October 2019

C-147 Registration Package for Gamma Ridge Recycling Containment and Recycling Facility Section 14, T24-S, R34-E, Lea County

Volume 1 - In-Ground Containment

View from the southeast corner of the freshwater containment facing east.

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 ▲ Fax: 505.266-0745
Artesia ▲ Carlsbad ▲ Durango ▲ Midland

October 25, 2019

Mr. Bradford Billings
Mr. Mike Bratcher
NMOCD District 1
Via E-Mail

RE: Solaris Water Midstream – Gamma Ridge Containment and Recycling Facility

Dear Mr. Billings:

Hicks Consultants, on behalf of Solaris, submits the attached registration. Volume 1 provides the C-147, the design drawings for the in-ground containment, the siting criteria demonstration, the design/construction plan, O&M plan and Closure Plan for the in-ground containment, and the geotechnical boring logs. Volume 2 contains the design information and associated plans and information for the Above-Ground Storage Tank Containments.

The package follows the order of Form 147 to allow for an easier review by OCD. Please note, as described below, this submission is a *registration* not a permit application. Because the containments meet all of the requirements of Rule 34, Solaris may begin filling the containments with produced water after submission.

The following elements of the submission are germane to the OCD review prior to posting the registration on the OCD Website.

A. Engineering drawings stamped by a NM Registered Engineer are provided.
B. In compliance with 19.15.34.10 of the Rule, this submission is copied to Quail Ranch, LLC, who is the surface owner of the surface upon which the containment will be constructed.
C. Site specific information demonstrates compliance with siting criteria for the location.
D. Water well logs from the OSE database and the logs from the geotechnical borings are included as appendices at the end of the submission.
E. Photographs of the site and environs are attached to this cover letter to provide assistance in the OCD review.

No variances from the Rule are necessary and this submittal demonstrates compliance with all mandates of the Rule for the containment. Since the recycling facility meets the criteria of 19.15.34.9.B.7, the facility also requires a registration. Thus, the Rule does not require approval by OCD in advance of using the containment.

This submission refers to the following elements that some OCD reviewers have considered variances:

1. An equivalency demonstration written by experts for the proposed 40-mil HDPE secondary liner has been previously approved by OCD. We maintain that the language of the Rule is clear[1] and a variance is not required. The previously-submitted equivalency demonstration is lengthy and we can submit it under separate cover if requested by OCD.
2. OCD has approved the proposed Avian Protection Plan (Bird-X Mega Blaster Pro) for other containments. Thus, the plan meets the requirement of the rule that the "otherwise protective of wildlife, including migratory birds" and a variance is not required.

[1] Secondary liners shall be 30-mil LLDPE string reinforced or equivalent with a hydraulic conductivity no greater than 1 x 10-9 cm/sec

3. Using the proposed deer fence in lieu of a 4-strand barbed wire fence is not a variance. Because feral pigs, javelina and deer are present in the area, a fence is required in order to comply with Section 19.15.34.12 D.1 of the Rule[2]. 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. We maintain that compliance with D.1 is the critical component of the Rule and operators need not be required to submit a variance request in order to follow Best Management Practices and comply with the Rule.

Should you have any questions or concerns regarding this registration or the attached C-147, please contact me or Randall Hicks.

Sincerely,
R.T. Hicks Consultants

Erica Hart
Geologist

Copy: Solaris, Michael Incerto and Todd Carpenter
Quail Ranch, LLC

[2] 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.

Gamma Ridge Site Photos

Figure A - Tank Pad west of the proposed pond.

Figure B - Zoomed out view of tank pad west of site.

Figure C - Caliche pad northeast of proposed containment.

Figure D - View of west berm of existing freshwater containment.

Figure E - View of east berm of containment from caliche pad NE of site.

Figure F - From the northern boundary of the site facing south.

Figure G - Northwest fence corner of freshwater pond.

Figure H - Freshwater pond facing south.

Figure I - Freshwater pond facing northwest.

Figure J - Southern boundary of freshwater pond.

Figure K - From southeast corner of property facing northwest. Freshwater pond visible in background.

Figure L - Abandoned stock tank approximately 0.5 miles northwest of site (USGS 14872).

Figure M - Zoomed in picture of stock tank (USGS 14872).

Figure N - Former windmill (USGS 14872). Well was plugged with soil.

Figure O - Former windmill (USGS 14872).

Figure P - Windmill (USGS 14881) approximately 1 mile north of site. The well is in use with an electric pump.

Figure Q – Produced water pipeline located approximately 1.7 miles west of the site. The location is 32.22618, -103.47599.

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 (OCD statistics only) ☒ 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 (For multiple operators attach page with information) OGRID #: 371643

Address: 9811 Katy Freeway, Suite 900, Houston, Texas 77024

Facility or well name (include API# if associated with a well): Gamma Ridge Containment #1 and #2

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

U/L or Qtr/Qtr C,D Section 14 Township 24S Range 34E County: Lea

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

2.

☒ **Recycling Facility:**

Location of recycling facility (if applicable): Latitude 32.222431° Longitude -103.443621° NAD83

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:** In ground(Volume 1), stated below

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

Center of Recycling Containment (if applicable): Latitude 32.220786 Longitude -103.443714 NAD83

☒ For multiple or additional recycling containments, attach design and location information of each containment **AST (Volume 2) 32.222274°,-103.443504°**

☒ Lined ☒ Liner type: Thickness 60 mil ☐ LLDPE ☒ HDPE ☐ PVC ☐ Other secondary 40 mil HDPE liner

☐ String-Reinforced (primary)

Liner Seams: ☐ Welded ☐ Factory ☐ Other _____ Volume: _____bbl Dimensions: L 428 x W 340 x D 18 ft

☐ 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 $_____ **(work on these facilities cannot commence until bonding amounts are approved)**

Provided in separate submission

☐ 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 8 ft game fence with 1 strand of barbed wire at the top.

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. (Box checked for OCD statistics only)

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

ALL CONSTRUCTION AND OPERATION VARIANCES HAVE BEEN PREVIOUSLY APPROVED BY OCD.

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 (PLATE 1)	☐ 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. (PLATE 3b) - Written confirmation or verification from the municipality; written approval obtained from the municipality	☐ Yes ☒ No ☐ NA
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Minerals Division (PLATE 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 (PLATE 5)	☐ Yes ☒ No
Within a 100-year floodplain. FEMA map (PLATE 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 (PLATE 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 (PLATE 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. (PLATES 3A & 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. (PLATE 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: 10-16-2019

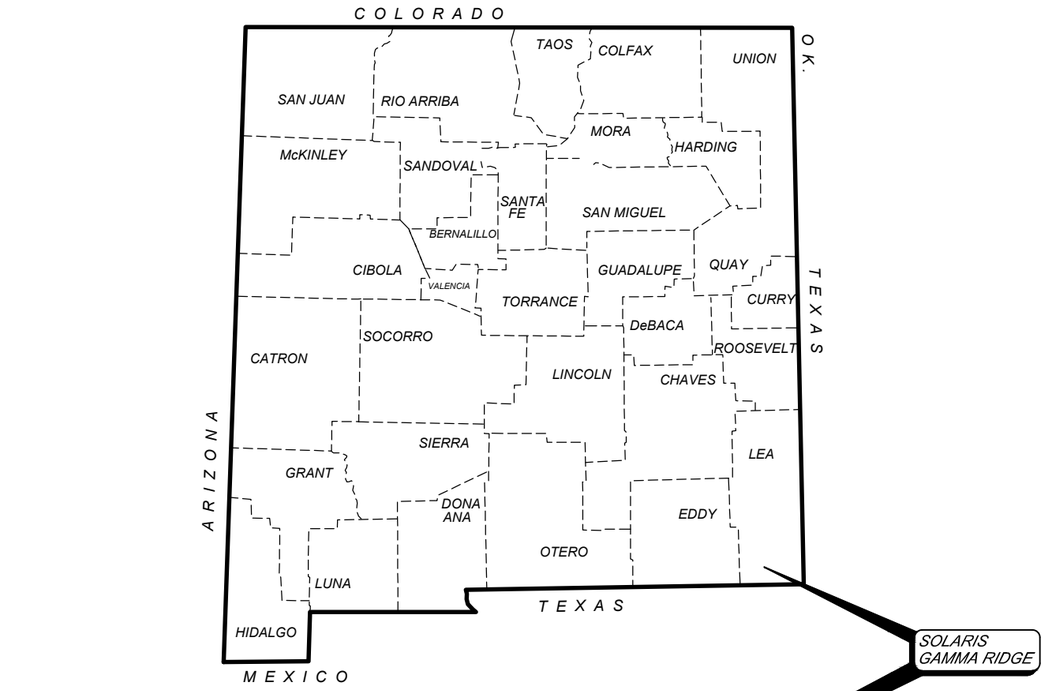
e-mail address: todd.carpenter@solarismidstream.com Telephone: (432) 203-9020

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

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

☐ OCD Conditions _____
☐ Additional OCD Conditions on Attachment

RECYCLING CONTAINMENT DESIGN DRAWINGS



SOLARIS WATER MIDSTREAM, LLC

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14 T24S R34E
LEA COUNTY, NM

INDEX OF SHEETS

GENERAL NOTES

1. ALL BOUNDARY, TOPOGRAPHIC AND UTILITY INFORMATION SHOWN ARE BASED ON SURVEY INFORMATION FURNISHED BY BASIN SURVEYS, HOBBS, NM AND HARCROW SURVEYING, ARTESIA, NM.
2. THE CONTRACTOR SHALL IDENTIFY AND LOCATE UTILITY LINES, MONITORING WELLS, SURVEY MONUMENTS, AND OTHER NEARBY STRUCTURES PRIOR TO PERFORMING WORK.
3. COORDINATE INFORMATION IS BASED ON STATE PLANE COORDINATES, NEW MEXICO EAST, NAD 83. THE CONTRACTOR SHALL IDENTIFY ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION.
4. ALL GEOMEMBRANES SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
5. UNDERGROUND GAS LINES ARE LOCATED NEAR THE PROJECT SITE. THE CONTRACTOR SHALL EXERCISE CAUTION AND ABIDE BY THE GAS LINE OPERATOR'S RULES.

CONTROL POINTS				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
999	446124.185'	816846.101'	3413.20'	CP-CHEVRON

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

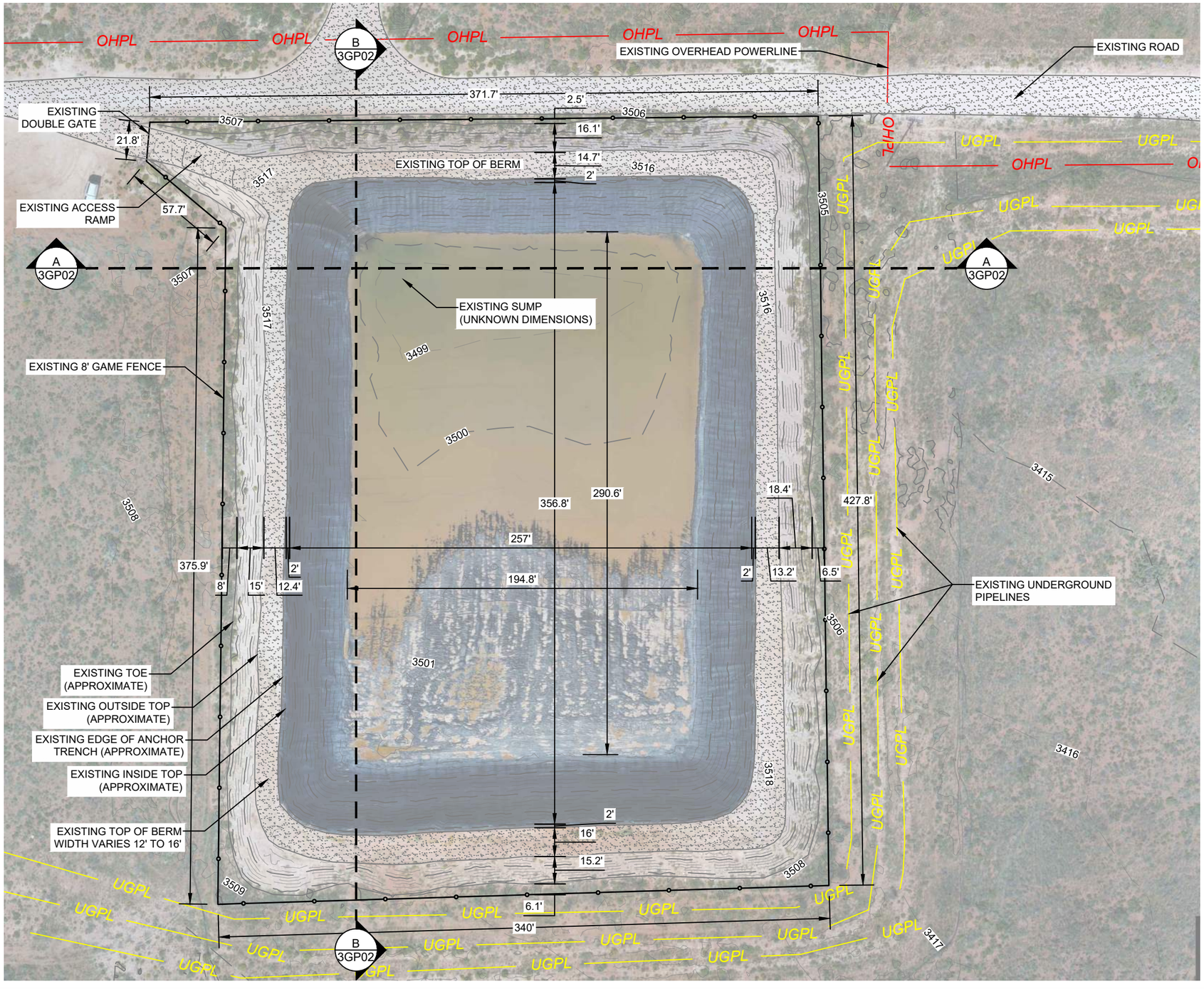
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

COVER SHEET

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: COVER	SHEET: 1COVER

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Cover.dwg



AS-BUILT DATA FROM HARCROW SURVEYING

OVERFLOW ELEV. 3515.8

VOLUME @ 2 FT FREEBOARD = 170,000 BBL
ELEV. 3513.8

VOLUME @ 3 FT FREEBOARD = 155,000 BBL
ELEV. 3512.8

N

SCALE 1"=60'

0 30' 60' 120'

LEGEND

- EXISTING GRADE CONTOURS
- EXISTING 8' GAME FENCE
- OVERHEAD POWERLINE — OHPL
- UNDERGROUND GASLINE — UGPL
- DRIVING SURFACE

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER

10/8/2019

MAGRYM

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

SOLARIS WATER MIDSTREAM

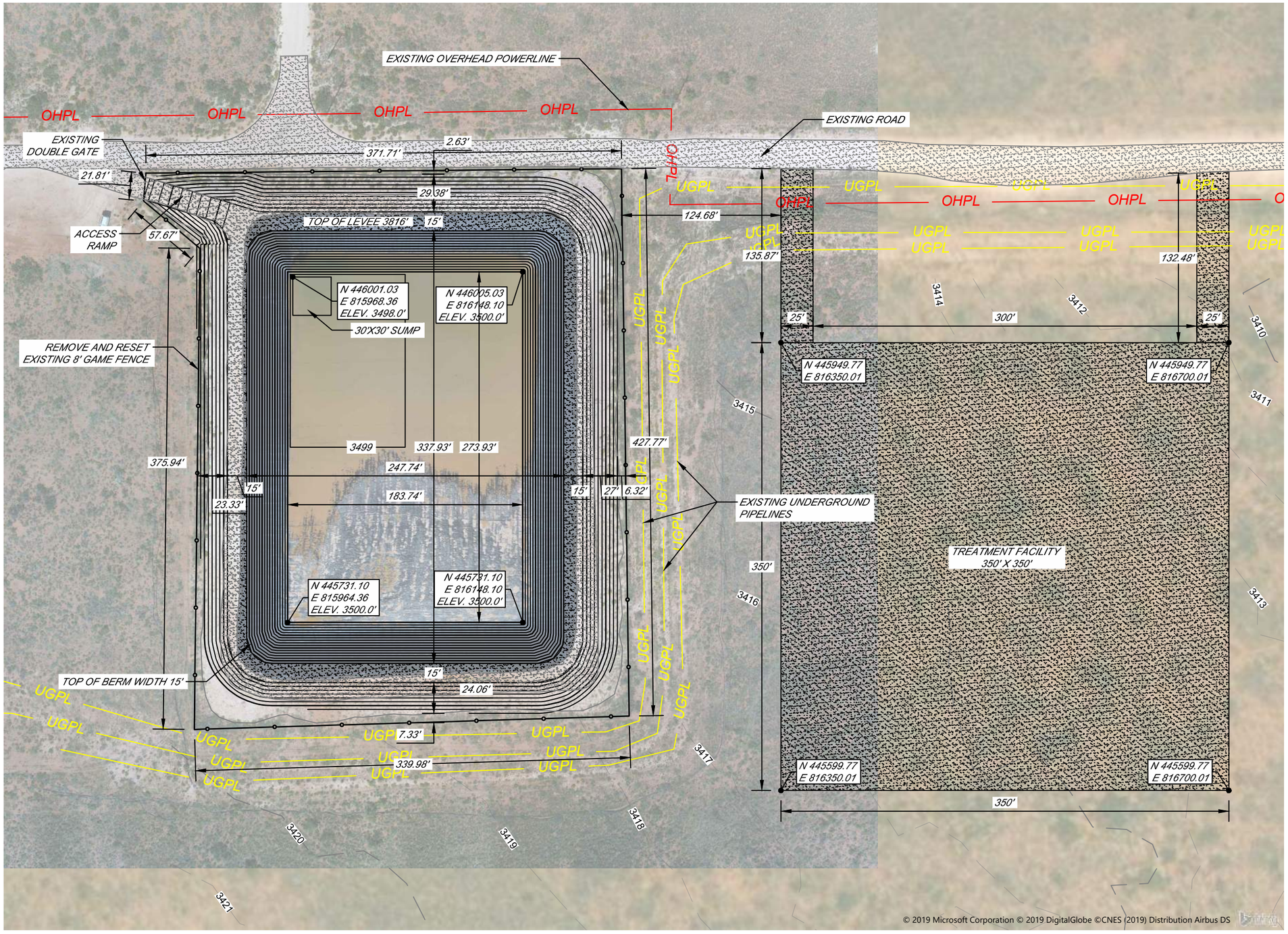
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

SITE PLAN - EXISTING CONDITIONS

HORIZONTAL SCALE: 1"=60'	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL01

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Horizontal Layout_EX.dwg



CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER

10/8/2019

MAGRYM

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

SOLARIS WATER MIDSTREAM

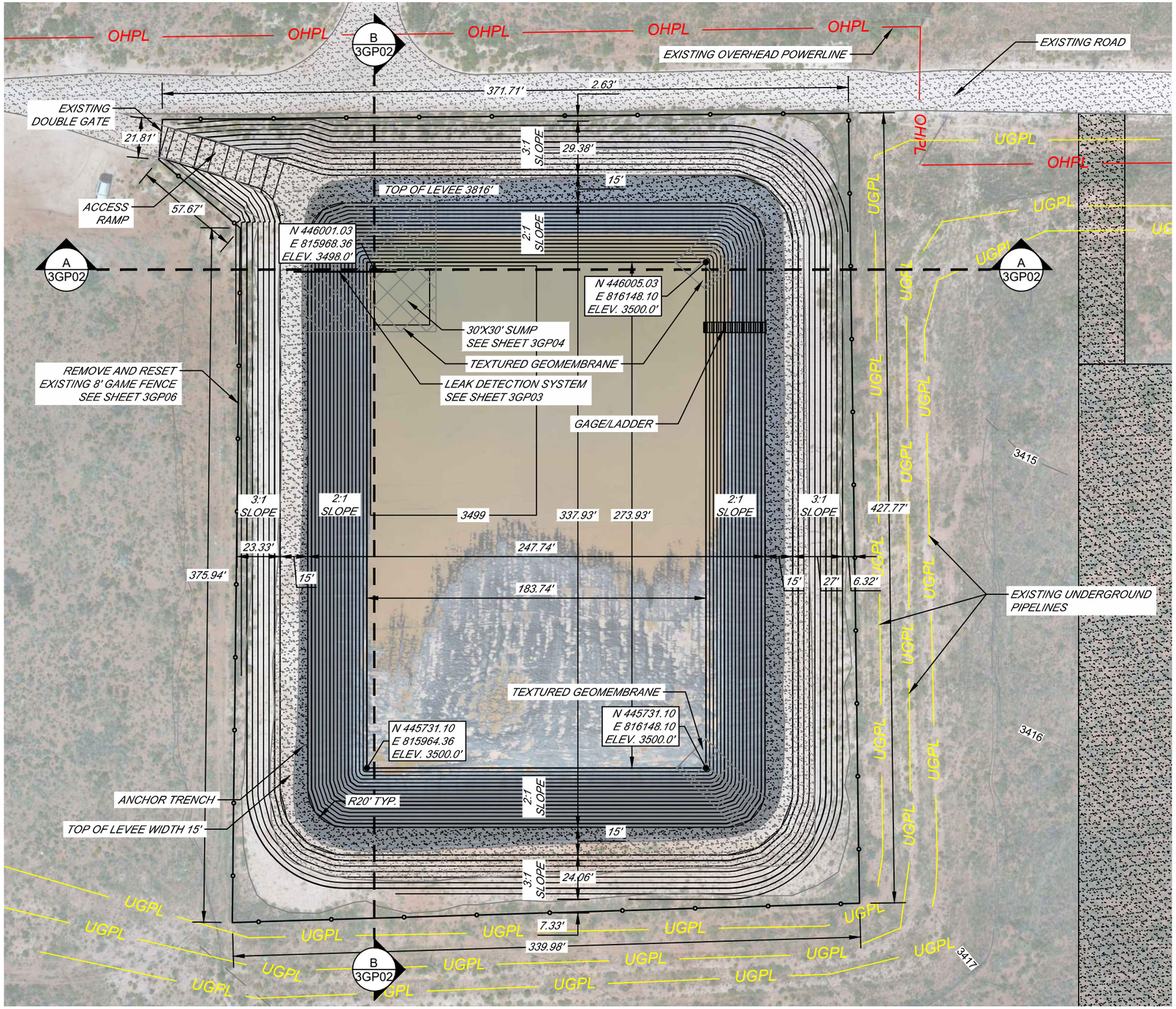
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

SITE PLAN - PROPOSED CONDITIONS

HORIZONTAL SCALE: 1"=80'	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: HORIZONTAL LAYOUT	SHEET: 1HL02

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Horizontal Layout_PR.dwg



SUMMARY OF QUANTITIES		
ITEM	UNIT	QTY
REMOVE EXISTING LINER	LUMP SUM	1
ESTIMATED CUT (BANK)	CUBIC YARD	5,855
ESTIMATED FILL (INCL. 15% FILL FACTOR)	CUBIC YARD	5,527
REMOVE AND RESET EXISTING FENCE	LINEAR FEET	1,595
20' DOUBLE GATE	EACH	1
60 MIL HDPE GEOMEMBRANE (TEXTURED)	SQUARE FEET	7,450
60 MIL HDPE GEOMEMBRANE (SMOOTH)	SQUARE FEET	90,300
200 MIL GEONET	SQUARE FEET	90,300
40 MIL HDPE GEOMEMBRANE	SQUARE FEET	90,300
10 OZ. GEOTEXTILE	SQUARE FEET	90,300
6" HDPE DR11 PIPE WITH PERFORATIONS IN SUMP	LINEAR FEET	115
DRAIN ROCK	CUBIC YARD	1
ANCHOR TRENCH	LINEAR FEET	1,157

STAGE-STORAGE	
ELEVATION (FT)	PIT VOLUME (BBL)
3498	0
3499	1,926
3500	6,914
3501	15,129
3502	23,643
3503	32,459
3504	41,582
3505	51,016
3506	60,766
3507	70,838
3508	81,238
3509	91,967
3510	103,031
3511	114,436
3512	126,185
3513	138,282
3514	150,733
3515	163,542
3516	176,713

N

SCALE 1"=60'

0 30' 60' 120'

LEGEND

- EXISTING GRADE CONTOURS
- PROPOSED CONTOURS
- EXISTING 8' GAME FENCE
- OVERHEAD POWERLINE — OHPL
- UNDERGROUND GASLINE — UGPL
- ANCHOR TRENCH
- DRIVING SURFACE
- RUB SHEET

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
10/8/2019

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

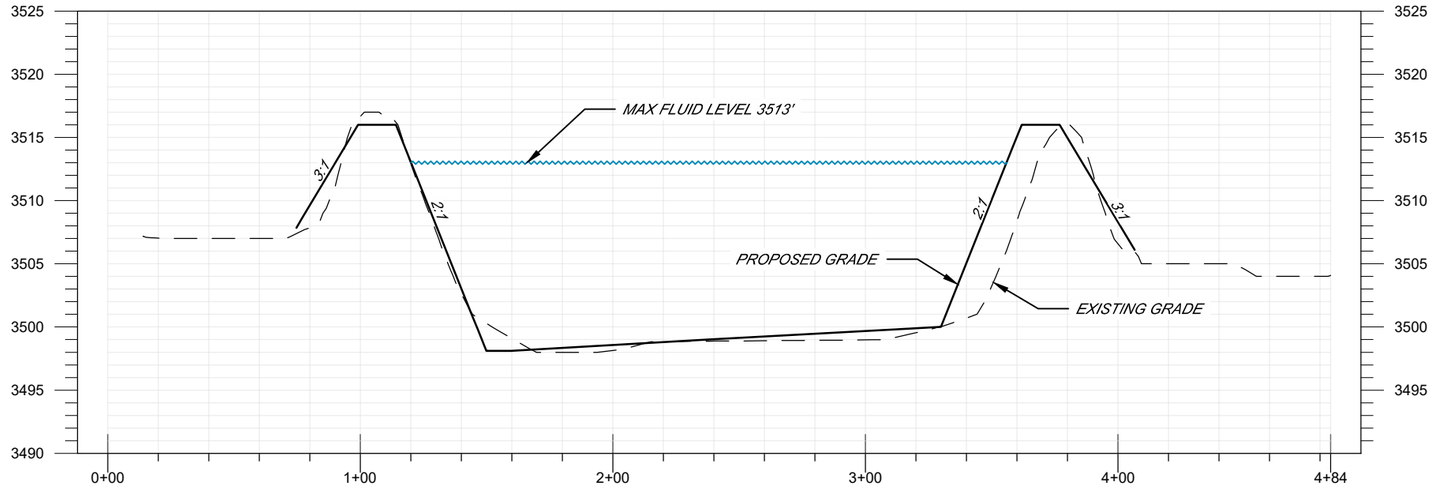
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

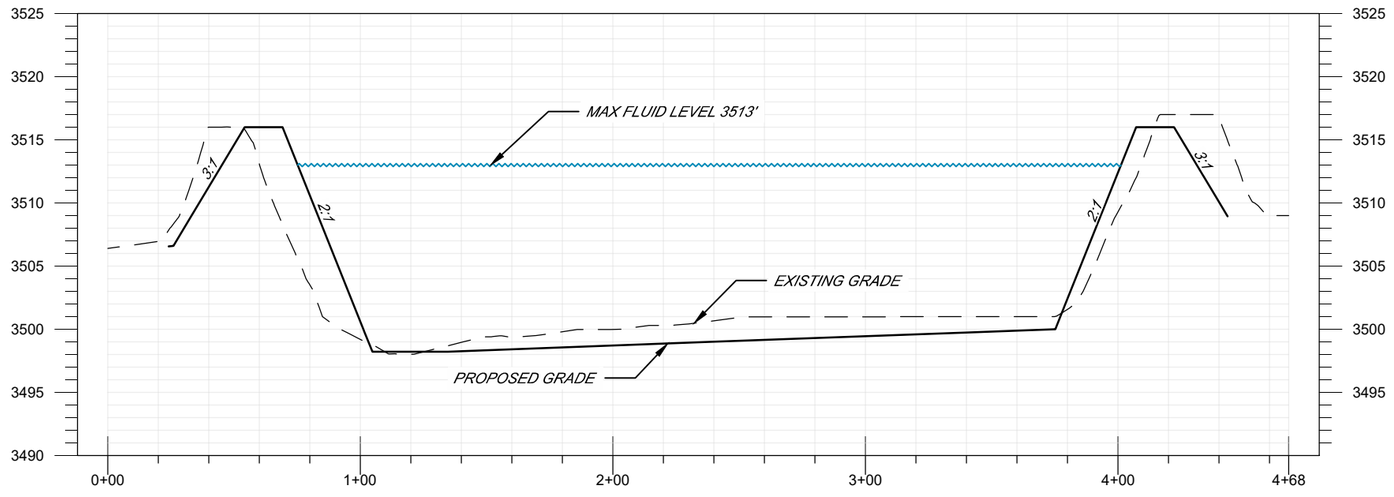
GRADING PLAN

HORIZONTAL SCALE: 1"=60'	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP01

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Grading_EX.dwg



SECTION A



SECTION B

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
10/8/2019

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

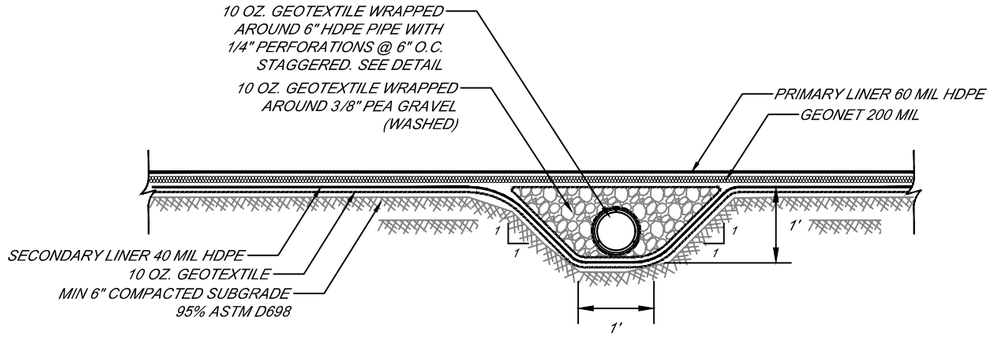
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

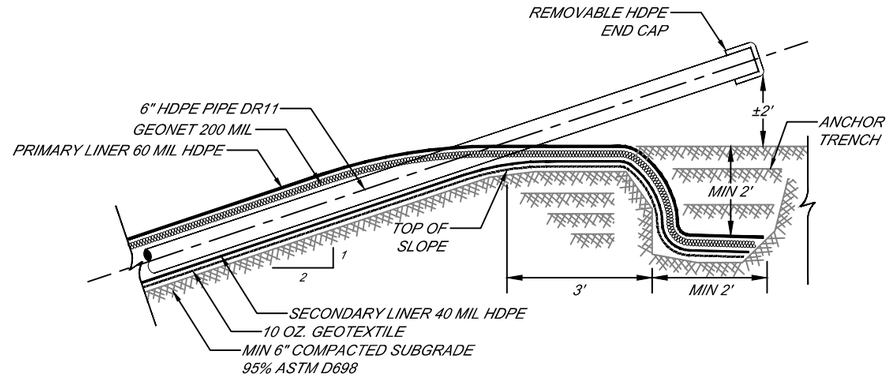
CROSS SECTIONS

HORIZONTAL SCALE: 1"=60'	VERTICAL SCALE: 1"=12'
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP02

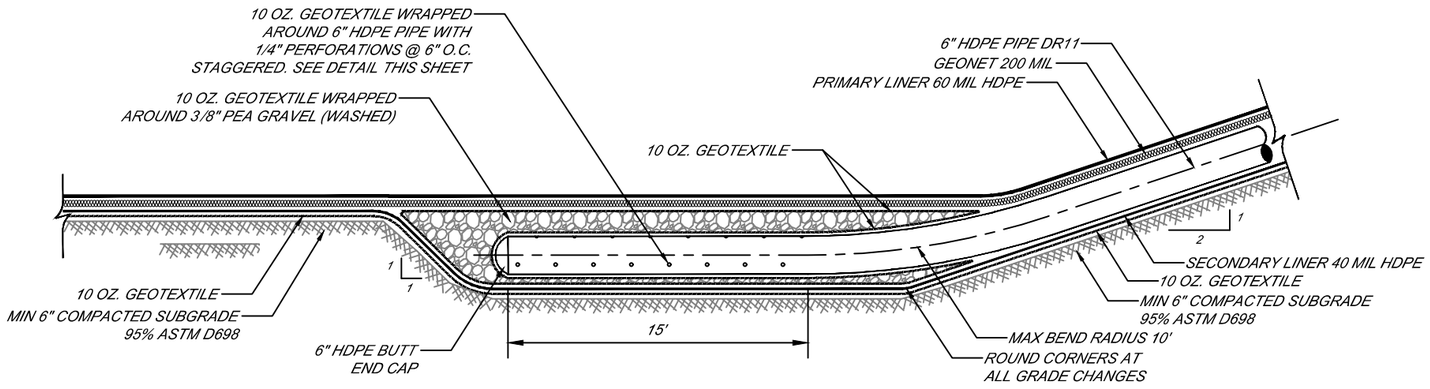
Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Grading_EX.dwg



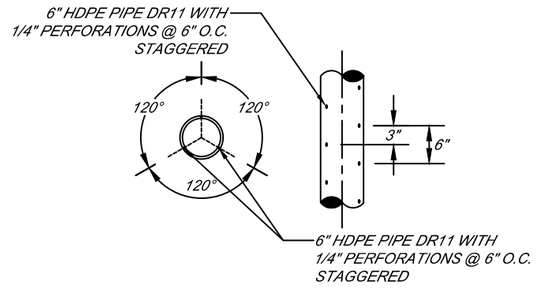
1 / 3GP03 **LEAK DETECTION SYSTEM SECTION A**
NOT TO SCALE



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



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



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

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
10/8/2019

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

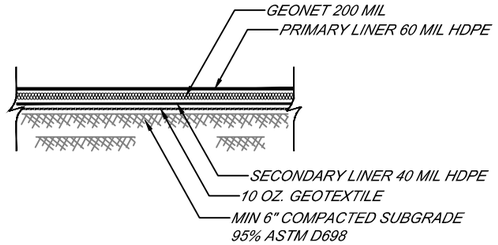
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

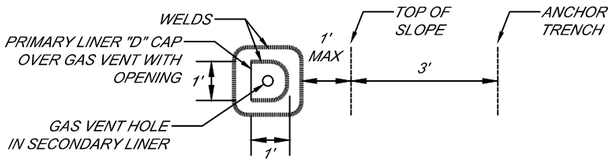
DETAILS

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP03

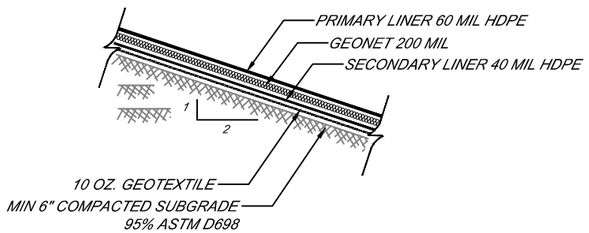
Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Details.dwg



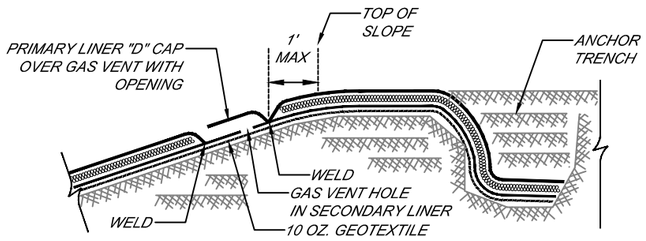
1 / 3GP04 **TYPICAL POND BOTTOM LINER**
NOT TO SCALE



TOP VIEW



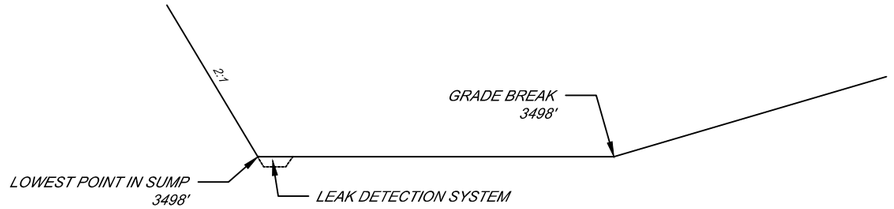
2 / 3GP04 **TYPICAL POND SLOPE LINER**
NOT TO SCALE



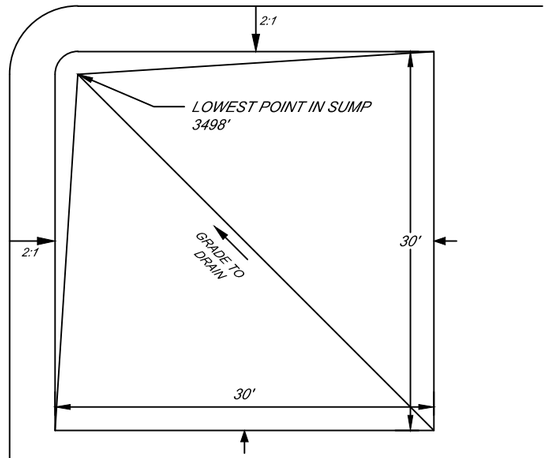
SIDE VIEW

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

3 / 3GP04 **TYPICAL GAS VENT**
NOT TO SCALE



SIDE VIEW



TOP VIEW

4 / 3GP04 **SUMP DETAIL**
NOT TO SCALE

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

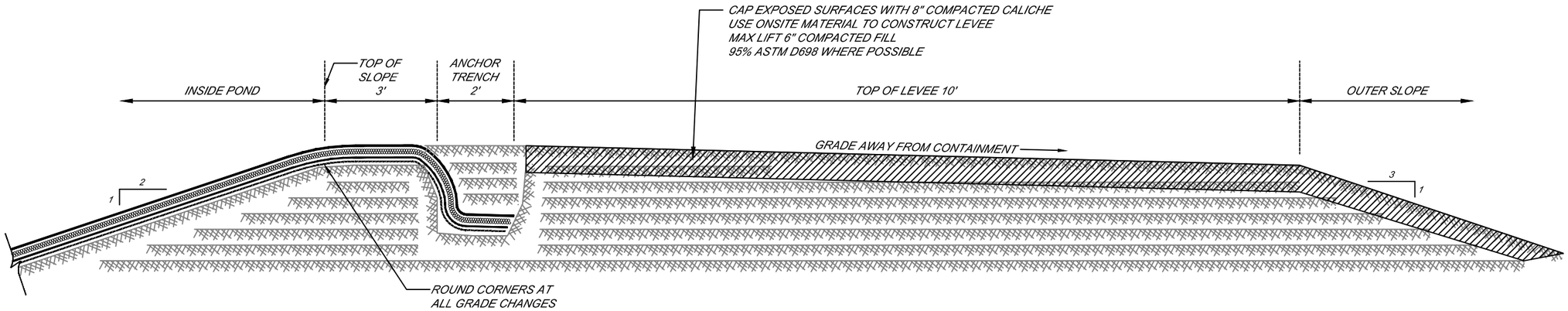
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

DETAILS

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP04

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Details.dwg



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

CLAUDIUS SANCHEZ CZYZEWSKA
NEW MEXICO
22897
PROFESSIONAL ENGINEER
10/8/2019

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

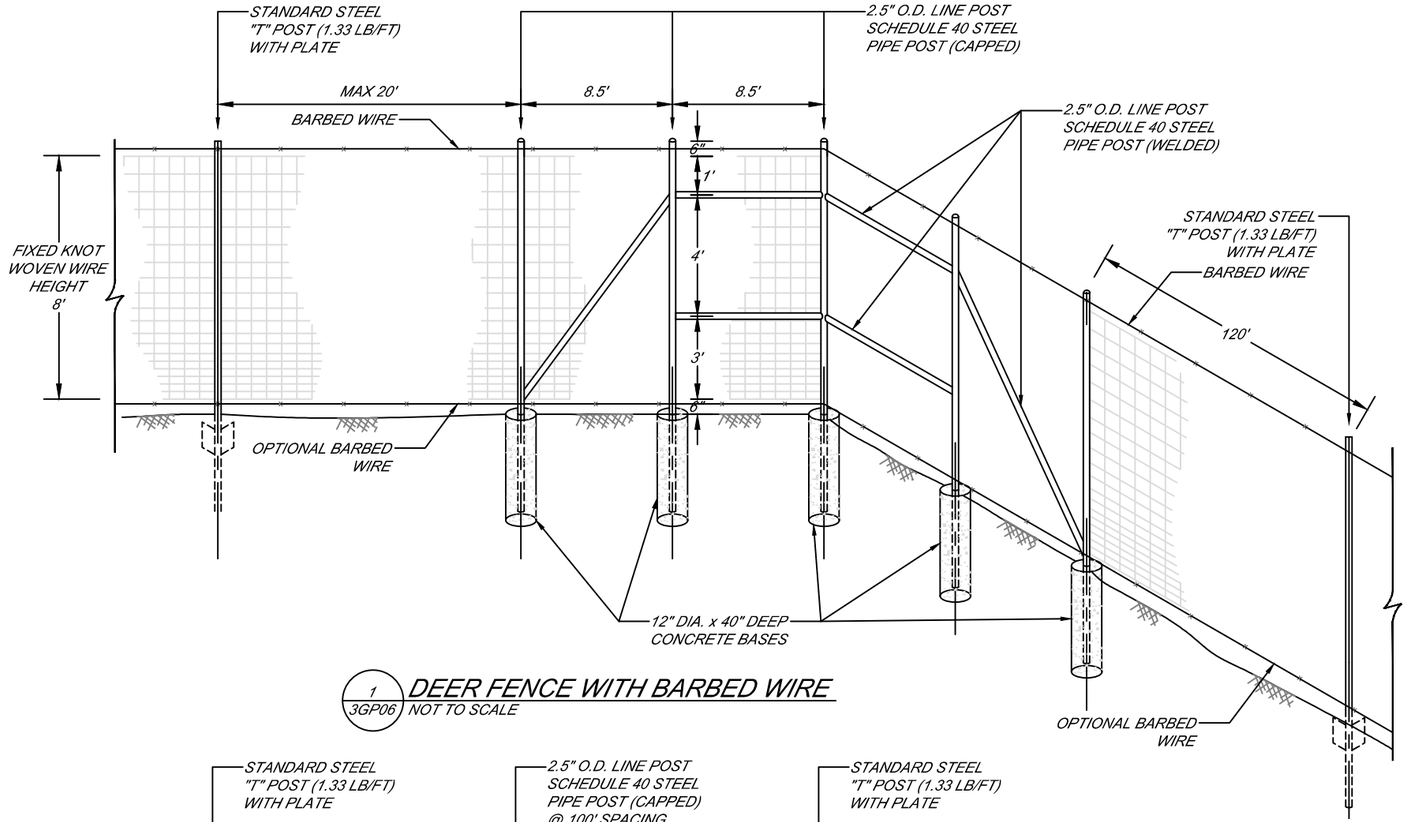
Solaris Water Midstream, LLC
907 Tradewinds Boulevard
Midland, TX 79701
432-203-9020
www.solarismidstream.com

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

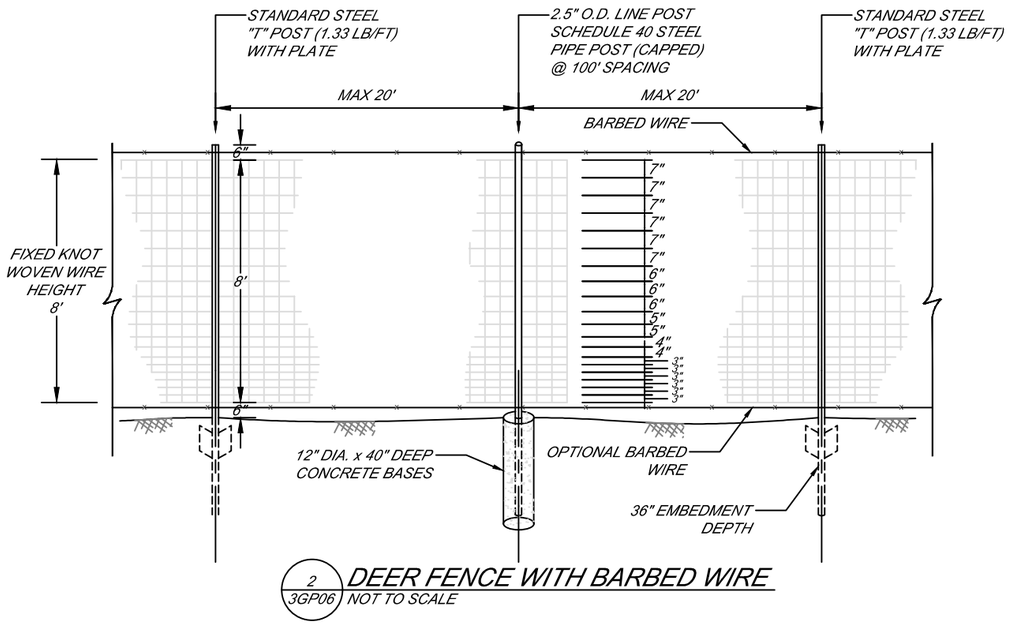
DETAILS

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP05

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Details.dwg



1 / 3GP06 **DEER FENCE WITH BARBED WIRE**
NOT TO SCALE



2 / 3GP06 **DEER FENCE WITH BARBED WIRE**
NOT TO SCALE

NOTES:

1. FOR WOVEN WIRE, TOP AND BOTTOM STRANDS SHALL BE 12 1/2 GAUGE OR HEAVIER; INTERMEDIATE STRANDS SHALL BE 14 1/2 GAUGE OR HEAVIER.
2. FOR BARBED WIRE, EACH LINE WIRE SHALL CONSIST OF 2 TWISTED STRANDS OF 12 1/2 GAUGE WIRE OR HI-TENSILE STRENGTH WIRE OF 15 1/2 GAUGE. THE BARBS SHALL BE EITHER 2-POINT BARBS ON APPROXIMATE 4 INCH CENTERS OR 4-POINT BARBS ON APPROXIMATE 5 INCH CENTERS.
3. ALL WIRE SHALL HAVE CLASS III GALVANIZATION.
4. 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.
5. CONCRETE FOOTINGS SHALL HAVE TOPS CROWNED.
6. TO PREVENT WIRE FROM SLIPPING ON STEEL POST, DOUBLE WRAP ALL WIRE AROUND STEEL POST OR WELD CHAIN LINK LOOPS.

Magrym Consulting Inc.
1510 North Acres Drive
Lovington, NM 88260
(432) 999-2737
www.magrym.com
TBPE F-19848

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

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

GAMMA RIDGE WATER TREATMENT AND REUSE FACILITY
S14, T24S, R34E
LEA COUNTY, NM
SOLARIS WATER MIDSTREAM, LLC.

DETAILS

HORIZONTAL SCALE: NTS	VERTICAL SCALE: NTS
PRINT DATE: 10/8/2019	DESIGNED BY: CSC
PROJECT NO. 19-149	CHECKED BY: CSC/EMH
SUBSET: GRADING PLANS	SHEET: 3GP06

Drawing File: Z:\Shared\Documents\Projects\19-149 Solaris_Gamma Ridge\04_CIVIL\CADD\Design\Drawings\19-149 Details.dwg

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 applica 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

Distance to Groundwater

Plate 1, Plate 2, and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) is greater than 50 feet beneath the 40-acre area of interest that is the location of the proposed recycling containment

Plate 1 is a geologic/ topographic map that shows:
1. The Gamma Ridge Containment and recycling facility area, which is owned by Quail Ranch, LLC, is identified by the blue square.
2. Plotted on the base map is a depth to water interpretation from Open File Report 95. This map is reasonably correct for this area.

Plate 2 is an area topographic map that shows:
1. The Gamma Ridge Containment and recycling facility is identified by the blue square with hatchings with the estimated surface elevations noted as 3505.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface.
3. Water wells measured by professionals and documented in published reports or by staff of Hicks Consultants (MISC wells).
4. Isocontour lines displaying the elevation of the groundwater surface.

Geology

The geologic map of New Mexico shows the project site is located on the Antelope Ridge. While the site is near the juncture of two physiographic regions, the drainage suggests the site is along the western edge of Eunice Plains physiographic region, east of the Antelope Ridge Area and south of the San Simon Swale (see inset next page). The surface of the site includes a thin veneer of wind-blown sand underlain by caliche. The sand was negligible and not shown on the attached log prepared by RT Hicks Consultants (Appendix GEOTECHNICAL). The caliche layer was approximately 20 feet thick and is presumed to be the top of the late Tertiary Ogallala Formation. Area wells appear to be placed in the Ogallala. Beneath the caliche was reddish tan sand and at 50 feet below ground surface, clay was encountered. This clay horizon was saturated at 63 feet below ground surface (approximate elevation of 3437 feet).

Nicholson and Clebsh (1961[1]) state that the thickness of the Ogallala in the area of Antelope Ridge and Grama Ridge ranges from a few feet thick to more than 100 feet. The 1961 report indicates that a well in the northwest quarter of Section 10 T24S R34E (MISC 302/USGS 14887) derives "water from sediments filling isolated depressions or valleys in the Triassic erosion surface."

The report sites a well at 24.34.10.112 as form sediments filling isolated depression or valleys in Triassic erosion surface (page 61 of the report).

Topographically, the area around the proposed containment slopes gently to the east-northeast.

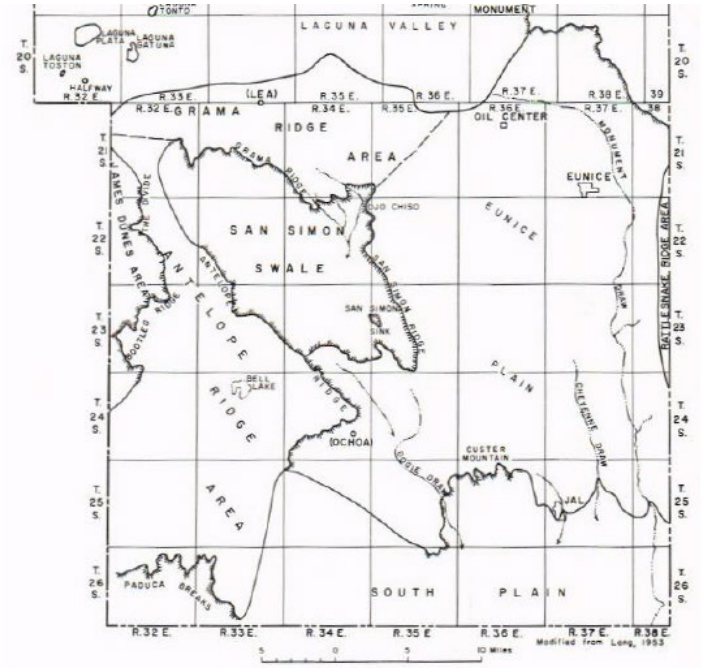


Figure 3
PHYSIOGRAPHIC SUBDIVISIONS OF SOUTHERN LEA COUNTY, N. MEX.

Groundwater Data

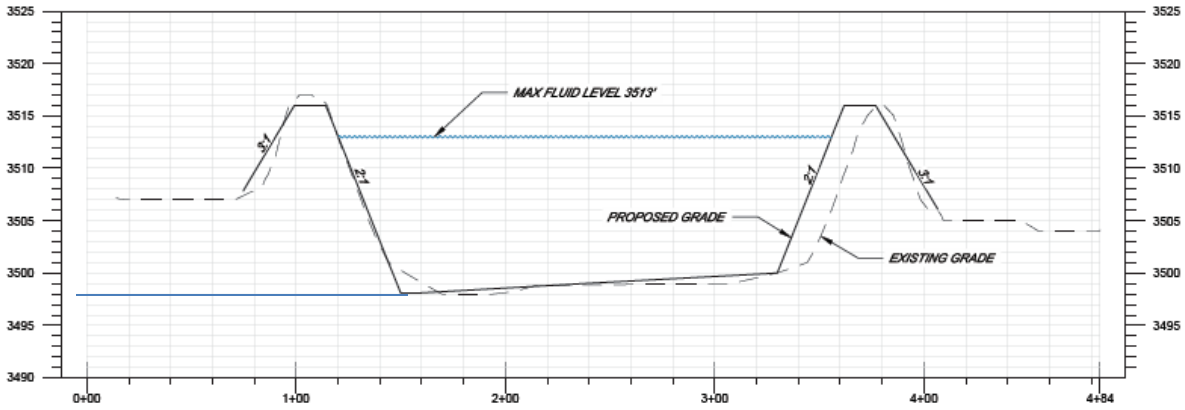
We relied upon the most recent data measured by the USGS and wells measured by Hicks Consultants data (Misc. 185) to create the water table elevation map shown in Figure 2. Water level data from the OSE database rely upon observed water levels by drillers during the completion of the water well. The OSE dataset provides some useful data in certain areas. Based upon our field survey and examination of Google Earth images, we are confident that the wells shown Figure 2 are accurate.

For the potentiometric surface map (Figure 2), we honored all data that we know are accurate to the best of our knowledge. From the data presented, we conclude:

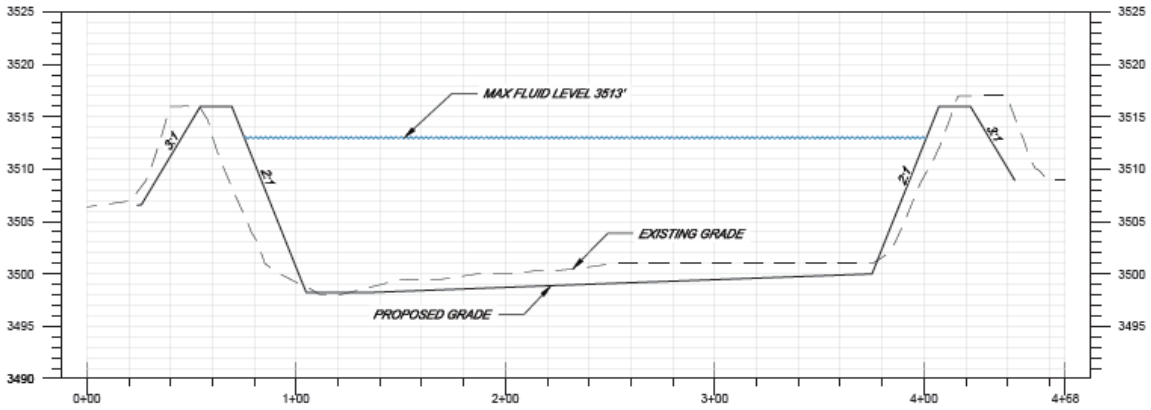
- Water elevations were shown to be 3442 feet (USGS 14881 measured in 2015) to 3464 feet (USGS 14887 measured in 1955) near the site, as indicated on the potentiometric map. Both of these sites were observed during the site visit. These wells were in use but neither were accessible for current measurements.
- The elevation of the groundwater surface beneath the area in which the Gamma Ridge Containment will be constructed was measured in a auger boring (MISC-393) as 3437 feet above mean sea level (63 feet below ground surface).
- The plugged and abandoned well boring (USGS 14872), which is reported to be in the southeast corner of Section 10, describes encountering groundwater at 63 feet in 1953. At the time of the site visit, this well was found to be plugged with soil.
- The site-specific data demonstrate that the distance between the proposed bottom of the containment (elevation 3498) and the groundwater surface (elevation 3437) is approximately 61 feet.

[1] https://geoinfo.nmt.edu/publications/water/gw/6/GW6.pdf

We say groundwater elevation is 3437 and we know it falls lower to the south. The bottom of the containment is 3498 in Sections A and B. So 3498-3437= 61 feet, cool. So the boring was at a surface elevation of about 3507? I got a little confused, but re-reading I think it is clear enough. See if you need to do something.

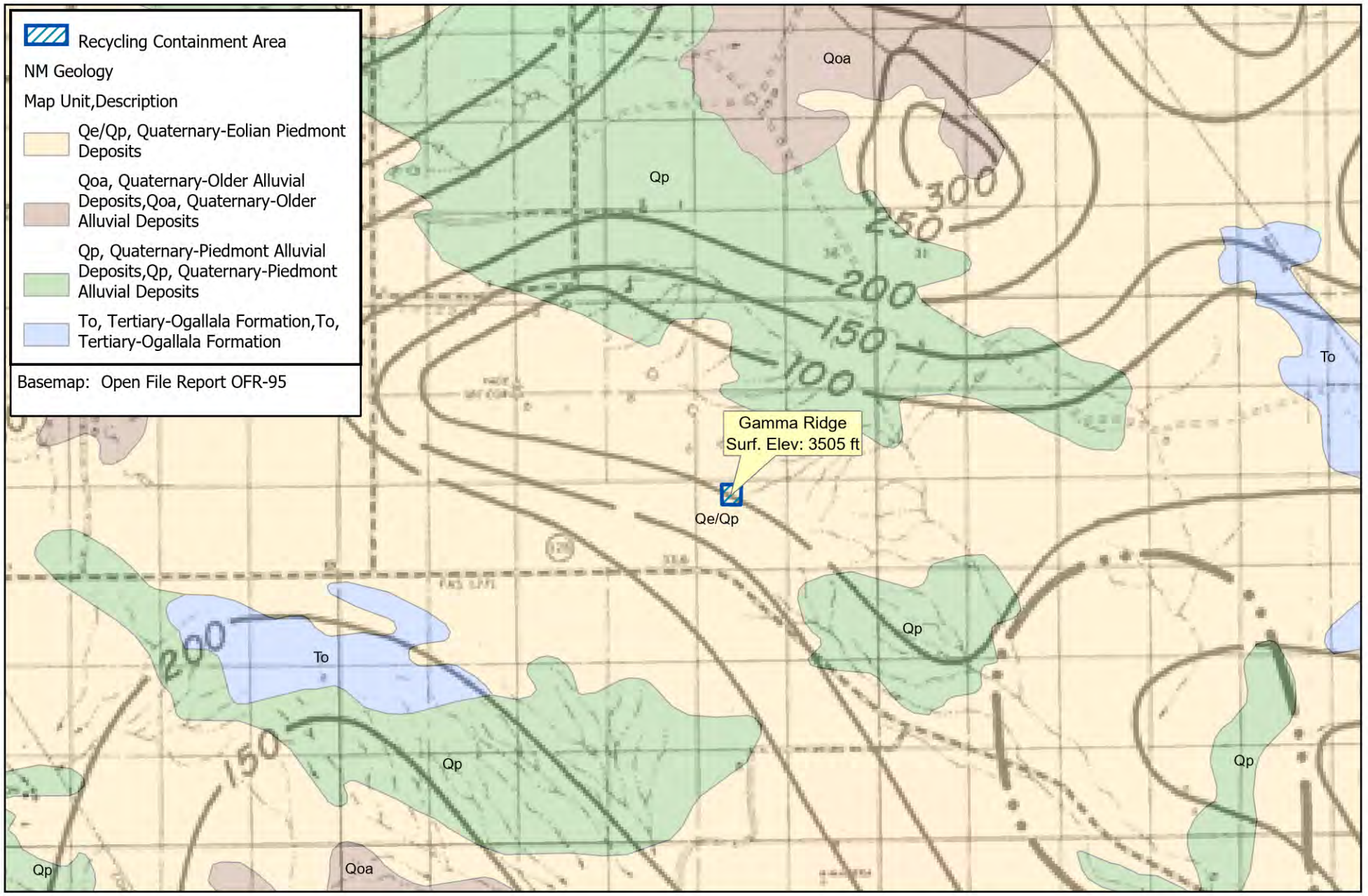


SECTION A



SECTION B

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 1 2 Miles

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

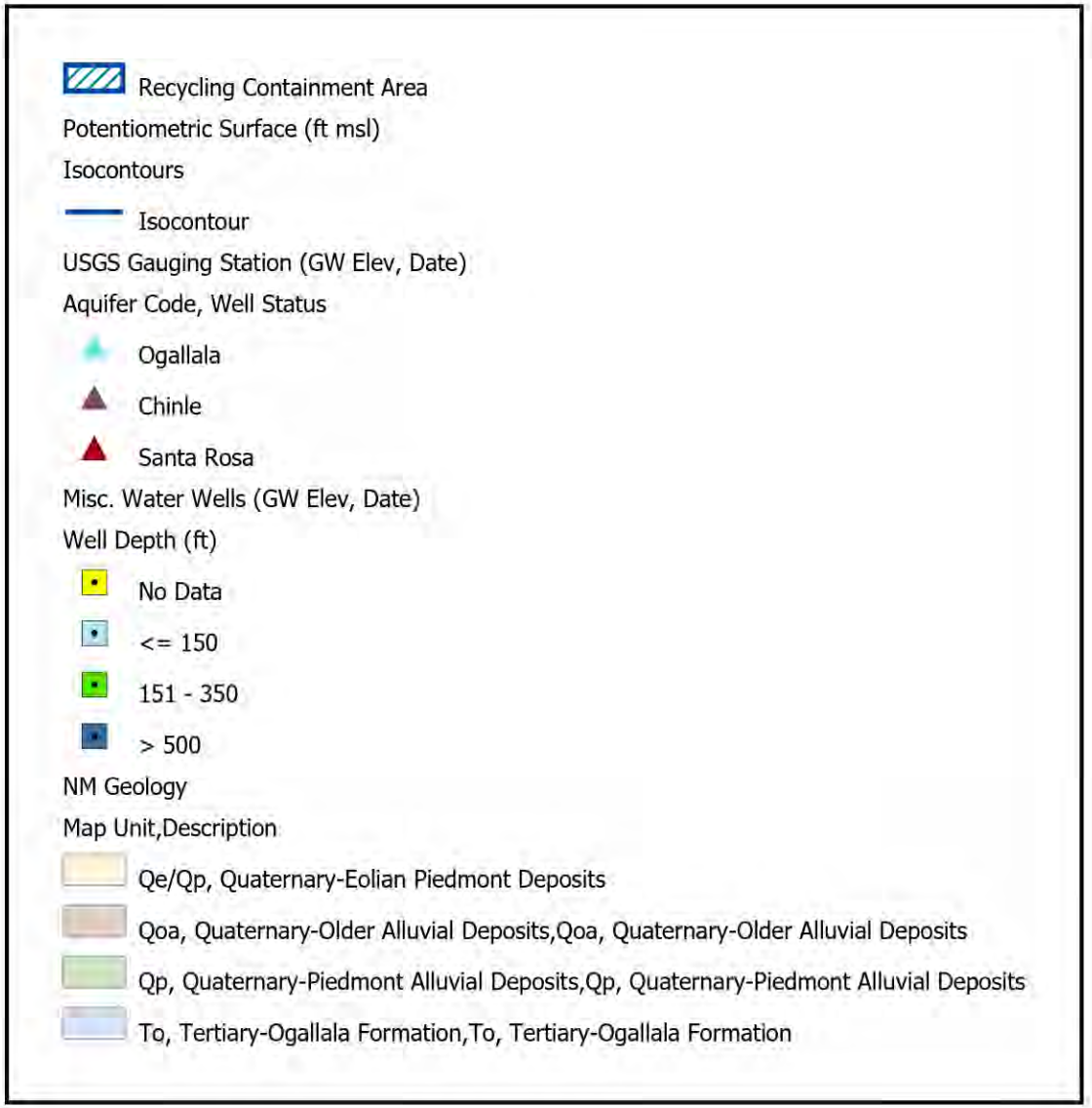
Depth to Water with Geology

Solaris Water Midstream, LLC
Gamma Ridge Recycling Project

Plate 1

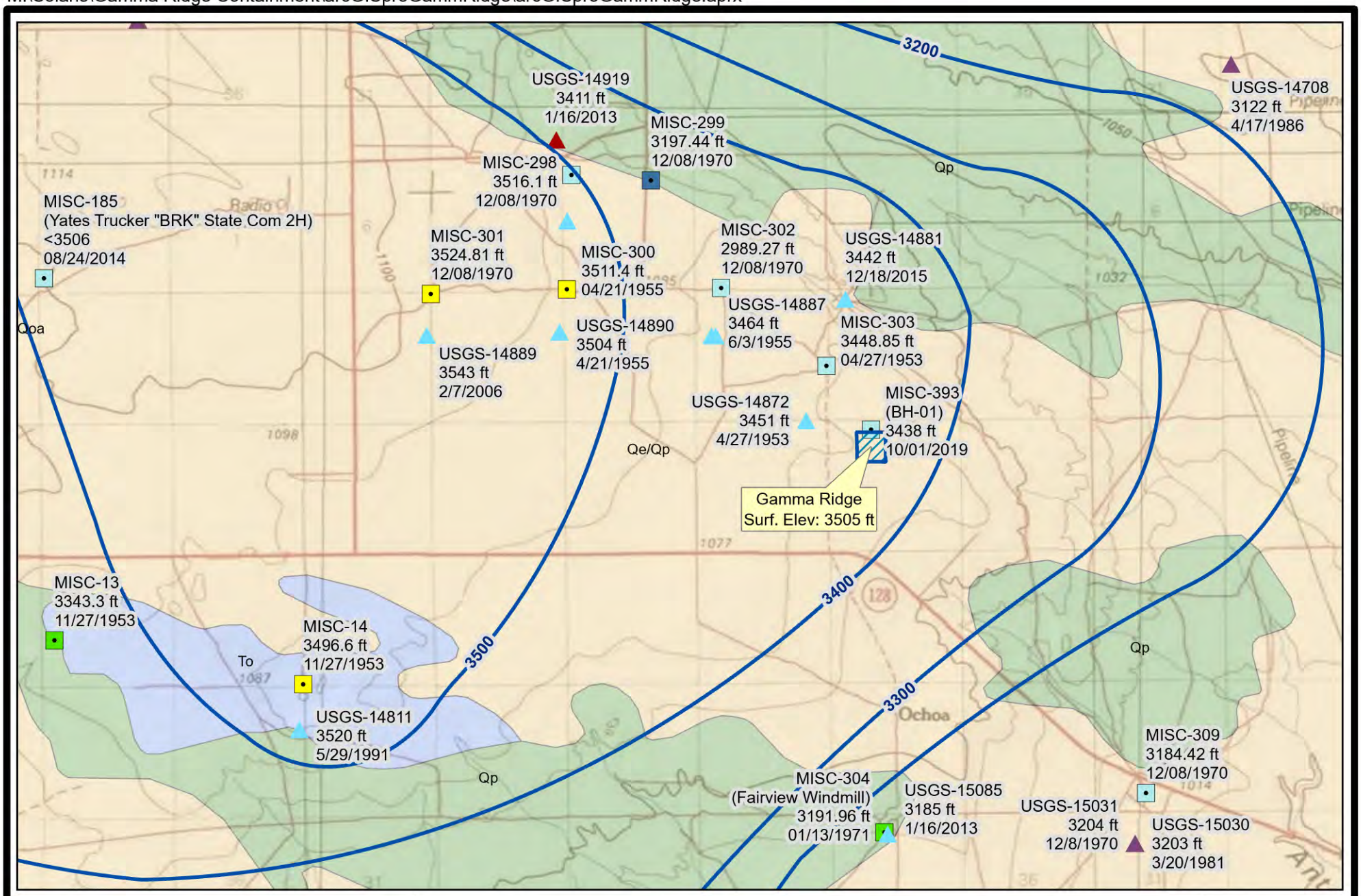
Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Potentiometric Surface	Plate 2 Legend
	Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 0.5 1 Miles

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

Potentiometric Surface	Plate 2
Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

Distance to Municipal Boundaries and Fresh Water Fields

Plate 3b demonstrates that the area of interest 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 Jal, NM approximately 17.6 miles to the southeast.
- The closest mapped public well field belongs to the City of Jal about 18 miles to the southeast.

Distance to Subsurface Mines

Plate 4 and our general reconnaissance of the area demonstrate that the nearest mines are rock quarries. The area of interest is not within an area overlying a subsurface mine.

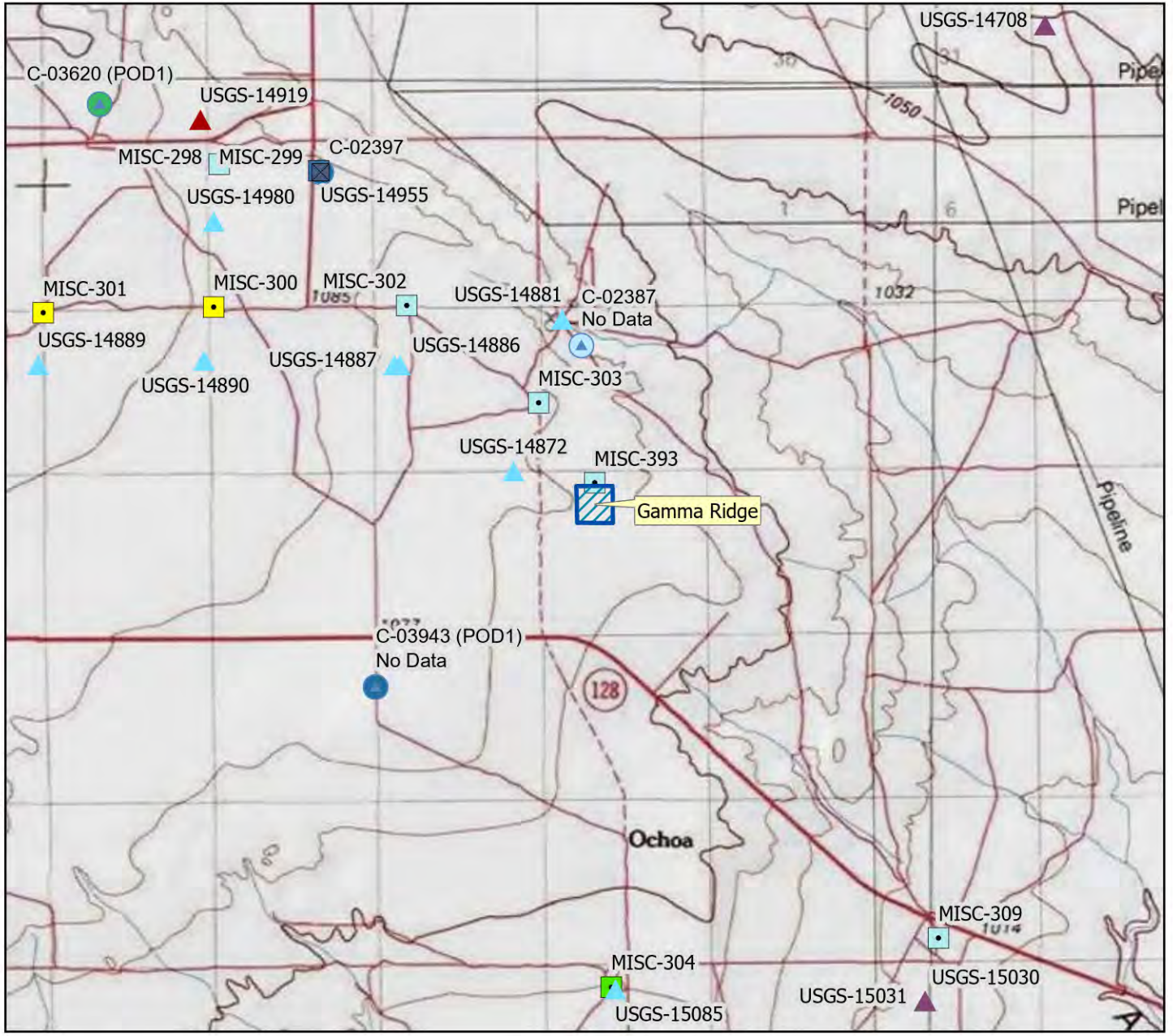
- The nearest quarry is located about 2 miles northwest of the area of interest.

Distance to High or Critical Karst Areas

Plate 5 shows the area of interest of the containment with respect to BLM Karst areas.

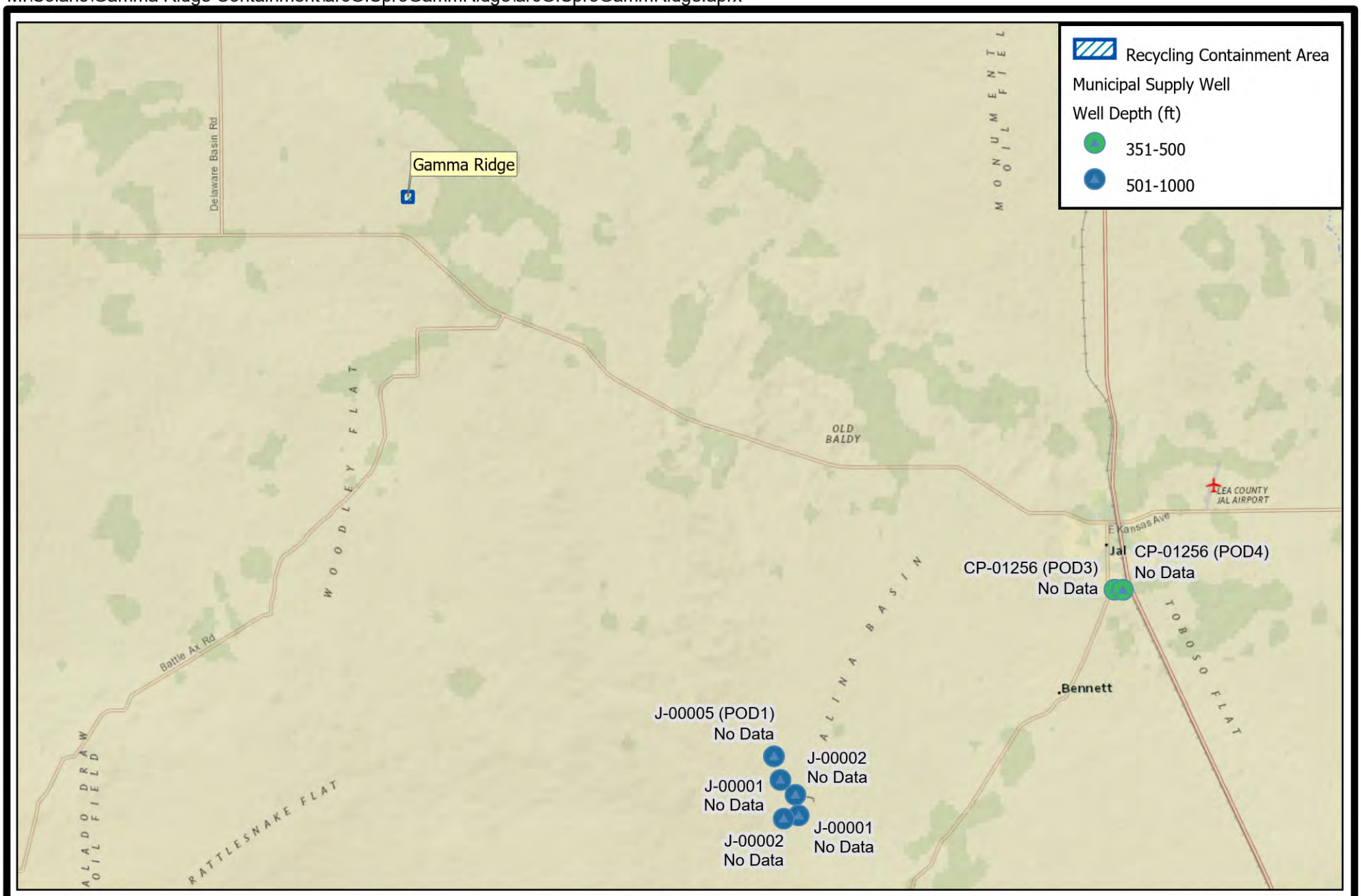
- The area of interest is located within a "low" potential karst area.
- The nearest "high" potential karst area is located approximately 17 miles southwest of the site.
- No evidence of solution voids were observed near the site during the field inspection.
- No evidence of unstable ground was observed in the area.
- The geotechnical boring report provides evidence of stable ground.

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Water Wells	Plate 3a
	Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 1.5 3 Miles

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

Wellhead Protection	Plate 3b
Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx

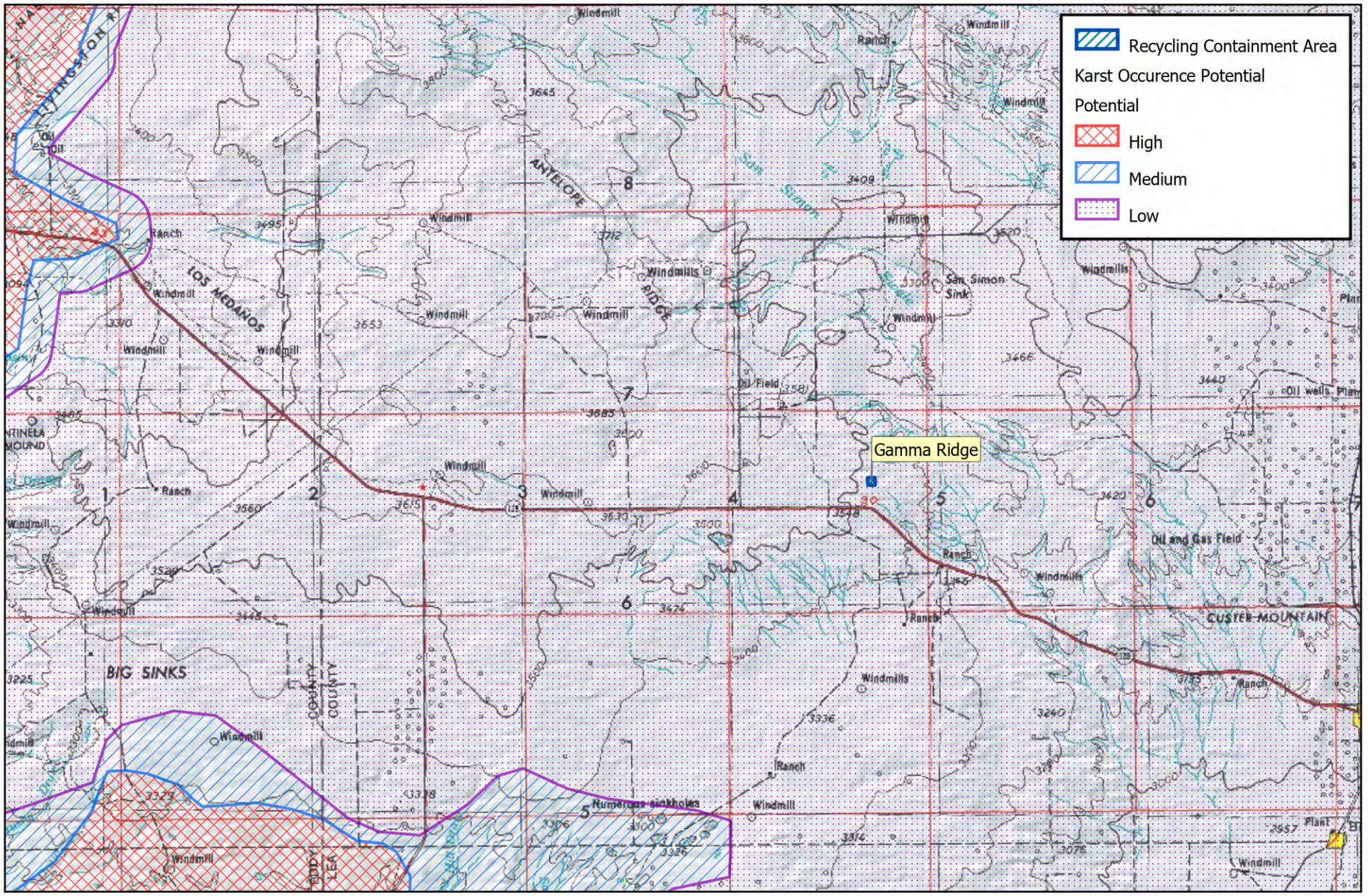
N
W E
S

0 0.5 1 Miles

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

Mines and Minerals	Plate 4
Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 2 4 Miles

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

Karst Potential	Plate 5
Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

Distance to 100-Year Floodplain

Plate 6 demonstrates that the area of interest is within Zone X as designated by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

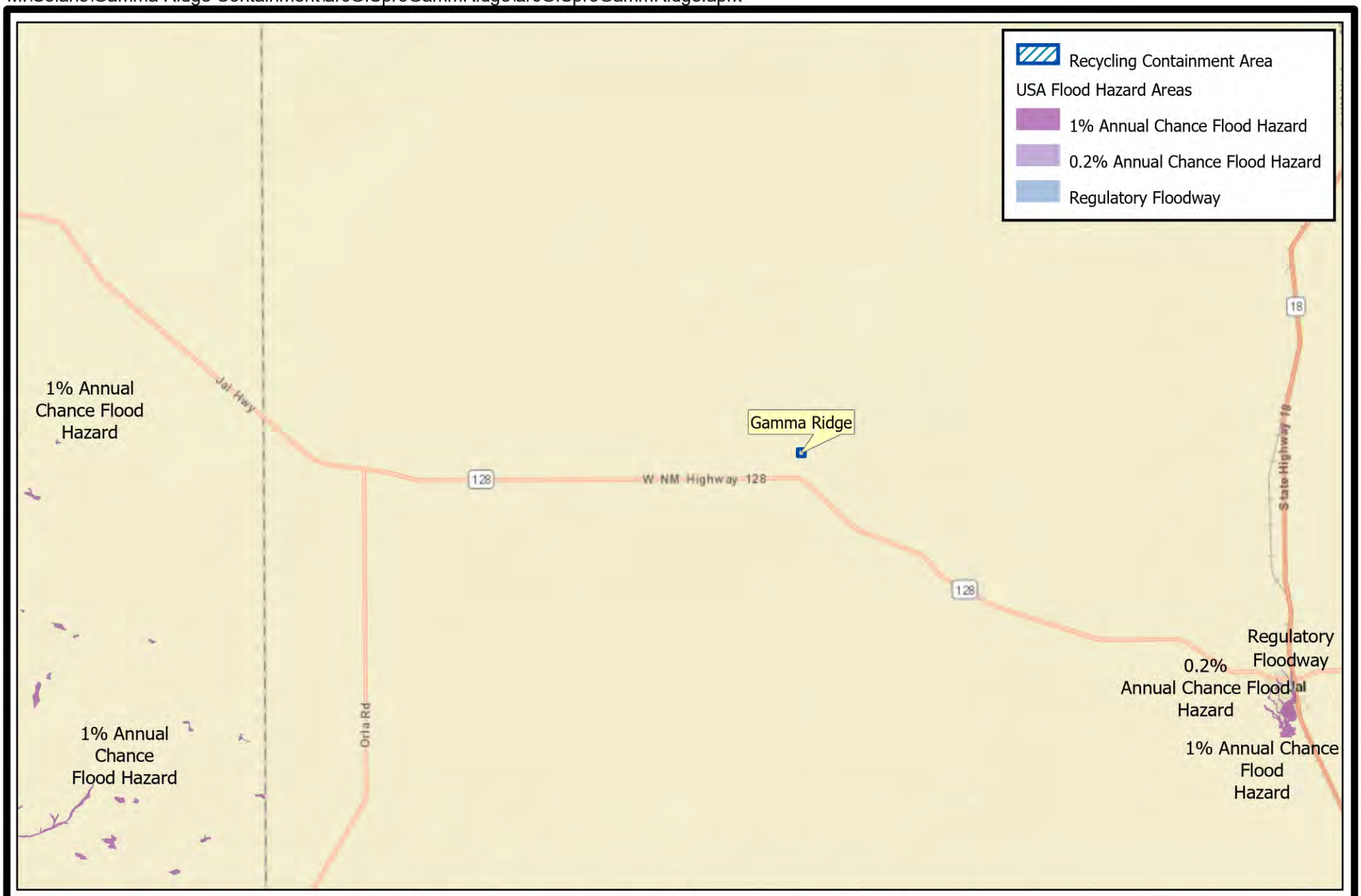
- Zone X is described as Areas Outside the 0.2% Annual Chance Floodplain.
- Our field inspection and examination of the topography permits a conclusion that the area of interest is not within any floodplain and has low risk for flooding.
- A regulatory floodway is present approximately 16miles east of the site boundary. The nearest 1% annual chance of flood hazard exists 18.8 miles southwest of the site and a 0.2% annual chance flood hazard exists approximately 16 miles southeast of the site.

Distance to Surface Water

Plate 7 and the site visit demonstrates that the area of interest is not within 300 feet of a continuously flowing watercourse or 200-feet of any other significant watercourse, lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark) or spring.

- The map depicts an "intermittent stream" located about 0.9 miles north of the project boundary and a lake/pond approximately 0.7 miles west of the site.
- No continuously flowing watercourses, significant watercourse or other water bodies, as defined by NMOCD Rules, exist within the prescribed setback criteria for the siting of a recycling containment.
- No springs were identified in Figure 7 or in the site visit.
- No playa lakes or lakebeds were identified by the site visit or databases within the 200-foot criteria.

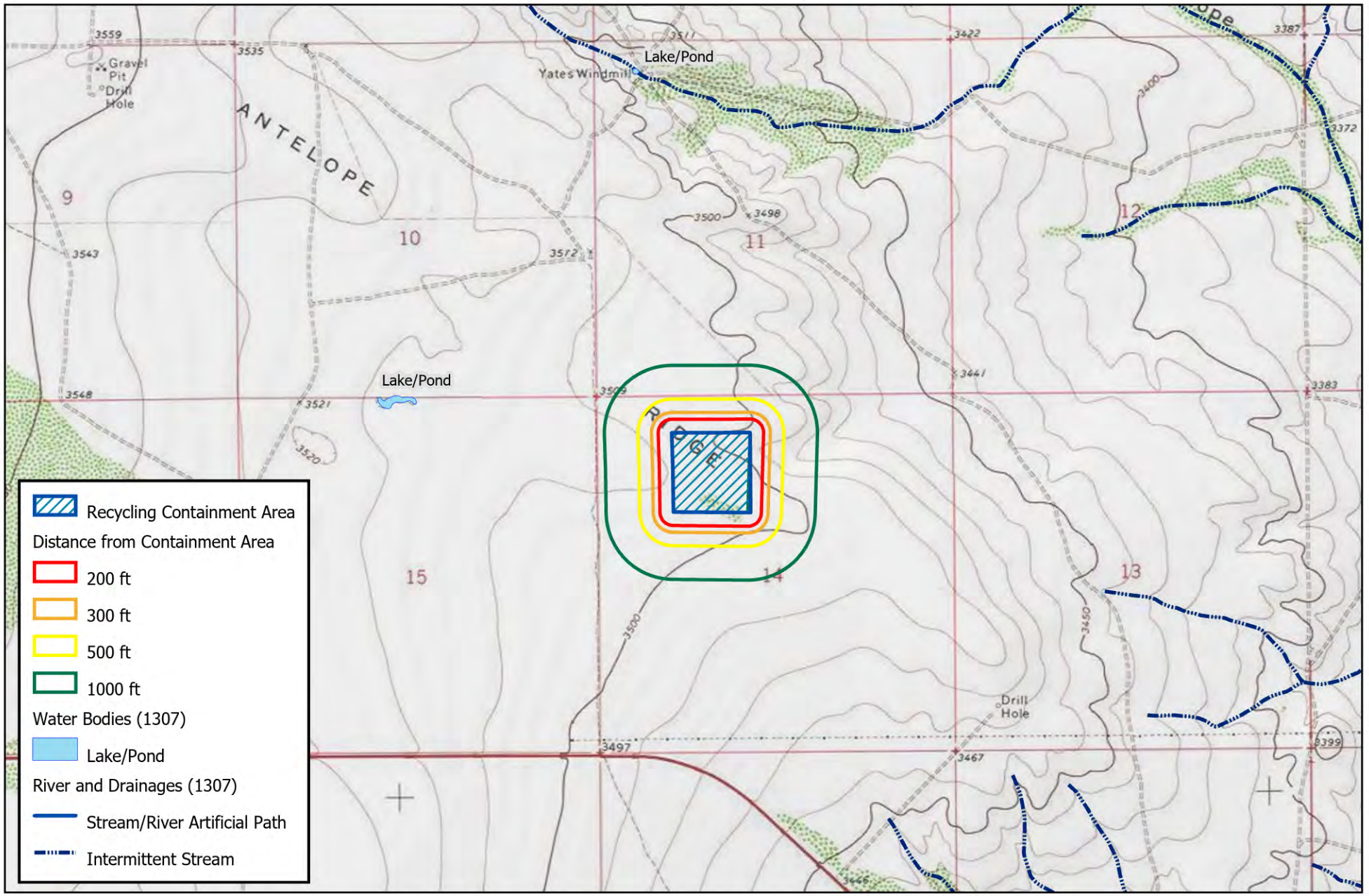
M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



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

Flood Hazard Areas	Plate 6
Solaris Water Midstream, LLC Gamma Ridge Recycling Project	Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 1,000 2,000
US Feet

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

Nearby Surface Water

Plate 7

Solaris Water Midstream, LLC
Gamma Ridge Recycling Project

Oct. 14, 2019

Distance to Permanent Residence or Structures

Plate 8 and the site visit demonstrates that the area of interest 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.

- The nearest structures are oil wells and tank batteries.

Distance to Non-Public Water Supply

Plates 3a and 7 demonstrates that the area of interest 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.

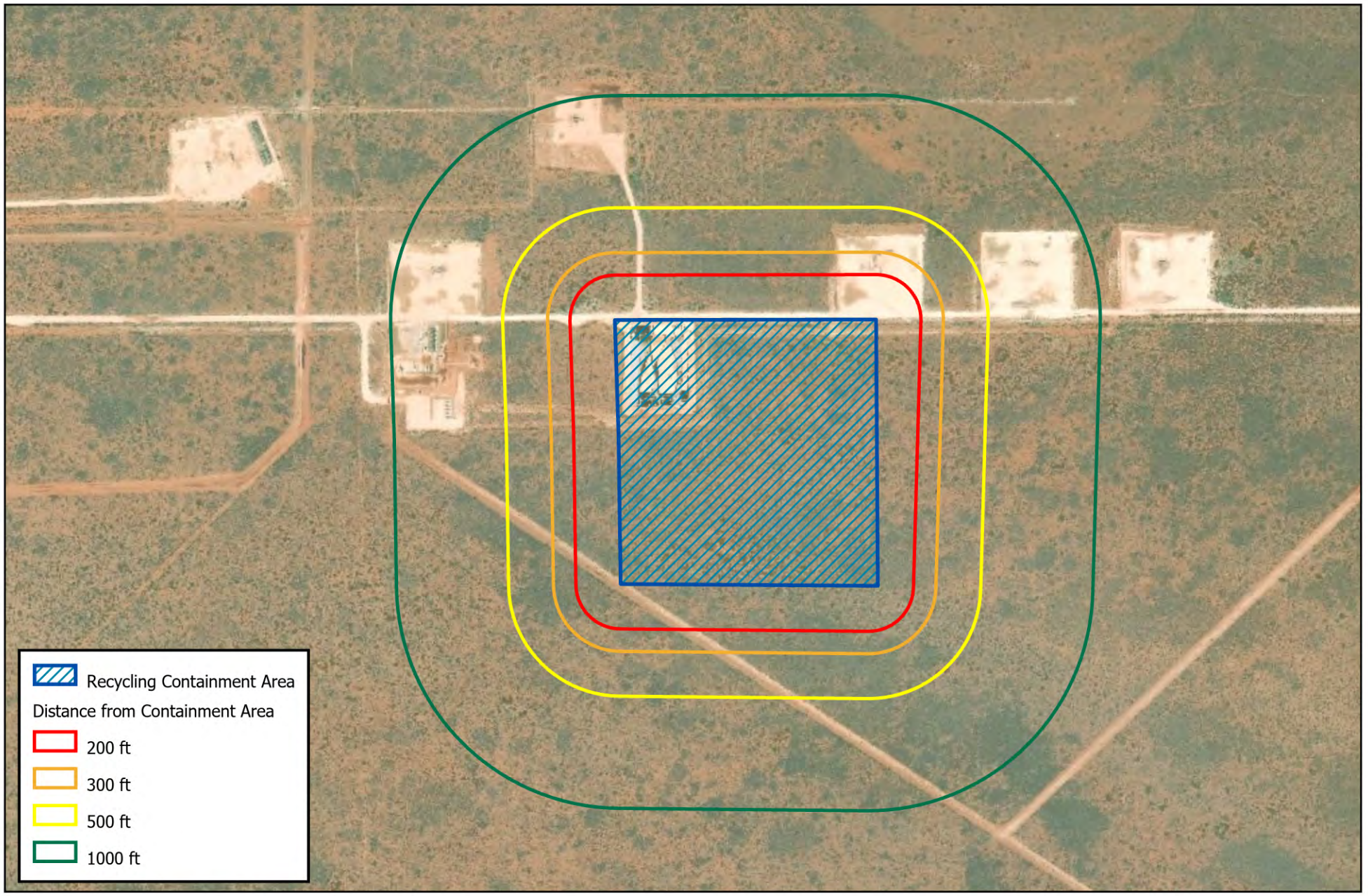
- Plate 3a shows the locations of all area water wells, active, plugged or planned (permit location in OSE database).
- The closest active water well is OSE water well C 02387 (USGS 14881) that is approximately 1 mile north of the containment area. This well was drilled in 1916. The well is still in use. (See Appendix WELL LOGS).
- No domestic water wells are located within 1,000 feet of the recycling area.
- No springs were identified within the mapping area (see Figure 7).

Distance to Wetlands

Plate 9 demonstrates the area of interest is not within 500 feet of wetlands.

- The nearest designated wetland is a freshwater pond located approximately 0.9 miles to the north of the area of interest.

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 300 600
US Feet

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

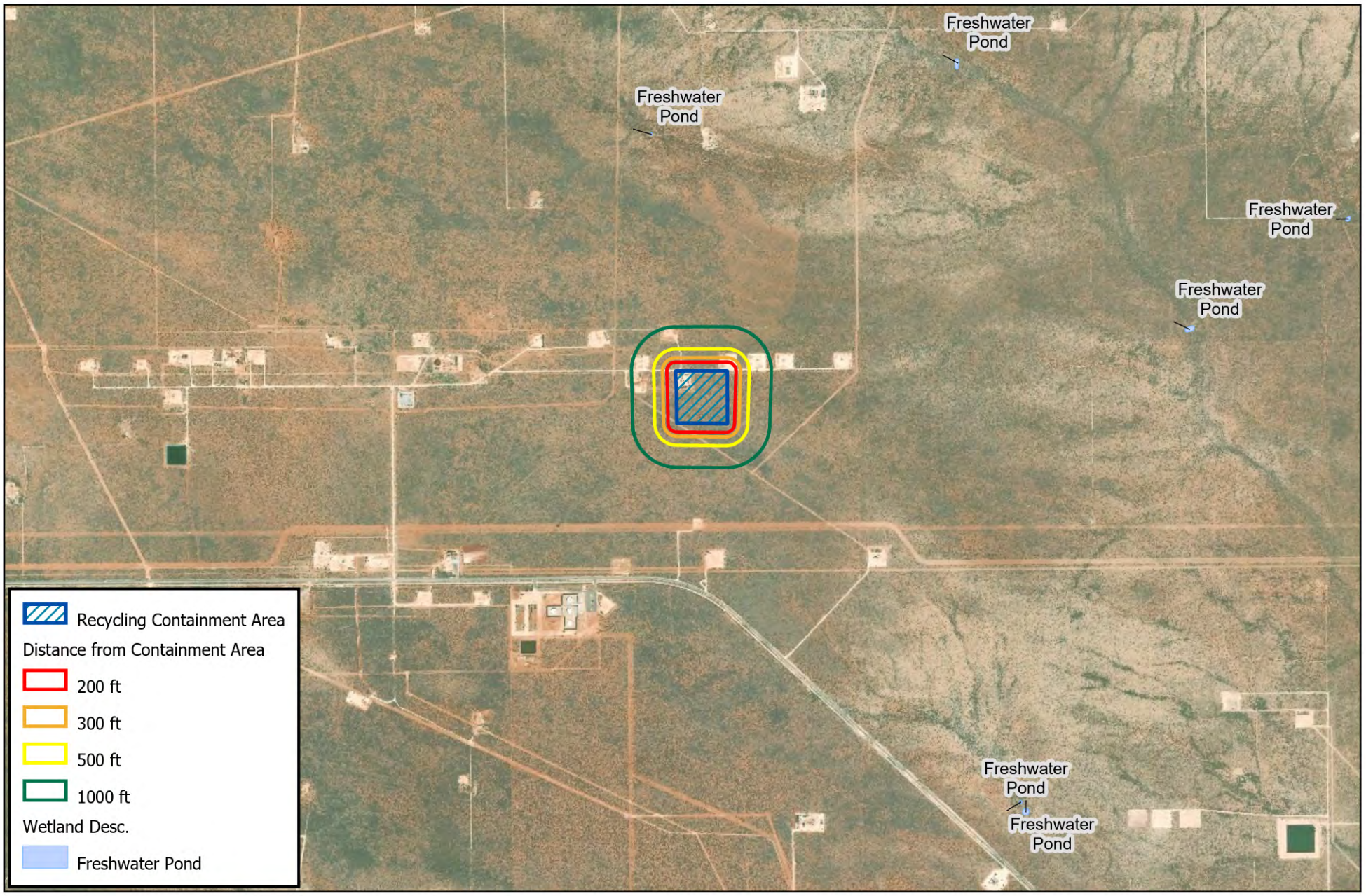
Nearby Structures

Plate 8

Solaris Water Midstream, LLC
Gamma Ridge Recycling Project

Oct. 14, 2019

M:\Solaris\Gamma Ridge Containment\arcGISproGammRidge\arcGISproGammRidge.aprx



N
W E
S

0 0.25 0.5 Miles

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

Nearby Wetlands

Plate 09

Solaris Water Midstream, LLC
Gamma Ridge Recycling Project

Oct. 14, 2019

DESIGN 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)**

Applicable mandates in Rule 34 are underlined. This plan addresses construction of the earthen containments.

Magrym Consulting, Inc. is providing the design of the containment and their preliminary plans are presented in this submission. Stamped "as built" drawings showing all design elements will be submitted to OCD prior to storage of produced water.

Dike Protection and Structural Integrity

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

Stockpile Topsoil

This containment is a conversion from a freshwater pond. At the time of closure, if requested by the owner, topsoil will be purchased for use as the final cover or fill at the time of closure.

Signage

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

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

Fencing

The operator will provide for a fence to enclose the recycling containment in a manner that deters unauthorized wildlife and human access. Solaris will employ a game fence rather than a four foot fence that has at least four strands evenly spaced in the interval between one foot and four feet above ground level. Because feral pigs, javelena 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[1]. 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. 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.

[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.

Netting and Protection of Wildlife

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

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

The avian protection plan includes the use of a Bird-X Mega Blaster Pro[2] 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

This containment is a conversion from a freshwater containment. The existing liner will be removed and the walls will be re-graded to ensure adherence to the rule as outlined below. The containment will have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. Geotextile may be placed under the liner when needed to reduce localized stress-strain or protuberances that otherwise may compromise the liner's integrity. Appendix A provide the stamped drawings for the containment will have 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 southeast corner.

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.

[2] https://bird-x.com/bird-products/electronic/sonic/mega-blaster-pro/

The primary (upper) liner is a geomembrane liner composed of an impervious, synthetic material that is resistant to ultraviolet light, petroleum hydrocarbons, salts and acidic and alkaline solutions. It is 60-mil HDPE. The secondary liner is 40-mil HDPE and is equivalent to 30-mil LLDPEr. Liner compatibility meets or exceeds a subsequent relevant publication to EPA SW -846 method 9090A.

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

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

At points of discharge into the lined earthen containment the pipe configuration effectively protects the liner from excessive hydrostatic force or mechanical damage during filling.

The design shows that at any point of discharge into or suction from the recycling containment, the liner is protected from excessive hydrostatic force or mechanical damage. External discharge or suction lines do not penetrate the liner.

Pumping from the containment to hydraulic fracturing operations is the responsibility of stimulation contractors. Typically, lines are permanently placed in the containment with floats attached to prevent damage to the liner system. The containment may be equipped with permanent HDPE stinger (supported by a sacrificial liner or geotextile) for withdrawal of fluid if the owner deems necessary during operations.

Leak Detection and Fluid Removal System Installation

The leak detection system, contains the following design elements

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

Operating and Maintenance Procedures

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

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 nearby oil and gas wells. During periods when water for E&P operations is not needed, produced water will discharge to one of the injection wells in the operator's SWD system. The containment will not be used for the disposal of produced water or other oilfield waste.

The operation of the containment is summarized below.

A. Via pipeline, produced water generated from nearby oil and gas wells is delivered to a treatment system located as indicated in the C-147.
B. 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 fresh water 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.
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.
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.

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.
8. The operator will maintain the containment free of miscellaneous solid waste or debris.
9. The operator will maintain at least three feet of freeboard for the containment and will use a free-standing staff gauge to allow easy determination of the required 3-foot of freeboard.
10. As described in the design/construction plan, the injection or withdrawal of fluids from the containment is accomplished through hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes.
11. The operator shall ensure that all gates associated with the fence are closed and locked when responsible personnel are not onsite.
12. The operator will maintain the fences in good repair.

Monitoring, Inspection, and Reporting Plan

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

Weekly inspections consist of:

- reading and recording the fluid height of staff gauges,
- recording any evidence that the pond surface shows visible oil,
- visually inspecting the containment's exposed liners, and
- checking the leak detection system for any evidence of a loss of integrity of the primary liner.

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

Monthly, the operator will:

A. Inspect diversion ditches and berms around the containment to check for erosion and collection of surface water run-on.
B. Inspect the leak detection system for evidence of damage or malfunction and monitor for leakage.
C. 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.
D. 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.
E. Record sources and disposition of all recycled water .

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

Freeboard and Overtopping Prevention Plan

The method of operation of the containment allows for maintaining freeboard with very few potential problems. When the capacity of the containment is reached (3-feet of freeboard), the discharge of produced water ceases and the produced water generated by nearby oil and gas wells is managed by an injection well(s).

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

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

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

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.

Example Inspection Log

Month **October**

Day	Weekly	Low Water	Activity	Monthly	Staff Gauge	Comments
1 - Wed						
2	x				8.75	Gate unlocked upon arrival - notified Jerry Smith, no birds in pit
3					10	
4					12	
5			x			Water transfer to frac - pipes are good
6			x			Water transfer to frac - pipes are good
7		x			2.5	No visible liner problems
8					3	
9	x				4	All OK - no oil on surface, no birds in pit
10					5	
11					5	
12					6	
13					7	
14					7.5	
15				x	8	No fluid in leak detection, outer berm and stormater diversion OK, H2S - no alarm,
16					9	
17					9	
18					9.5	
19	x				10	All OK
20					11	
21					12	
22			x			Water transfer to frac - no problems
23			x			Water transfer to frac - no problems
24		x			1.75	No visible liner problems
25					2.25	
26	x				3.75	High wind -liner is good, no birds
27					4.75	
28					5.5	
29					6.75	
30					7.75	
31					8.5	

Closure Plan – Lined Earthen Containments

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

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

The operator shall substantially restore the impacted surface area to

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

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

Excavation and Removal Closure Plan – Protocols and Procedures

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

1. The operator will remove all liquids from the containment and either:
    a. Dispose of the liquids in a division-approved facility, or
    b. Recycle, reuse or reclaim the water for reuse in drilling and stimulation.
2. The operator will close the recycling containment by first removing all fluids, contents and synthetic liners and transferring these materials to a division approved facility.
3. After the removal of the containment contents and liners, soils beneath the containment will be tested by collection of a five-point (minimum) composite sample which includes stained or wet soils, if any, and that sample shall be analyzed for the constituents listed in Table I of 19.15.34.14.
4. After review of the laboratory results
    a. If any contaminant concentration is higher than the parameters listed in Table I, additional delineation may be required and the operator must receive approval before proceeding with closure.
    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.

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. If requested by the owner, one foot of topsoil will be purchased to replace the site to 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.

Closure Documentation

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

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

APPENDIX OSE WELL LOGS

New Mexico Office of the State Engineer

Point of Diversion Summary

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters)

Well Tag	POD Number	Q64	Q16	Q4	Sec	Tws	Rng	X	Y
	C 02387			1	11	24S	34E	646513	3567613*

x

Driller License: **Driller Company:**

Driller Name: UNKNOWN

Drill Start Date:		**Drill Finish Date:**	12/31/1916	**Plug Date:**	
Log File Date:		**PCW Rcv Date:**		**Source:**	
Pump Type:		**Pipe Discharge Size:**		**Estimated Yield:**	3 GPM
Casing Size:	6.00	**Depth Well:**	62 feet	**Depth Water:**	40 feet

x

***UTM location was derived from PLSS - see Help**

10/14/19 2:17 PM POINT OF DIVERSION SUMMARY

APPENDIX GEOTECHNICAL BORINGS

Logger:	CSC	**Client:** **Solaris**	**Well ID:**
Driller:	Ready Drill, LLC		BH-1
Drilling Method:	Air Rotary	**Project Name:** **Gamma Ridge**	
Start Date:	9/5/2019		
End Date:	9/5/2019	**Location:** **32.22351°, -103.443727°**	
		Lat/Long, TRS UL	

Depth (feet)	Description	Lithology	Comments	PID (ppm)	Chloride Field	Chloride Lab	Borehole Completion	Depth (feet)
0.0	Tan Silty Sand (Caliche)		surface elevation ~3504' per topo map					0.0
1.0								1.0
2.0								2.0
3.0								3.0
4.0								4.0
5.0								5.0
6.0			approximate depth of bottom of containment					6.0
7.0								7.0
8.0								8.0
9.0								9.0
10.0								10.0
11.0								11.0
12.0								12.0
13.0								13.0
14.0								14.0
15.0								15.0
16.0								16.0
17.0								17.0
18.0								18.0
19.0								19.0
20.0	Reddish Tan Sand							20.0
21.0								21.0
22.0								22.0
23.0								23.0
24.0								24.0
25.0								25.0
26.0								26.0
27.0								27.0
28.0								28.0
29.0								29.0
30.0								30.0
31.0								31.0
32.0								32.0
33.0								33.0
34.0								34.0
35.0								35.0
36.0								36.0
37.0								37.0
38.0								38.0
39.0								39.0
40.0								40.0
41.0								41.0
42.0								42.0
43.0								43.0
44.0								44.0
45.0								45.0
46.0								46.0
47.0								47.0
48.0								48.0
49.0								49.0
50.0	Tan Silty Sand							50.0
51.0								51.0
52.0								52.0
53.0								53.0
54.0								54.0
55.0								55.0

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW
Suite F-142
Albuquerque, NM 87104
505-266-5004

Solaris Water Midstream

Boring Log

Plate # BH-1a

September 2019

Logger:	CSC	**Client:** **Solaris**	**Well ID:**
Driller:	**Ready Drill, LLC**		BH-1
Drilling Method:	Air Rotary	**Project Name:** **Gamma Ridge**	
Start Date:	9/5/2019		
End Date:	9/5/2019	**Location:** **32.22351°, -103.443727°**	
		Lat/Long, TRS UL	

Depth (feet)	Description	Lithology	Comments	PID (ppm)	Chloride Field	Chloride Lab	Borehole Completion	Depth (feet)
56.0	Gray Sandy Clay							56.0
57.0								57.0
58.0								58.0
59.0								59.0
60.0	Reddish Tan Sandy Clay							60.0
61.0								61.0
62.0								62.0
63.0			water encountered @63'				▽	63.0
64.0								64.0
65.0			TD ~3439'					65.0
66.0								66.0
67.0								67.0
68.0								68.0
69.0								69.0
70.0								70.0
71.0								71.0
72.0								72.0
73.0								73.0
74.0								74.0
75.0								75.0
76.0								76.0
77.0								77.0
78.0								78.0
79.0								79.0
80.0								80.0
81.0								81.0
82.0								82.0
83.0								83.0
84.0								84.0
85.0								85.0
86.0								86.0
87.0								87.0
88.0								88.0
89.0								89.0
90.0								90.0
91.0								91.0
92.0								92.0
93.0								93.0
94.0								94.0
95.0								95.0
96.0								96.0
97.0								97.0
98.0								98.0
99.0								99.0
100.0								100.0
101.0								101.0
102.0								102.0
103.0								103.0
104.0								104.0
105.0								105.0
106.0								106.0
107.0								107.0
108.0								108.0
109.0								109.0
110.0								110.0
111.0								111.0

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW
Suite F-142
Albuquerque, NM 87104
505-266-5004

Solaris Water Midstream

Boring Log

Plate # BH-1b

September 2019