eolian processes and blanketing low-gradient slopes. Deposit characteristics vary with the nature of the materials exposed up-gradient and underlying the deposit. Deposits are unconsolidated and poorly exposed. No evidence of significant soil development was observed. Deposit thicknesses are 0 to perhaps 4 m.

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Karst Potential with Geologic Map of Malaga 7.5-minute Quadrangle on Aerial Base Map Legend

Figure 5c

Solaris Water Midstream EKG Recycling Containment

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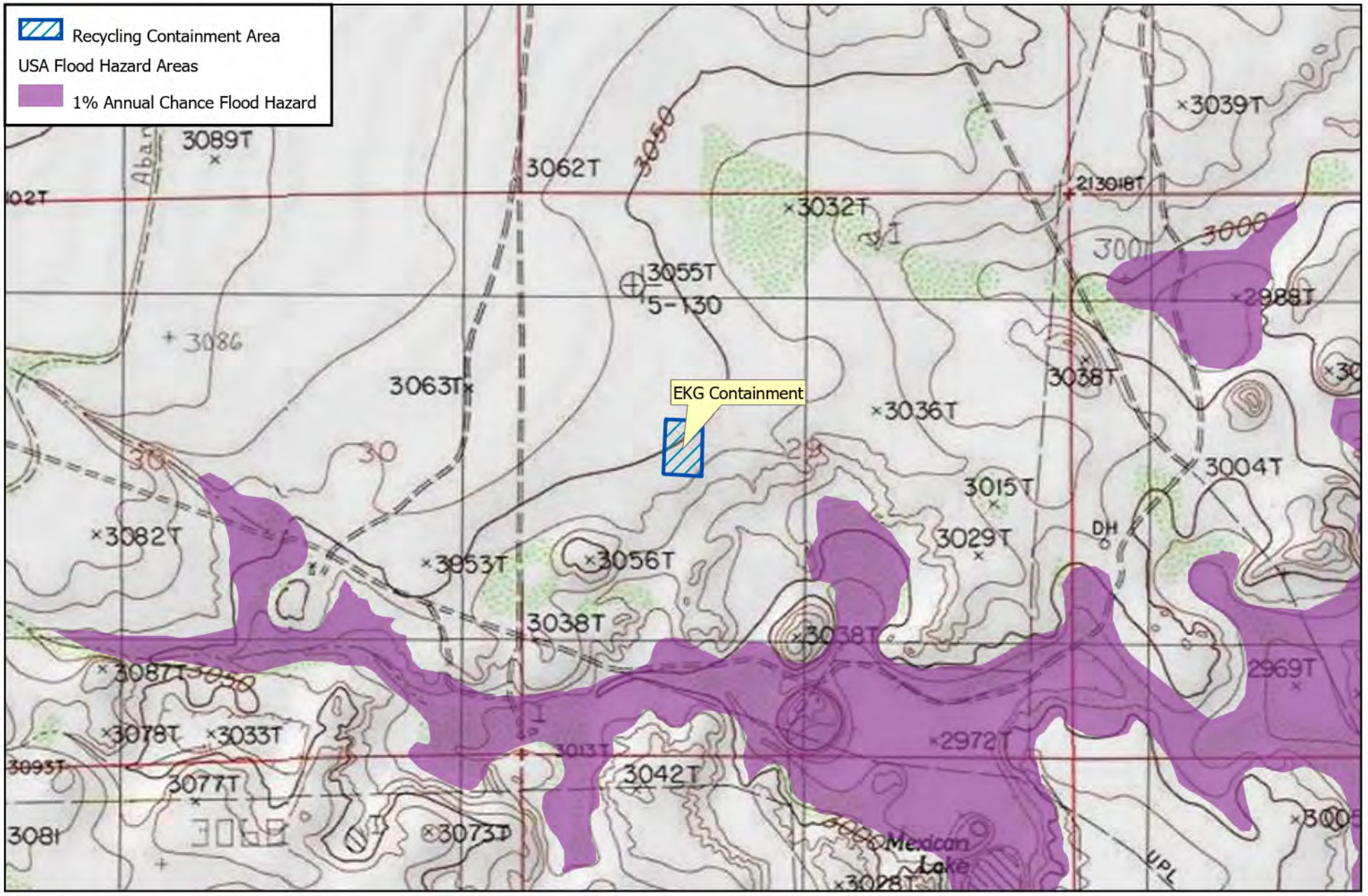

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	FEMA Flood Hazards	Figure 6
	Solaris Water Midstream EKG Recycling Containment	Jan 2021

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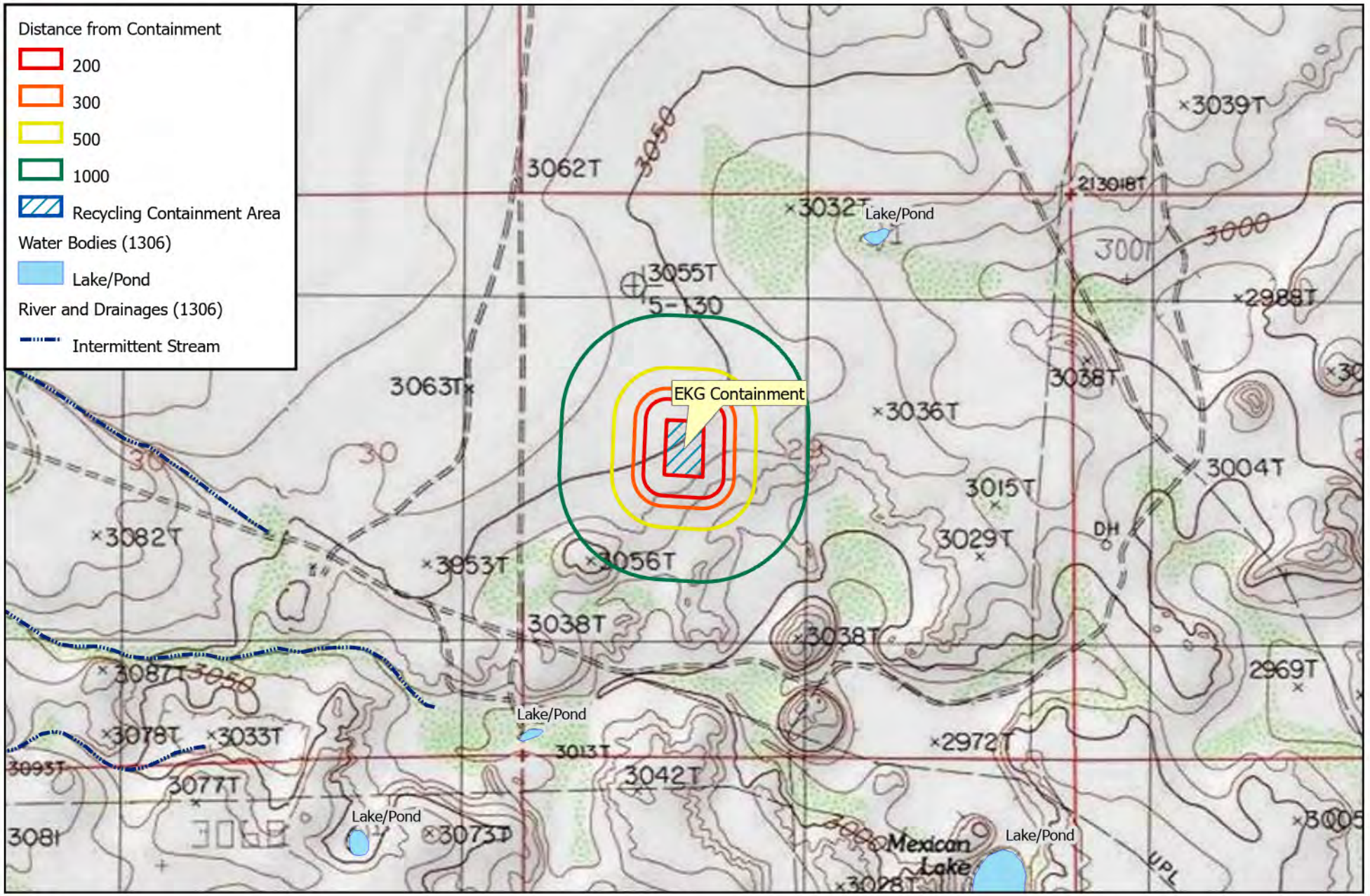

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Surface Water	Figure 7
	Solaris Water Midstream EKG Recycling Containment	Jan 2021

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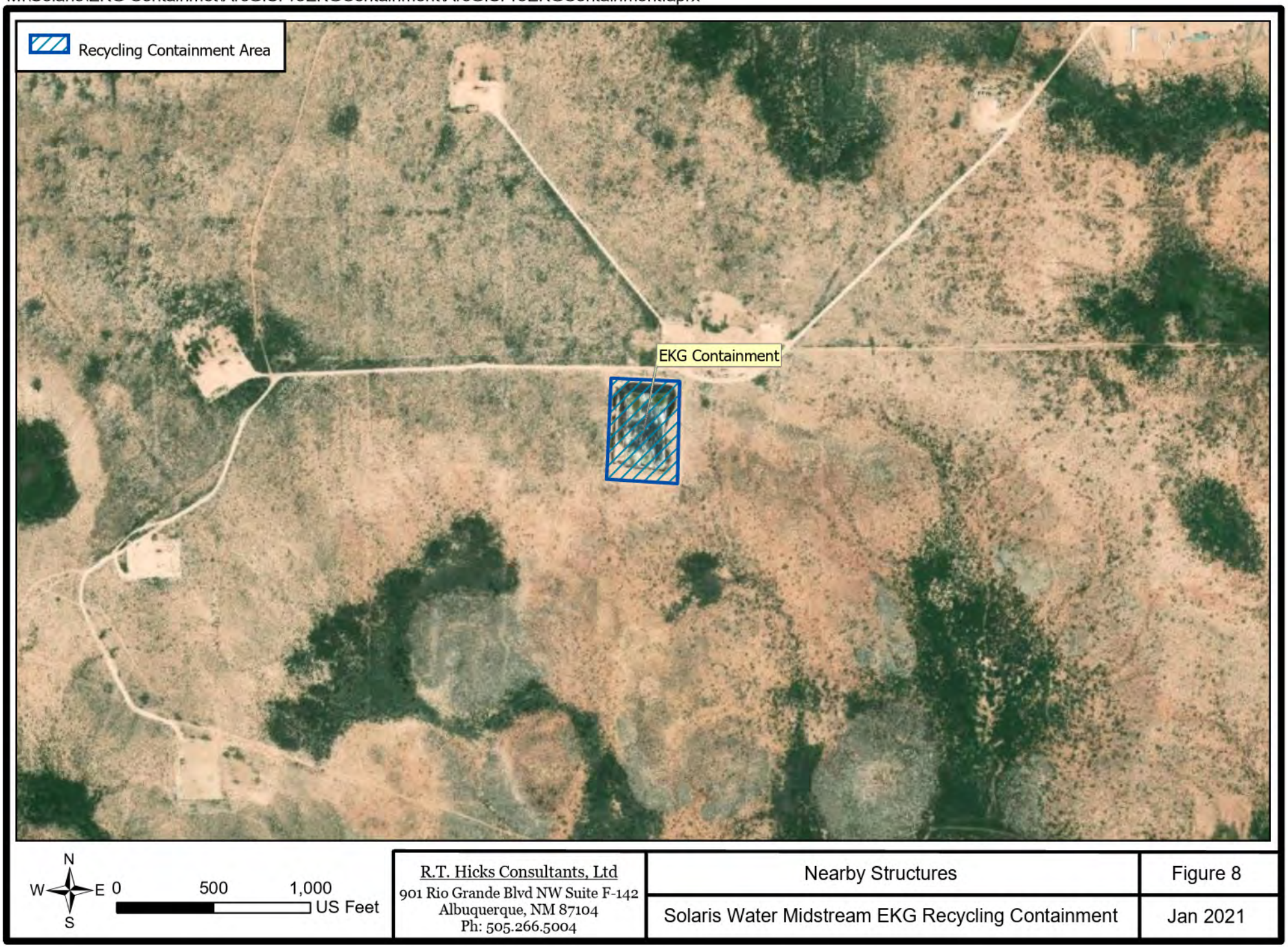

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Nearby Structures

Figure 8

Solaris Water Midstream EKG Recycling Containment

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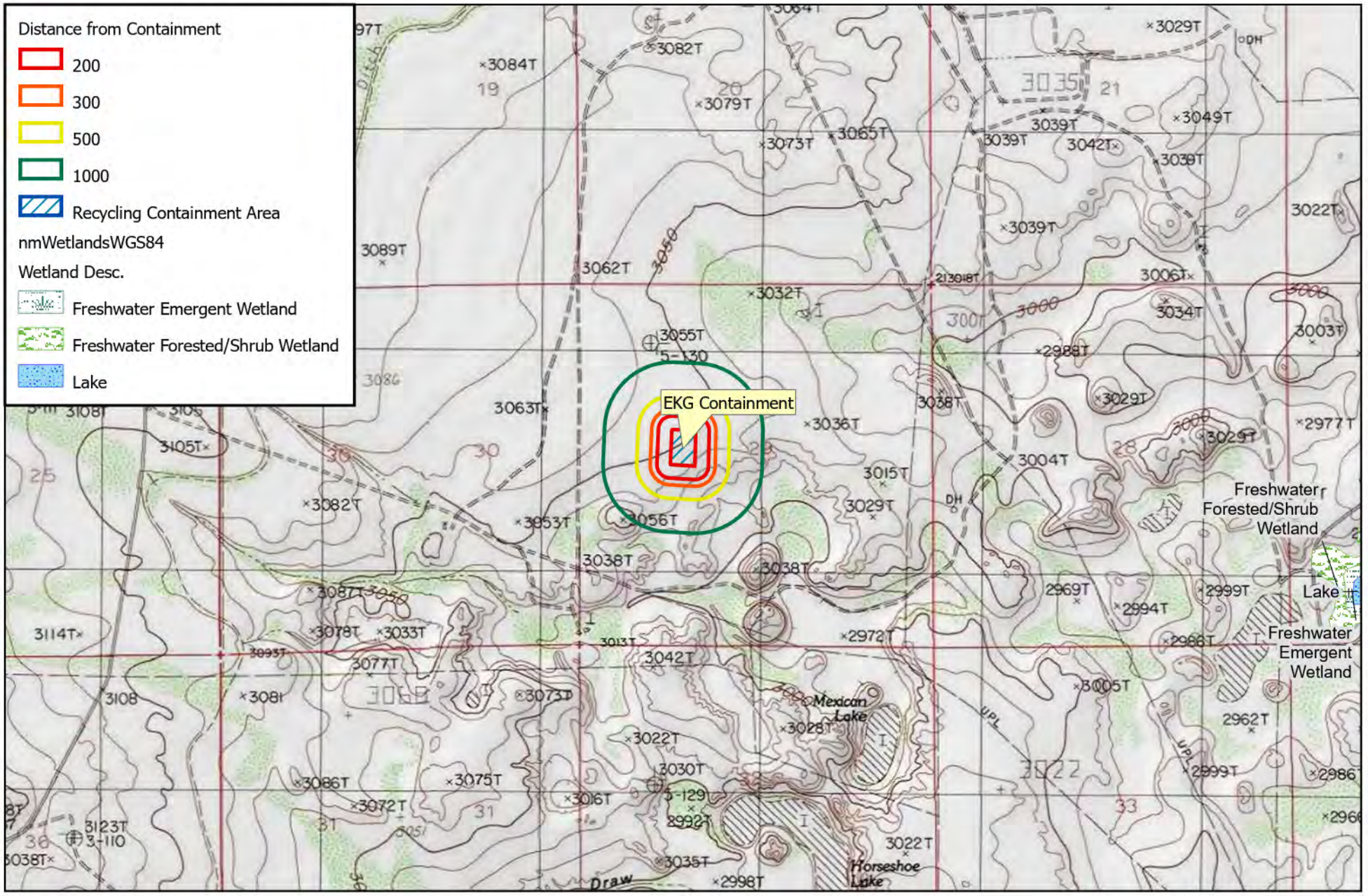

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Nearby Wetlands

Figure 9

Solaris Water Midstream EKG Recycling Containment

Jan 2021

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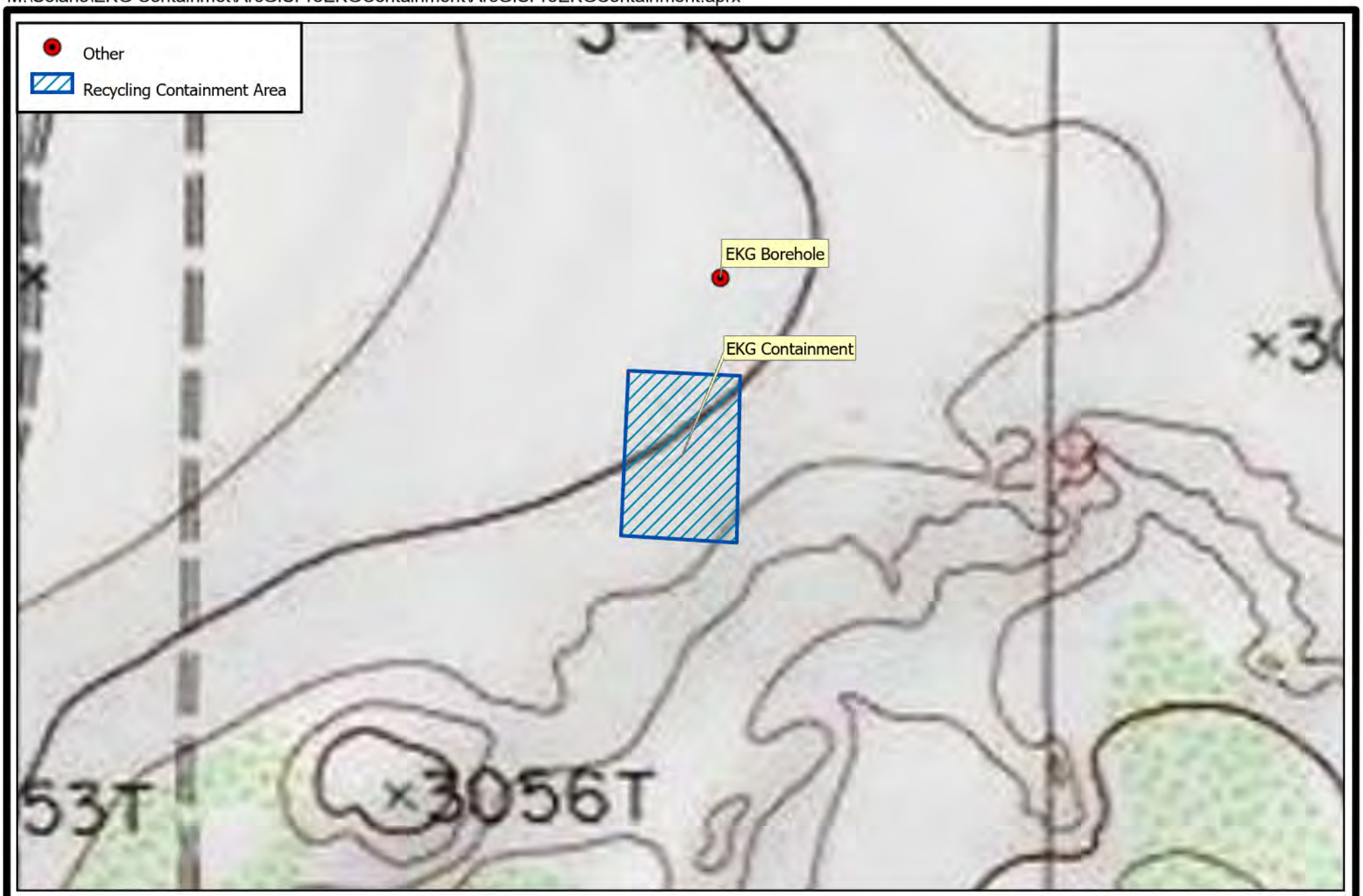

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Borehole Location	Figure 10
	Solaris Water Midstream EKG Recycling Containment	Jan 2021

APPENDIX Well Logs

Solaris-EKG Containment

TEST HOLE-December 10, 2020
Air Rotary Rig
32.190845, -104.112875

Kristin Pope (RT Hicks)
Jason Maley (Vision Resources)

depth (ft BGS)	Moisture	Description	Time	Penetration ft/min
0-24	dry	Tan, fine sand, well-sorted	0820	3.0
24-47	dry	Brown, very fine sand, well-sorted	0828	1.5
47-60	dry	Pink-tan, very fine sand; 15% red clay bits	0844	0.4
60-65	dry	Red-brown, med.-fine sand; Air pocket @60	0917	1.7
65-78	dry	Red-brown, med.-fine sand; 10% brown silt/clay bits	0920	1.2
78-80	dry	Red, fine sand, well-sorted	0931	1.0
80	dry	Total Depth	0933	

33

Bottom of pond south of hole is 7.75 ft LOWER than drilling surface.
e is 328 ft north of pond.

Appendix Site Photographs