FINAL
SITE SELECTION REPORT
POND OPTIMIZATION STUDY 2
FOR PARADOX VALLEY UNIT EVAPORATION PONDS

Submitted to:
Wastren Advantage, Inc.
1571 Shyville Road
Piketon, Ohio 45661

Submitted by:
Amec Foster Wheeler Environment & Infrastructure, Inc.
San Diego, California

August 2016
Amec Foster Wheeler Project No. 1655500023

August 11, 2016
Amec Foster Wheeler Project 1655500023

Dave Sablosky
Wastren Advantage, Inc.
Project Manager
1571 Shyville Road
Piketon, Ohio 45661

Re: Paradox Valley Unit Salinity Control Project: Final Pond Optimization Study Paradox Valley, Colorado

Dear Mr. Sablosky:

This report fulfills the deliverable for the Paradox Valley Unit Evaporation Ponds Study 2: Pond Optimization Final Pond Selection Report. This is a final report, and has responded to all comments received from Reclamation.

If you have any questions or concerns regarding this report, please contact Carla Scheidlinger at 858-300-4311 or by email at carla.scheidlinger@amecfw.com.

Respectfully submitted,

Amec Foster Wheeler Environment & Infrastructure, Inc.

Carla Scheidlinger
Project Manager

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ACRONYMS AND ABBREVIATIONS

af	acre-feet
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
BLM	Bureau of Land Management
cuft	cubic feet
ERA	Ecological Risk Analysis
gpm	gallons per minute
H_2S	Hydrogen sulfide
in	inch
lb	pound
NaCl	sodium chloride
NRCS	Natural Resources Conservation Service
PVU	Paradox Valley Unit
Reclamation	United States Bureau of Reclamation
USGS	United States Geological Service
WAI	Wastren Advantage, Inc.
yr	year

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EXECUTIVE SUMMARY

This report describes the process that was used by the Amec Foster Wheeler team, in collaboration with staff from United States Bureau of Reclamation (Reclamation), to select the three sites to be considered for the development of evaporation ponds for disposal of brine produced by the Paradox Valley Unit (PVU). An initial paper study was conducted that resulted in the preliminary identification of eight sites for evaluation. When the Amec Foster Wheeler design team convened at the PVU site with staff from Reclamation and Wastren Advantage, Inc. seven of those proposed sites were eliminated, and seven more were proposed. The team visited the nine sites, and developed a ranking matrix for describing and selecting the most appropriate sites for further consideration. After collecting ranking information and opinions from all members of the site visit team, Amec Foster Wheeler selected three sites for further evaluation. These sites are NW Paradox, BLM, and Landfill. The ranking criteria for each of these three sites is described and discussed. The rationale for selecting these sites is presented, and additional data needs are described.

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1.0 INTRODUCTION

1.1 Background and Goals

The Bureau of Reclamation's (Reclamation) Paradox Valley Unit (PVU) is a component of the Colorado River Basin Salinity Control Program, a multi-works program to control the salinity of Colorado River water delivered to users in the United States and Mexico. The PVU currently intercepts 200 gallons per minute (gpm) of 260,000 Mg/l brine and diverts it to a 16,000' deep injection well for disposal. The injection rate has been curtailed during the 20 year life of the well due mainly to induced seismic activity associated with the injection process. At the current rate, Reclamation prevents approximately 100,000 tons per year from entering the Colorado River system. The current collection well field is capable of producing 400 gpm. However salinity control benefits may decrease when pumping in excess of 300 gpm. Therefore, for purposes of this study, the goal is to control up to 170,000 tons per year, or 300 gpm. Due to current and future limitations of the injection well, and long term salinity control considerations at Paradox, Reclamation is currently evaluating alternative methods of brine disposal of this produced brine. One of the long-term strategies being considered for brine disposal is diverting the brine to an evaporation pond or series of ponds. The Pond Optimization Study investigates site location, sizing, layout and configuration strategies, and operational strategies, for an evaporation pond or ponds. This report presents the strategy for pond site selection.

Amec Foster Wheeler is conducting studies for three other aspects of the evaporation ponds. These studies include the management of hydrogen sulfide (H_2S), the nature and quantity of byproducts that the ponds will produce, and the ecological risk associated with the development and operation of the ponds. The results of these studies are integrated with the pond optimization study. This report is to detail the process and results of site selection for such ponds. The pond sites selected will be evaluated for site-specific details that will determine their ultimate suitability for construction of the proposed evaporation ponds. Future reports will detail pond design based on salt modeling and on site characteristics for the three locations selected in this report, and will detail operational strategies to produce the desired by-products.

The end goal for all of these studies is to provide Reclamation with the information needed to determine if implementing evaporation ponds will provide an economically viable and environmentally suitable solution for the disposal of the brine recovered by the PVU.

1.2 Location

The PVU is located near Bedrock, Colorado in the Paradox Valley of Montrose County, about 10 miles east of the Colorado-Utah state line. (Figure 1). The well sites are located adjacent to the Dolores River, which flows from south to north through the valley. The elevation of the well sites is about 5000 feet.

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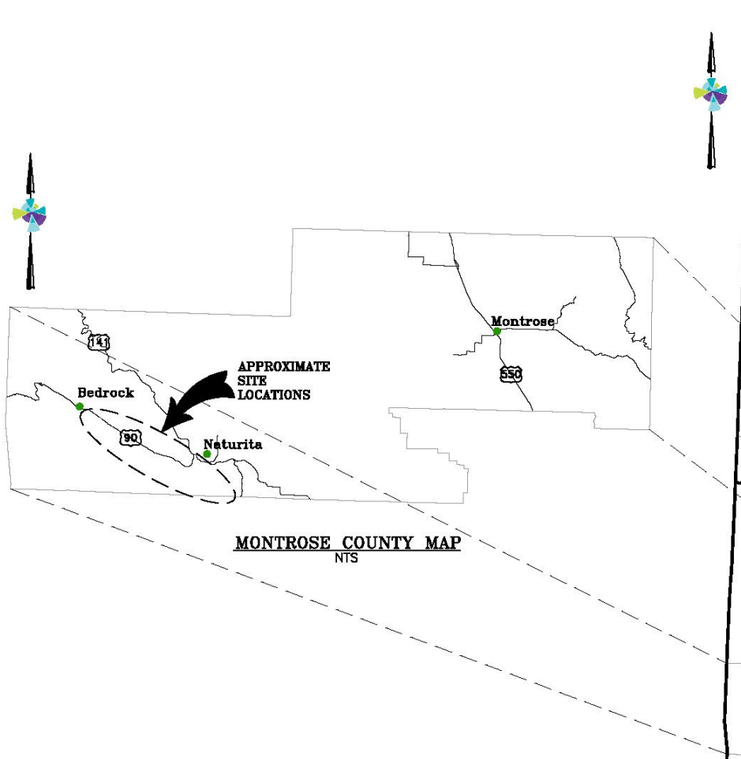
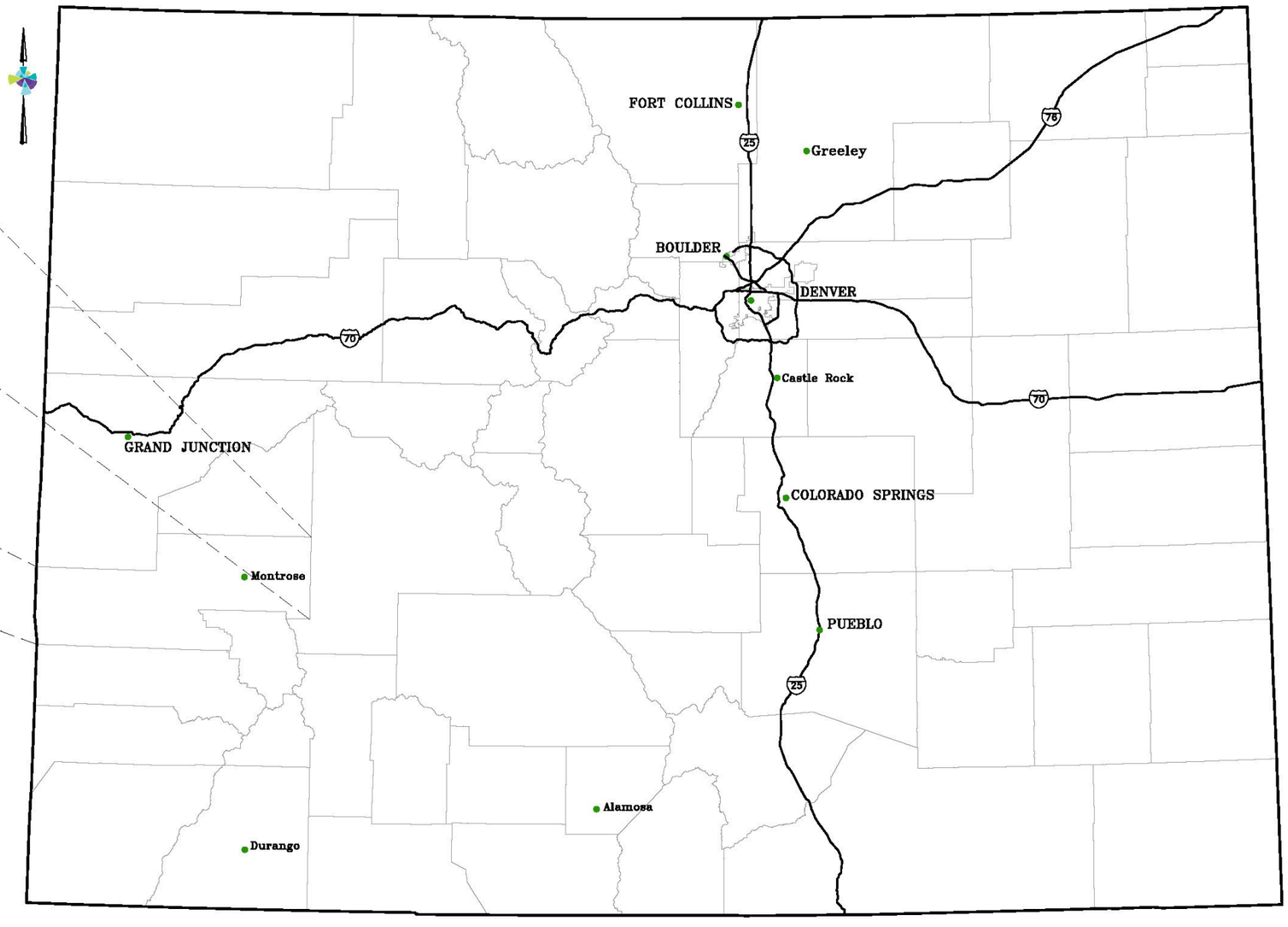


MONTROSE COUNTY MAP
NTS



COLORADO STATE MAP
NTS

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DRN BY: MGC DSN BY: RBR CHK BY: ALM APR BY: ALM	PROJECT: PARADOX VALLEY UNIT EVAPORATION PONDS TITLE: OVERALL MAP	PROJECT No.: 1655500023 FIGURE No.: 1 REV: 0

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2.0 SITE SELECTION PROCESS

The site selection process required the consideration of a number of assumptions regarding site characteristics that would contribute to a suitable site for an evaporation pond complex. These assumptions produced a set of criteria that were used to select and then to evaluate each proposed site. These assumptions included the need for brine characterization calculations that in turn allow for calculation of the size and relative configuration of proposed evaporation ponds.

2.1 Assumptions

The assumptions about the ponds were developed by the salt chemistry team and by the engineering team. They are grouped into two categories: pond sizes and configuration, and pond construction and operation.

2.1.1 Pond sizes and configuration assumptions

Determination of pond size and configuration is based on the flow rate of the brine into the ponds, the climate data of the site taking into account evaporation rates of brine at different concentrations, rainfall patterns, and the way that salt is precipitated as the brine evaporates. Models are under development to use all of this information to produce a refined description of an optimal pond design, and these models will be finalized and described in a future report (Design Strategy Report). Operational considerations will also be refined and described in a future report (Operational Strategy Report). Based upon preliminary sizing requirements, the total size of the evaporation pond complex will be about 400 acres. The evaporation pond complex will be composed of a surge pond, a concentrator pond, an array of crystallizer ponds, and a bittern pond (if needed).

2.1.2 Pond construction and operation assumptions:

There are some assumptions regarding how the ponds will be built and operated that affected site selection:

1. Site slopes greater than 4% are excessive, and would cause the construction costs to be excessive.
2. The ponds will be lined. The soils of the region are not suitable for retaining brine and having minimal seepage, so lining will be required. Seepage of the concentrated brines into the soils that support natural vegetation or into agricultural lands would be an unacceptable environmental impact of the project, so a liner is assumed.
3. A source of fresh water must be available to construct a mitigation pond for waterfowl of about 6 acres. A freshwater pond was the preferred strategy articulated in the Ecological Risk Analysis (ERA) report for mitigating impacts to waterfowl. Freshwater is required as well as to provide a feed to prevent clogging of pipes during brine transfer between ponds.
4. The site must be accessible 12 months of the year to allow for operation, maintenance, and removal of solid salt.

5. Freezing of the ponds will not be an issue, as none of the brines in the pan tests froze during the winter at the PVU facility.
6. Solid salt will be removed at intervals of 3-4 years from each of the crystallizer ponds. A deposition rate of about 2.8 inches per year was used for this determination. Pond depth in the crystallizers will accommodate up to 4 years (about 11.2 inches) of solid salt before removal. With 4 ponds operated in parallel, there would be one pond with enough salt to harvest each year. Each individual pond would be harvested every 4 years. In order to minimize storage needs, removal will be to a storage facility, or directly to a customer.

2.1.3 Pond Footprint and Operations Conclusions

This data allowed our salt team to develop size and configuration criteria based on the nature of the brine and of its interaction with the local climate and environment. The team was thereby able to arrive at a total footprint for the evaporation ponds, which in turn allowed for the evaluation of sites that could be suitable for the development of a pond complex of the necessary size. The required surface area is estimated at 325 - 335 acres. With berms and other associated non-evaporation infrastructure, including mitigation ponds suggested by the ERA, the pond site area should not be less than 350 acres.

The operational criteria also figured into the pond selection process. Specifically, slope, lining, and access considerations made a lot of difference in assumptions about where the ponds could be located based on how they could be built and operated. Availability of fresh water for operations and the requirement to harvest salt on a winter calendar could affect site selection.

2.2 Pond Site Selection Criteria

The size, configuration, construction, and operation assumptions led to the development of site selection criteria. These criteria included the following:

1. Slope. The ponds will ideally be large; so to minimize the amount of berm construction, the site needs to have a shallow slope. Sites proposed generally had slopes less than 4%. Over the areas considered for a single site, some portion of the area could have a slope of greater than 4%.
2. Proximity to well facility. Brine from the wells will have to be piped to the pond site, at a calculable cost. No sites were selected that were farther away than 30 miles from the production well site.
3. Topography. Sites to the north and south from the production well site were not considered due to the steep canyons in both of these directions. In addition, the presence of distinct drainages upslope of, or on, a proposed pond site presents pond protection and construction issues. Therefore, sites with significant drainage issues were not considered.
4. Elevation. Brine will need to be piped to the sites from the production well location. Sites substantially higher than the production well location would incur higher pumping costs.
5. Distance to storage. Solid salt will need to be removed from the pond site. Even if a market is identified, markets are not predictable from year to year, so long-term storage disposal

opportunity is a requirement. Preliminary discussions with the owner and operator of the Broad Canyon Landfill indicate that this landfill, with its permitted expansion area, has sufficient capacity to accept the amount of solid salt expected to be produced over a 50 year period by the project.

6. Potential for development of an adjacent storage facility owned by Reclamation and operated by a professional landfill operator. Such an arrangement minimizes hauling costs. Sites with a potential storage site availability of at least 80 acres were scored higher.
7. Land ownership. Reclamation would acquire private land only from willing sellers. There is no guarantee that public (Bureau of Land Management, BLM) land will be available for use, although BLM sites were considered. No evaluation was made in the selection criteria to assess the ultimate availability of the land for the project. Land ownership was presented in the matrix as an informational item, but was not considered when sites were ranked.
8. Availability of fresh water. As noted above in Section 2.1.2, fresh water may be required for waterfowl mitigation habitat as well as for operational needs. Fresh water can be acquired from a well, or by pumping from a surface water source. For example, if a 6-acre mitigation pond is required, approximately 25 gpm would be required to balance the evaporation rate from the pond. Additional fresh water would be required to transfer saturated brine from one pond to another. Water rights could be required to obtain a suitable amount of fresh water. Reclamation has water rights in the Dolores River that could be used to provide this water.
9. Road improvement needs. The requirement to upgrade roads in order to access the site for operation and/or solid salt transfer would add cost to the project.
10. Availability of electricity. Electricity for lighting, and potentially for pump operation, will be required for operation and maintenance. Electricity needs will be evaluated in the Pond Design Strategy and Operational Strategy reports.
11. Proximity to homes. The ponds are not generally seen as being desirable neighbors. Being “too close” to homes was a subjective evaluation, but most members of the scoring team agreed on what was “too close”.
12. Site configuration. A landscape configuration that could require that the ponds be divided from each other, as across a drainage, a road, or any other feature would add cost.
13. Soils data. Data for the soils was ultimately not used as a selection criterion, as it had been determined, based on vegetation, that none of the soils in the area was suitable for pond operation without lining. If the ponds are lined, the soil type matters less. When potential site selections have been narrowed down to the sites that will be examined in detail, soil evaluations will be conducted for engineering purposes.

These criteria were considered in general terms as potential sites were examined. The criteria were further evaluated during the selection process, and were applied in the selection matrix as described in Section 2.3.3.

2.3 Pond Selection Process

2.3.1 Paper and Map Study

The pond optimization team (Scheidlinger, Meduna, Pyles, and Chesnut) examined maps, including those on Google Earth, United States Geological Survey (USGS) topographic maps, Natural Resources Conservation Service (NRCS) online soils maps, and the land ownership maps provided online by Montrose County. Each of these maps allowed for a preliminary list of sites to be identified for a potential field visit. Information compiled from these sources allowed for the evaluation of location, elevation, road distance from Reclamation's PVU office to the site, road distance from the proposed site to the Broad Canyon Landfill, direct distance from the brine production well site to the proposed site that could be used for a pipeline, topography, a rough evaluation of slope, and land ownership. As noted above, soils were evaluated generally, and were not considered in detail after preliminary evaluation resulted in the decision to line the ponds. When sites are selected for further design consideration, soils at the selected sites will be evaluated for construction and geotechnical considerations.

In addition, this team produced evaluations based on evaporation and salt chemistry that allowed for the calculation of the required footprint for the ponds and for an associated storage facility. This allowed us to reject any sites that did not have sufficient area for at least the pond system.

Prior to a site visit, a total of eight potential sites were identified and mapped, and the maps were circulated to the members of the site review group.

2.3.2 Field Trip

On March 22-23, 2016 the pond site review team visited the Paradox Valley for the purpose of meeting with WAI and Reclamation staff to conduct site visits to potential pond sites. The participants in this meeting and the field visits were:

- Reclamation: Lesley McWhirter, Brent Uilenberg, Frederick Busch and Andy Nicholas
- WAI: John Adams
- Amec Foster Wheeler: Carla Scheidlinger, John Chesnut, Andrea Meduna, Tim Fischer, Emmet Curtis, and John Pyles (consultant)

Originally, eight sites were identified (as indicated in Section 2.3.1) for consideration. The general location of these sites are shown on the map in Figure 2. Prior to the field trip, six of the sites were eliminated from further consideration. These sites, and the reason for their exclusion, were:

- Paradox Farms, west of the Dolores River, north of the bridge. This site was too small, and it is in the flood plain of the Dolores River.
- Dry Creek Basin, high elevation bench to the east of the Reclamation office and south of Highway 90. This site is in protected sage grouse habitat, and is too remote to make it logistically feasible.

- Davis Mesa high elevation bench to east of Reclamation office. This site is too difficult to access via dirt roads, and is logistically infeasible.
- Airport, west of Naturita airport. This site was subjectively judged to be too close to homes.
- Paradox Townsite, northwest Paradox Valley. This site was subjectively judged to be too close to homes.
- Second Park, east of 141 north of Naturita. This site is too far away, and was subjectively judged to be too close to homes.

The two sites remaining were the Central and Hamilton Creek sites. During the field visit, seven new sites were identified by the team. These nine sites were visited during the field visit, and are shown in blue in Figure 3.

2.3.3 Selection Matrix

Following the field trip, a matrix of all the sites still under consideration was prepared so that all participants could rank the sites. The matrix is shown as Table 1. Additional information collected in the matrix is shown in Appendix A.

The Project Manager from Amec Foster Wheeler made the first effort at selecting two sites from this matrix that merit further and more detailed analysis for the purpose of inclusion into the Reclamation EIS. Reclamation also provided input to the selection process. Final selections and ranking are described in the following section.

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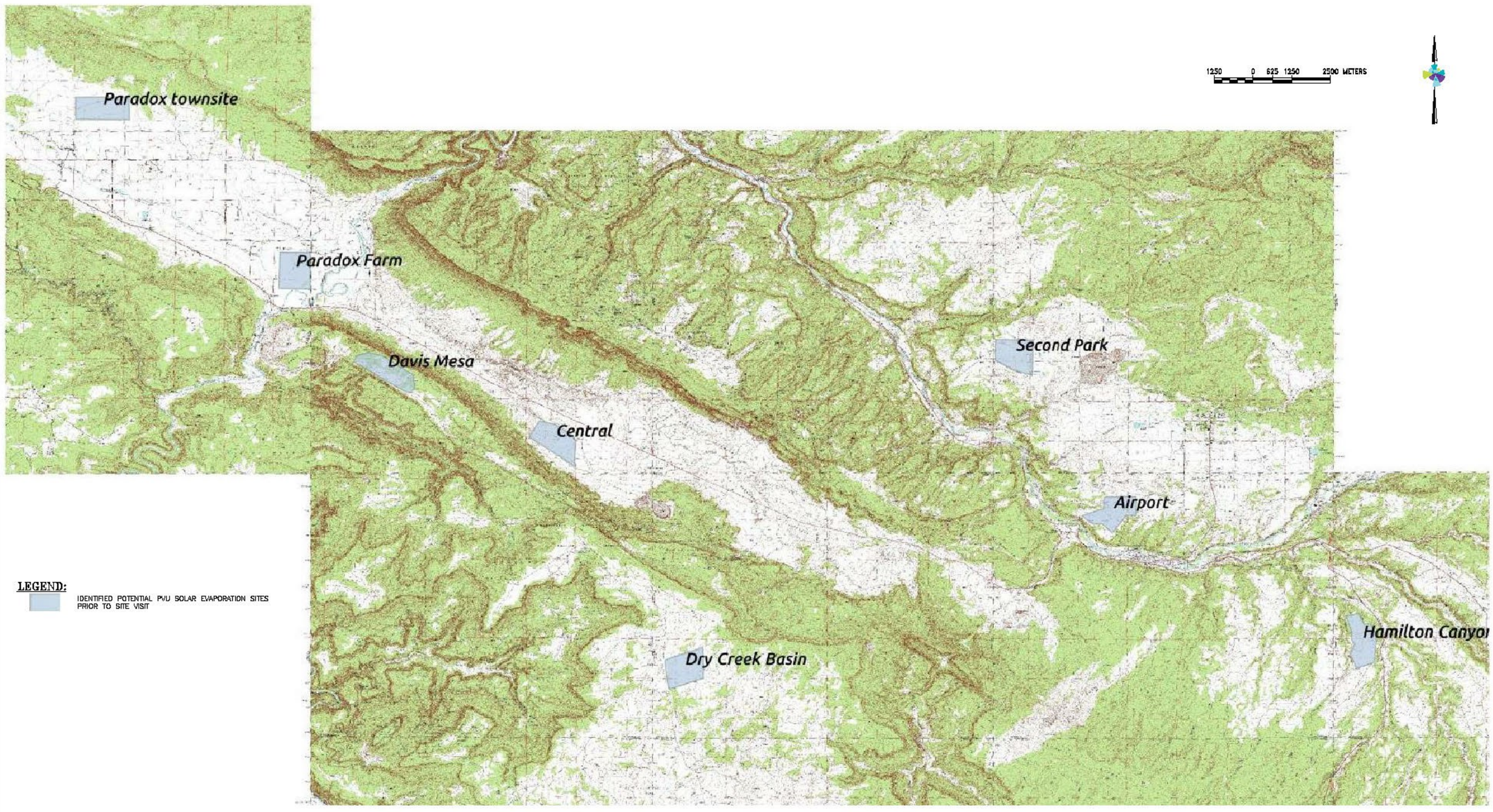

LEGEND:

IDENTIFIED POTENTIAL PVU SOLAR EVAPORATION SITES PRIOR TO SITE VISIT

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1250 0 625 1250 2500 METERS

Paradox NW

Paradox SW

Paradox East

BLM b

Central

BLM a

Thunderbolt

Divide

Hamilton Canyo

Landfill

LEGEND:

VISITED POTENTIAL PVU SOLAR EVAPORATION SITES

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FIGURE No.	3
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Table 1.
Potential Pond Rankings, Paradox Valley

POND MAP NAME	LOCATION	LAT. LONG. (COORDS)	APPROX. SITE ELEV. (feet)	ELEV. CHANGE FROM INJECT. WELL TO SITE (4,970) (vertical feet)	ROAD DISTANCE FROM INJECT. WELL TO SITE (miles)	PIPELINE DISTANCE FROM INJECT. WELL TO SITE ALONG HWY 90 & CR GG25 (miles)	ROAD DISTANCE TO BROAD CANYON LANDFILL (miles)	LANDOWNER(S)	PIPELINE COST (Today's $)	NUMBER OF TRIPS PER TRUCK PER DAY TRUCKS NEEDED	NUMBER OF TRUCKS (rounded to whole truck)	FUEL COST TO HAUL TO LANDFILL COST PER TRUCK (Over 50 years)	TOTAL COST OF FUEL (Over 50 Years)	ONSITE SALT STORAGE FACILITY POSSIBLE?
Central	South of Hwy 90, middle of valley	38.15'42"N 108°47'06"W	5,428	458	8	8	25	Private	$5,913,600	(11 trips/truck/day) 5 trucks needed	5	$4,242,450	$21,212,250	Yes
Hamilton Canyon	Off Hwy 141, near existing Broad Canyon Landfill	38°10'31"N 108°29'20"W	6,000	1,030	30	27	2	Private	$19,958,400	(22 trips/truck/day) 2.5 trucks needed	3	$424,250	$1,272,750	Yes Use Broad Canyon or construct one
BLM	North of Highway 90, middle of valley	38°16'16"N 108°45'52"W	5,392	422	8	8	25	BLM	$5,913,600	(12 trips/truck/day) 4.6 trucks needed	5	$4,242,450	$21,212,250	Yes
Landfill	Adjacent to and east of Broad Canyon Landfill property	38°09'32"N 108°31'31"W	6,256	1,286	32	25	0.5	Private and BLM	$18,480,000	(24 trips/truck/day) 2.3 trucks needed	3	$141,450.00 or Conveyor System ?	$424,350	Not needed
Southwest Paradox	West Paradox: V Rd. and 900	38°20'49"N 108°52'32"W	5,017	47	5	4	35	Private	$2,956,800	(11 trips/truck/day) 5.5 trucks needed	6	$5,939,400	$35,636,400	Yes
Northwest Paradox	W. Paradox (northeast of Southwest Paradox)	38°21'40"N 108°53'58"W	5172	202	6	4	36	Private and BLM	$2,956,800	(11 trips/truck/day) 5.5 trucks needed	6	$6,151,500	$36,909,000	Yes
Paradox East	East of river, South of BOR facility	38°19'05"N 108°51'01"W	5,021	51	3.2	4	20.8	Private and BLM	$2,956,800	(11 trips/truck/day) 3.4 trucks needed	4	$4,819,500	$19,278,000	No
Divide	Divide (head of Paradox East)	38°13'16"N 108°39'42"W	5,802	832	13.5	13.3	10.5	BLM	$9,831,360	(17 trips/truck/day) 2.2 trucks needed	3	$1,606,500	$4,819,500	Yes
Thunderbolt	North of Thunderbolt Mine	38°14'11"N 108°42'29"W	5,617	647	11	11	13	Private	$8,131,200	(16 trips/truck/day) 2.3 trucks needed	3	$2,008,500	$6,025,500	Yes
Paradox Farm	Immediately N of Hwy 90 W of bridge		4,955	-15	3.2	3,2	22	Private						
Dry Creek Basin	S of Hwy 90, W of mine		6,950	1,980	17.5	12.2	NA	BLM						
Davis Mesa	W of injection site		6,200	1,230	17	1	NA	BLM						
Airport	W of Naturita airport		5,800	830	27	16	NA	BLM and Montrose County						
Paradox Townsite	NE of pumping station		5,400	430	11	11	NA	Private						
Second Park	E of 141 N of Naturita		5,750	780	33	33	NA	Private						

Notes:
Did not visit; considered **Flood Plain Definition: A flat area where flood waters would collect and remain. Not a water channel.**

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Table 1.
Potential Pond Rankings, Paradox Valley (continued)

POND MAP NAME	FRESH WATER AVAILABLE?	FRESH WATER POND POTENTIAL?	LOCATED IN THE FLOODPLAIN	CONSTRUCTION COSTS	DRAINAGE PROTECTION ISSUES	NEED NEW ROADS OR IMPROVE EXITING ROADS	POWER ACCESS?	NEAR HOMES?	RELOCATE UTILITIES?	LOGISTICS (ROAD DISTANCE)	CONTIGOUS SITE?	PREVAILING WIND ISSUE?	Fischer OVERALL SITE RANK	Pyles OVERALL SITE RANK	Nicholas OVERALL SITE RANK	Chesnut OVERALL SITE RANK	Meduna OVERALL SITE RANK	Scheidlinger OVERALL SITE RANK	Busch/Norman OVERALL SITE RANK
Central	Piped in	yes?	No	High; drainages, slope	High	Minimum	Nearby	No.	No	Moderate	Yes	Moderate	Medium	Low	Medium	Medium	Medium to High	Medium	Medium
Hamilton Canyon	Piped in	yes	No	Low to medium	Low	Minimum	???	No	No	Difficult	Yes	Low	Medium	Medium		Low	Low	Low	Medium
BLM	Piped in	yes	No	Medium to high	Medium	Major	??	No	No	Moderate to Difficult	Yes	Low	Medium-High	Low		Low	Medium to High	Low	Medium
Landfill	Piped in, long distance	yes	No	Low to medium	Low to medium	Minimum	None	No	No	Difficult	Yes	Low	Medium	Medium	Medium	Low	Low	Medium to High	Medium
Southwest Paradox	Piped in, close	yes	No	Low	Low	Minimum	Nearby	No	No	Easy	No	Moderate	High	Medium to High	High	High	High	High	High
Northwest Paradox	Piped in, very close	yes	No	Low	Low	Minimum	Nearby	No	No	Easy	Yes	Moderate	High	High	High	High	High	High	High
Paradox East	Piped in, very close	no?	Some areas	Medium; site complexity	Medium	Minimum	Nearby	Yes	Possible power & water	Easy	Yes	High	Low	Low to Medium	High	Low	High	Low	Low
Divide	Piped in	yes	No	Medium to high	Medium	Medium to major	Yes	No	Possible natural gas	Moderate to Difficult	Yes	Moderate	Low	Low to Medium	Low	Low	Low	Low	Low
Thunderbolt	Piped in	yes	Yes	Low to medium	Medium	Minimium	Yes	Yes	No	Moderate	Yes	Moderate	Low	Medium	Low	Medium to High	Medium	Medium	Low
Paradox Farm													Not Considered						
Dry Creek Basin													Not Considered						
Davis Mesa													Not Considered						
Airport													Not Considered						
Paradox Townsite													Not Considered						
Second Park													Not Considered						

Notes:
Did not visit; considered off table **Flood Plain Definition: A flat area where flood waters would collect and remain. Not a water channel.**

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3.0 SITE SELECTION RESULTS

The sites recommended by Amec Foster Wheeler and selected by Reclamation for detailed consideration were "Paradox NW" site as the highest ranked site, the BLM site as second ranked, and the “Landfill” site as the third site ranked. These three sites will receive a more detailed evaluation required for the EIS. These sites are shown together in Figure 4, and separately in Figures 5, 6, and 7. Design elements such as netting will be addressed in the future Design Strategy Report.

3.1 Paradox NW

Paradox Northwest received the highest rank from virtually all individuals involved in the scoring. The site is shown in Figure 5 on a United States Geological Survey (USGS) map. Included on this map is an alternative site nearby, Paradox SW which could be substituted if there are circumstances discovered in the future that suggest that it would be preferable. A summary of the selection criteria for this site follows:

- Slope. The slope at this site is approximately 1.6%, lower than the conceptual threshold of 4%.
- Proximity to brine well facility. This site is approximately 3.3 miles from the collection wells in a direct line; about 7 miles by existing roads and bridge.
- Topography. There are no obvious topographic obstacles, either on-site (such as deep gullies) or offsite (such as washes or drainages feeding onto the site) that would complicate construction.
- Elevation. The difference in elevation from the brine production facility to the highest point of the proposed parcel is approximately 230 feet.
- Distance to storage. It is proposed for this site to develop a dedicated storage facility adjacent to the pond complex. If this is not feasible from a permitting standpoint, the distance to the Broad Canyon Landfill is about 32 miles.
- Potential for development of an adjacent storage facility owned by Reclamation and operated by a professional landfill operator. This potential is being evaluated by the Byproducts Disposal study. It is assumed that such a facility would have to be lined.
- Land ownership and land use. The land is privately owned by an individual and/or entity. The land is undeveloped scrubland with native vegetation, and is used for dryland grazing.
- Availability of fresh water. This site is approximately 3 miles from the Dolores River, from which Reclamation has water rights.
- Road improvement needs. This site is accessed by well-maintained dirt roads. Some improvement might be necessary for heavy equipment operation.
- Availability of electricity. Reclamation staff indicated that electricity is nearby.
- Proximity to homes. There is one home across the county road from the southwest corner.

- Site configuration. There would be no need to break up a pond configuration at this site; all ponds could be constructed in a continuous fashion.
- Soils data. Detailed soils data has not been acquired for this site. On the Natural Resources Conservation Service (NRCS) map, it is shown as Paradox fine sandy loam with 1-4% slope.

3.2 BLM Site

BLM site received a preliminary high rank from virtually all individuals involved in the scoring. The site is shown in Figure 6 on a USGS map. Included on this map is an alternative site nearby, Central, which could be substituted if there are circumstances discovered in the future that suggest that it would be preferable. A summary of the selection criteria for this site follows:

- Slope. The slope at this site is approximately 3.0%, lower than the conceptual threshold of 4%.
- Proximity to brine well facility. This site is approximately 8 miles from the well collection wells along Highway 90.
- Topography. There are no obvious topographic obstacles, either on-site (such as deep gullies) or offsite (such as drainages feeding onto the site) that would complicate construction.
- Elevation. The difference in elevation from the brine production facility to the highest point of the proposed parcel is approximately 420 feet.
- Distance to storage. It is proposed for this site to develop a dedicated storage facility adjacent to the pond complex. If this is not feasible from a permitting standpoint, the distance to the Broad Canyon Landfill is about 25 miles.
- Potential for development of an adjacent storage facility owned by Reclamation and operated by a professional landfill operator. There is potential for development of such a facility at this site. This potential is being evaluated in the Byproducts Disposal study. It is assumed that the storage site would have to be lined.
- Land ownership and land use. The land is entirely on BLM land. The land is undeveloped scrubland with native vegetation, and is used for dryland grazing.
- Availability of fresh water. This site is approximately 8 miles from the Dolores River, from which Reclamation has water rights.
- Road improvement needs. This site is accessed by Highway 90, which is paved. It is assumed that access to this site could also be developed with dirt roads to avoid hauling salt on pavement. Some improvement might be necessary for heavy equipment operation.
- Availability of electricity. Reclamation staff indicated that electricity is nearby.
- Proximity to homes. This site is not near to any homes, although it would be visible from Highway 90.

- Site configuration. The site could be orientated to avoid drainages to the north, and would not present any obstacles for pond development.
- Soils data. Detailed soils data has not been acquired for this site. On the Natural Resources Conservation Service (NRCS) map, it is shown as several types of fine sandy loams.

3.3 Landfill Site

Landfill site received mixed rankings from the individuals involved in the scoring. The site is shown in Figure 7 on a USGS map. Included on this map is an alternative site nearby, Hamilton Canyon, which could be substituted if there are circumstances discovered in the future that suggest that it would be preferable. Its advantages were its proximity to the Broad Canyon Landfill, such that removal of salt could be accomplished by a conveyor system instead of by trucking; and its remoteness from any homes or communities. Disadvantages are distance from the brine well site and potential issues with slope and soils. A summary of the selection criteria for this site follows:

- Slope. The slope at this site is approximately 2.6%, lower than the conceptual threshold of 4%.
- Proximity to brine well facility. This site is approximately 22 miles from the well collection wells along Highway 90.
- Topography. There are several obvious topographic obstacles, some on-site (such as a deep drainage) or offsite (such as drainages feeding into the site) that would complicate construction.
- Elevation. The difference in elevation from the brine production facility to the highest point of the proposed parcel is approximately 1289 feet.
- Distance to storage. This site is immediately adjacent to the Broad Canyon Landfill, with the longest distance from the edge of the property being about 0.5 mile. Removal of salt from the ponds to the landfill would be accomplished by conveyor belt.
- Potential for development of an adjacent storage facility owned by Reclamation and operated by a professional landfill operator. Due to the proximity to the existing Broad Canyon Landfill, this would not be necessary.
- Land ownership and land use. The land is privately owned by various individuals and/or entities. The land is undeveloped scrubland with native vegetation, and is used for dryland grazing.
- Availability of fresh water. This site is approximately 22 miles from the Dolores River, from which Reclamation has water rights. Water would be piped to the site along the same ROW needed for the brine line, and the pipe would lie in the same trench. An alternative source may be to drill a well nearer to the site.
- Road improvement needs. This site is accessed by Highway 90 and Highway 141, through the town of Naturita. These roads are paved. The last several miles is along a graded dirt road, the same road used to access the Broad Canyon Landfill. The potential for accessing the site from existing dirt roads including HH26 Rd. are being explored. Significant

improvement in these roads might be necessary for heavy equipment operation or regular vehicle access.

- Availability of electricity. Electricity is not present at the existing landfill.
- Proximity to homes. This site is not near to any homes.
- Site configuration. It would be necessary to break up a pond configuration at this site; not all ponds could be constructed in a continuous fashion unless the intervening drainage is filled or re-routed.
- Soils data. Detailed soils data has not been acquired for this site. On the Natural Resources Conservation Service (NRCS) map, it is shown as a complex of several soil types, including fine sandy loams (Barx), rock outcrop complexes (Pinon-Bowditch-Rock Outcrop Complex) with shallow soils that may include bedrock at the surface or at 16-20 inches, and complexes that include shallow soils with un-weathered bedrock at a depth of 20-40 inches (Barx-Progresso Complex). Such soils would require blasting to construct ponds.

4.0 LAND OWNERSHIP CONSIDERATIONS

Land ownership, although not initially used as a selection criterion, emerged as an important consideration as review of the preferred parcels progressed. Land ownership maps for the preferred pond areas, taking into account the area required for the ponds themselves as well as for any salt storage area adjacent to the ponds, are shown in Figures 8, 9, and 10.

Paradox NW, with its associated salt storage site, is situated almost exclusively on the land of a single landowner, with a small portion on BLM land. The land of the adjacent site, Paradox SW, belongs the same landowner, with a small portion on a second private property. These 2 sites, then, are almost exclusively privately owned.

The BLM site is completely on BLM land, offering an opportunity to site a project exclusively on land currently in the public domain. The adjacent site, Central, is located almost exclusively on a single owner's land, with a small portion on BLM land.

Landfill, as shown, would require land from 3 private owners, in addition to a small portion of BLM land. The associated site, Hamilton Canyon, occupies the land of only two private owners.

As the site evaluation progresses in more detail, the landowner considerations may indicate that one of the alternate sites be considered instead of the primary site. Other selection criteria considerations are basically the same for each of the paired sites.

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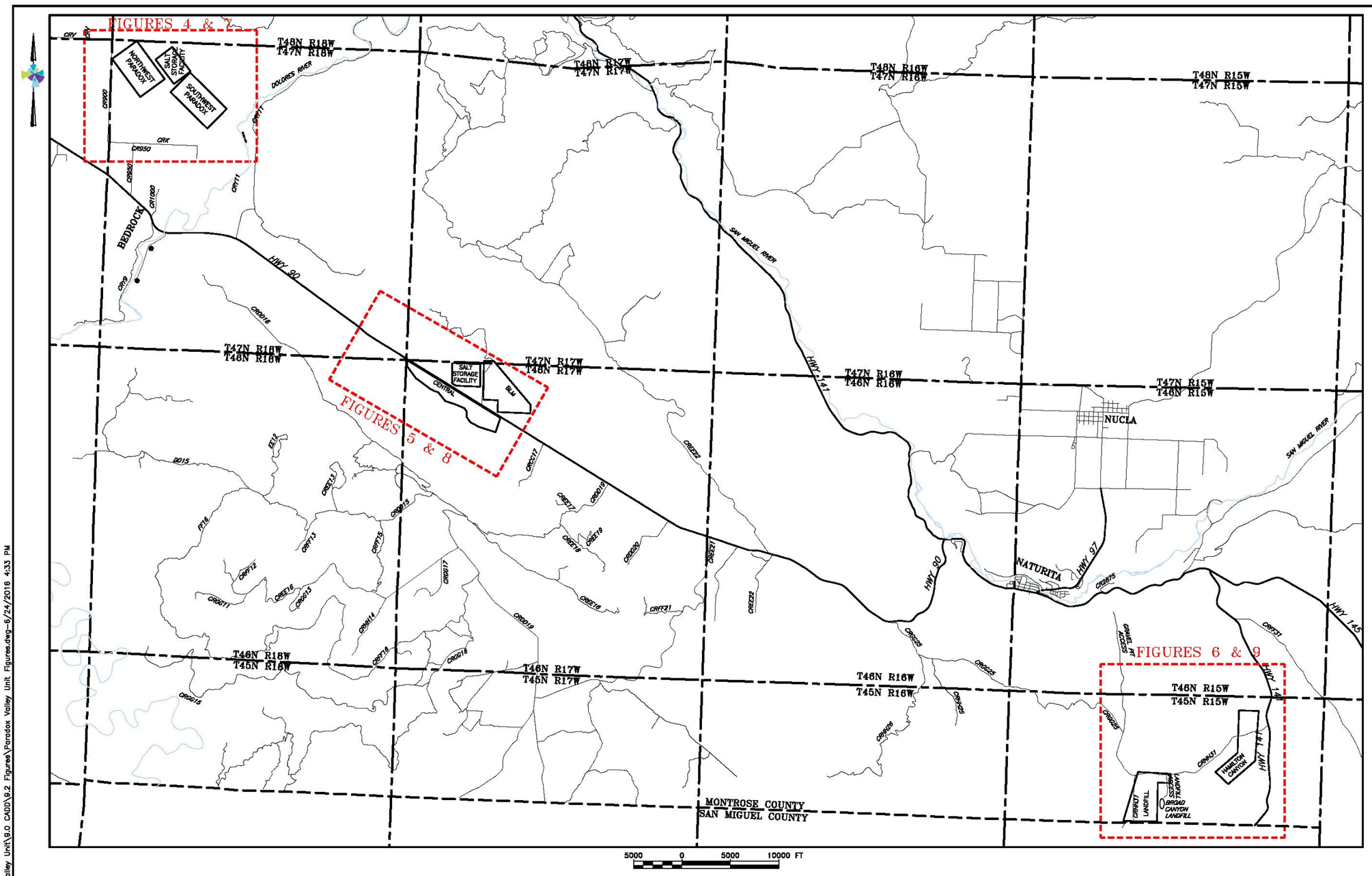

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amec foster wheeler

CLIENT	BUREAU OF RECLAMATION	ISSUED DATE	06/22/2016
DRN BY MGC / DSN BY RBR / CHK BY ALM / APR BY ALM	PROJECT: PARADOX VALLEY UNIT EVAPORATION PONDS	PROJECT No.	1655500023
	TITLE: SELECTED SITE FIGURE MAP	FIGURE No.	4
		REV	0

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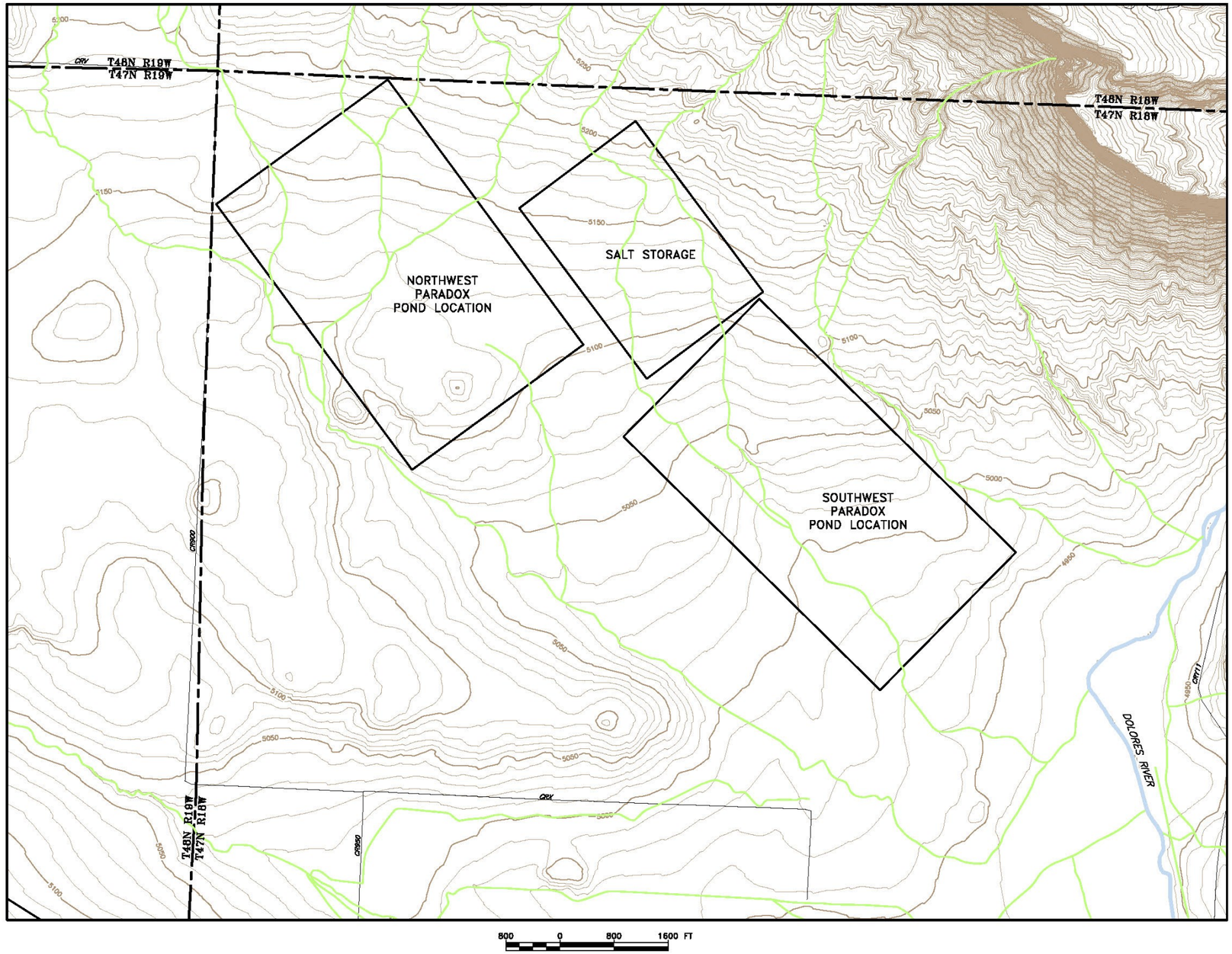

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- 100 EXISTING GROUND SURFACE CONTOUR EL, FEET
- EXISTING HIGHWAYS
- EXISTING COUNTY ROADS
- PROPOSED PONDS
- EXISTING RIVERS AND STREAMS
- EXISTING DRAINAGE WAYS

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CLIENT	BUREAU OF RECLAMATION
DRN BY MGC / DSN BY RBR / CHK BY ALM / APR BY ALM	
PROJECT	PARADOX VALLEY UNIT EVAPORATION PONDS
TITLE	NORTHWEST PARADOX AND SOUTHWEST PARADOX EVAPORATION POND LOCATIONS
ISSUED DATE	06/22/2016
PROJECT No.	1655500023
FIGURE No.	5
REV	0

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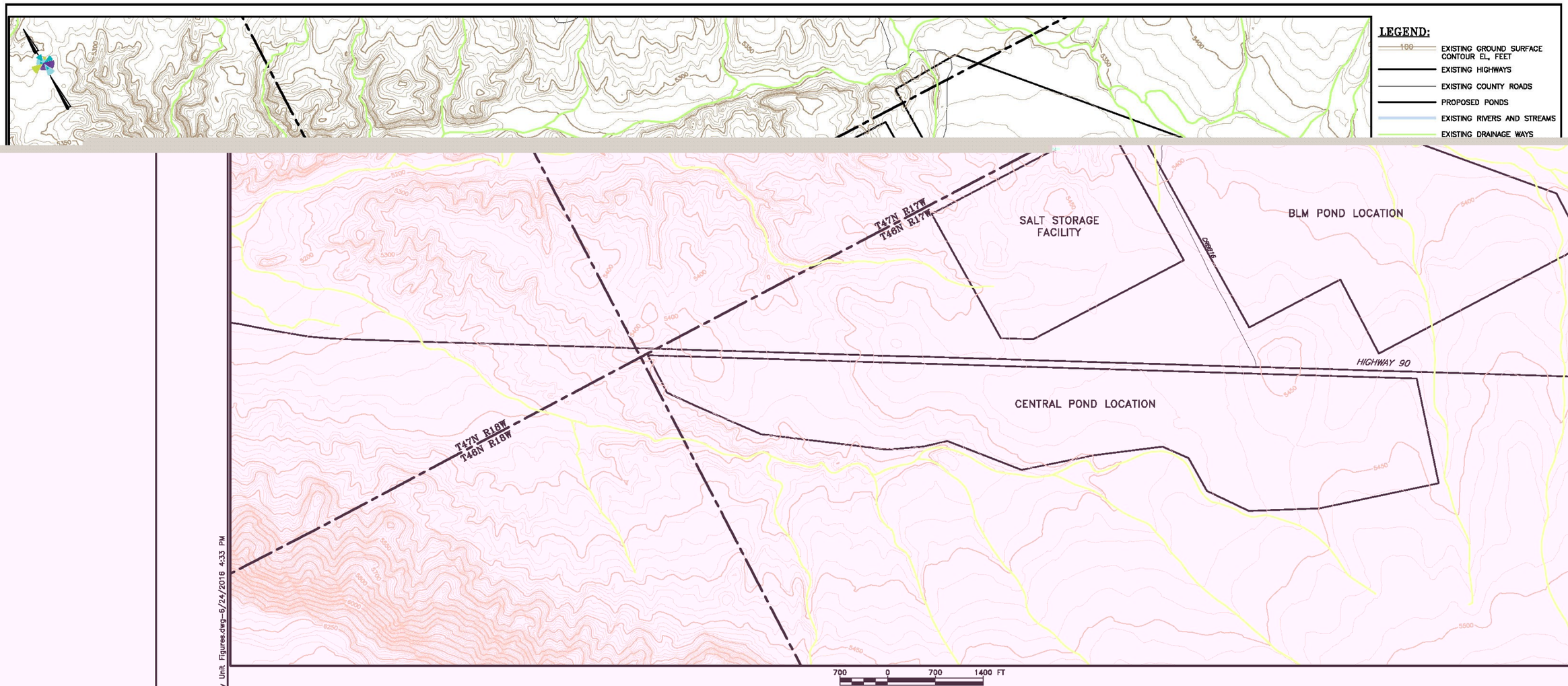

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ISSUED DATE	06/22/2016
PROJECT No.	1655500023
FIGURE No.	6
REV	0

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CLIENT	BUREAU OF RECLAMATION
DRN BY MGC	PROJECT: PARADOX VALLEY UNIT EVAPORATION PONDS
DSN BY RBR	
CHK BY ALM	TITLE: BLM AND CENTRAL EVAPORATION POND LOCATIONS
APR BY ALM	

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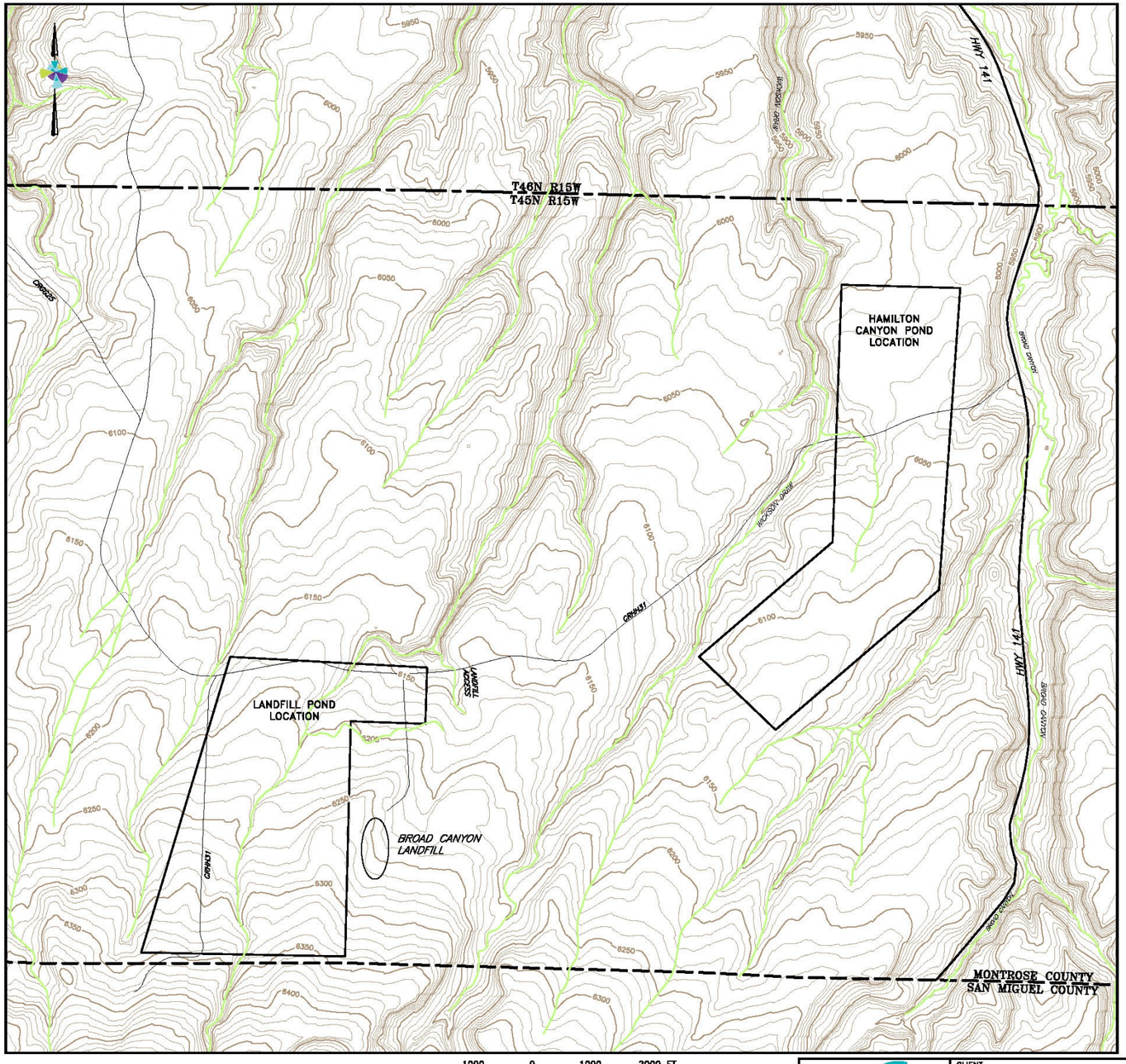

LEGEND:

- EXISTING GROUND SURFACE CONTOUR EL, FEET
- EXISTING HIGHWAYS
- EXISTING COUNTY ROADS
- PROPOSED PONDS
- EXISTING RIVERS AND STREAMS
- EXISTING DRAINAGE WAYS

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CLIENT	BUREAU OF RECLAMATION
DRN BY MGC / DSN BY RBR / CHK BY ALM / APR BY ALM	PROJECT: PARADOX VALLEY UNIT EVAPORATION PONDS
TITLE	LANDFILL AND HAMILTON CANYON EVAPORATION POND LOCATIONS
ISSUED DATE	06/22/2016
PROJECT No.	1655500023
FIGURE No. / REV	7 / 0

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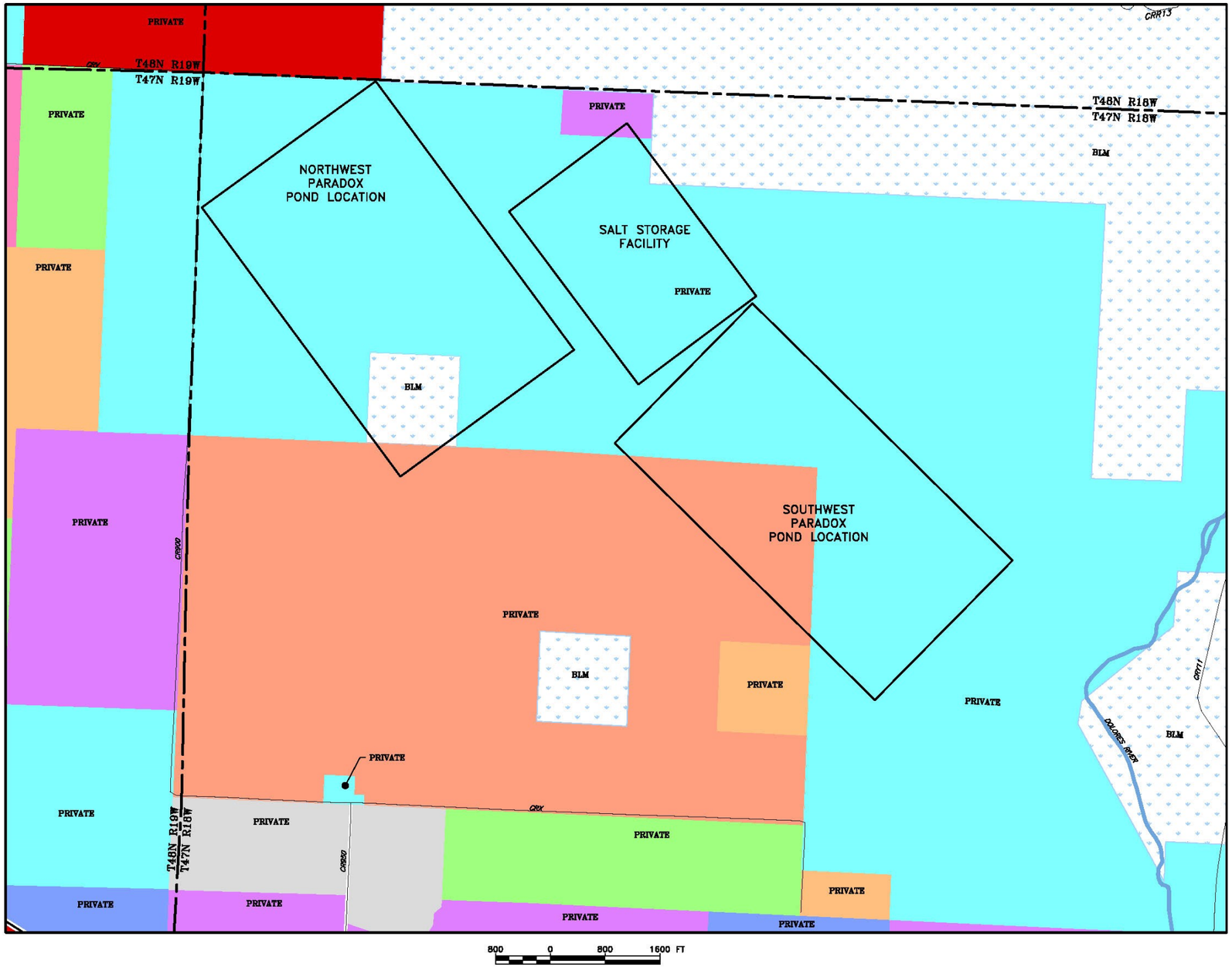

LEGEND:

- EXISTING HIGHWAYS
- EXISTING COUNTY ROADS
- PROPOSED PONDS
- EXISTING RIVERS AND STREAMS
- TOWNSHIP & RANGE

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CLIENT	BUREAU OF RECLAMATION
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TITLE	PROPERTY OWNERS LOCATED NEAR NORTHWEST PARADOX AND SOUTHWEST PARADOX EVAPORATION PONDS
ISSUED DATE	06/22/2016
PROJECT No.	1655500023
FIGURE No. / REV	8 / 0

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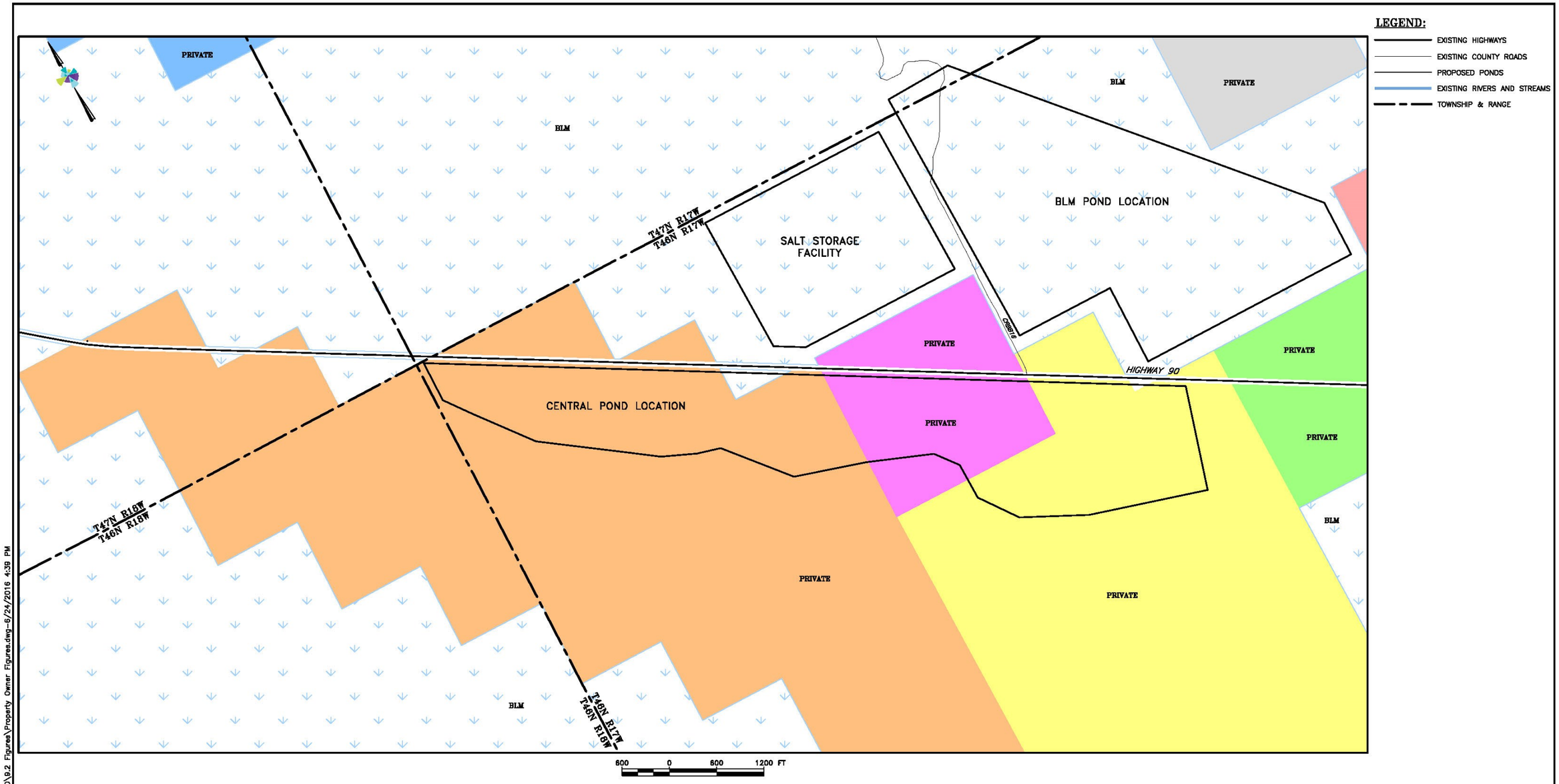

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CLIENT	BUREAU OF RECLAMATION	ISSUED DATE 06/22/2016
DRN BY MGC DSN BY RBR CHK BY ALM APR BY ALM	PROJECT PARADOX VALLEY UNIT EVAPORATION PONDS	PROJECT No. 1655500023
	TITLE PROPERTY OWNERS LOCATED NEAR BLM AND CENTRAL EVAPORATION PONDS	FIGURE No. 9 / REV 0

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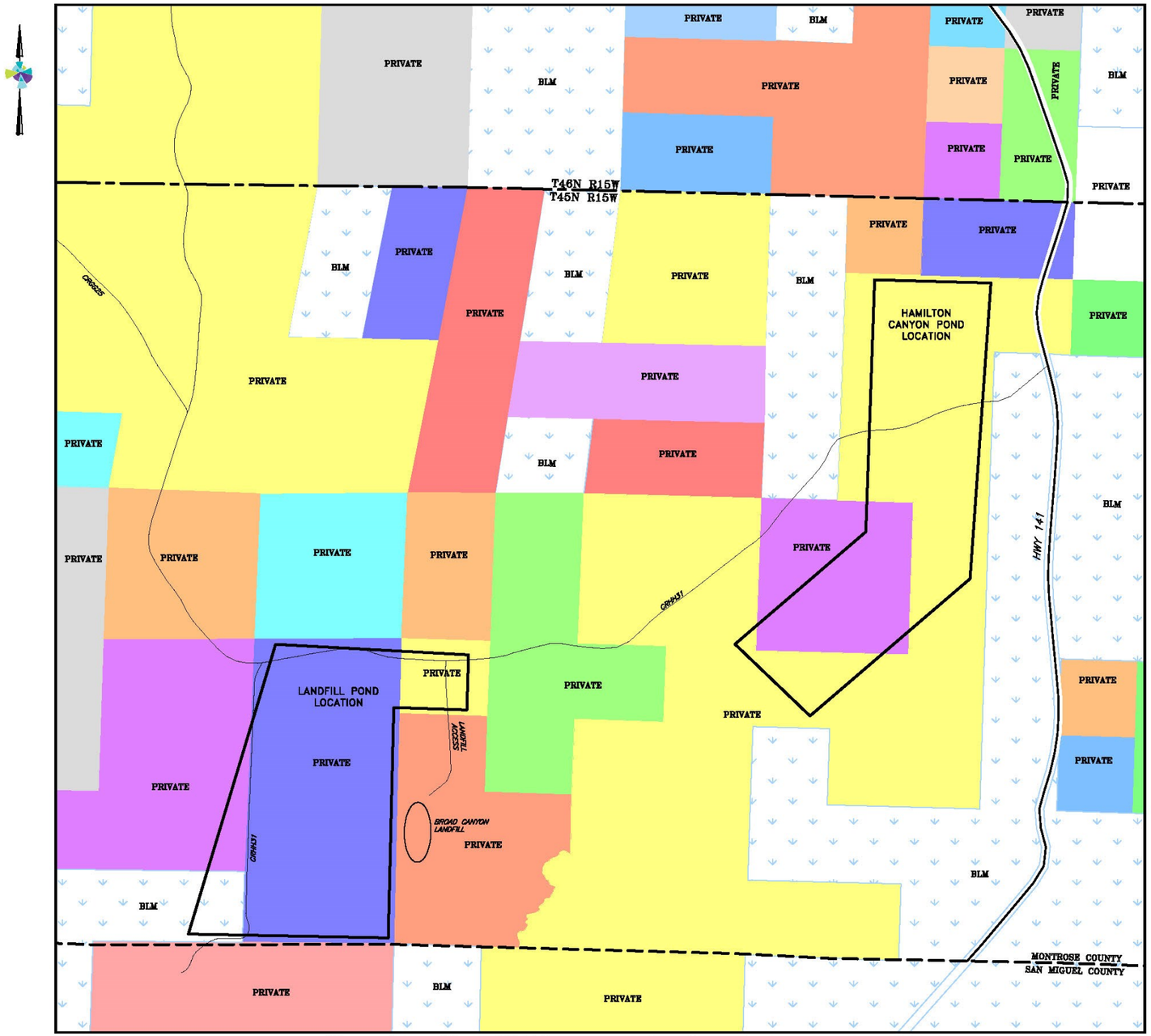

LEGEND:

- EXISTING HIGHWAYS
- EXISTING COUNTY ROADS
- PROPOSED PONDS
- EXISTING RIVERS AND STREAMS
- TOWNSHIP & RANGE

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CLIENT	BUREAU OF RECLAMATION
DRN BY MGC / DSN BY RBR / CHK BY ALM / APR BY ALM	
PROJECT	PARADOX VALLEY UNIT EVAPORATION PONDS
TITLE	PROPERTY OWNERS LOCATED NEAR LANDFILL AND HAMILTON EVAPORATION PONDS
ISSUED DATE	06/22/2016
PROJECT No.	1655500023
FIGURE No.	10
REV	0

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5.0 ADDITIONAL DATA NEEDS FOR POND DESIGN

There are several additional data needs that are being pursued as necessary for developing conceptual designs and costs for implementation of the evaporation pond project at these sites.

5.1 Topography

Details of the topography of the sites, ideally to 1 foot contours, is necessary in order to determine how ponds can be constructed at a minimum cost. Contour information is proposed to be developed using LiDAR data acquired from an aerial drone. This information will identify potential construction issues associated with minor drainages both on and off-site, outcroppings of rock, and small elevation changes such as rises or dips in the landscape. In addition, the topographic data will allow for the identification of any issues associated with the development of alternate road or pipeline routes from the river and the brine production wells, or to the Broad Canyon Landfill.

5.2 Soils and Geotechnical Data

Preliminary soils evaluation has already been determined that the ponds will need to be lined, as brine losses to the loamy or rocky soils that provide rooting for native vegetation would be phytotoxic, and therefore environmentally unacceptable. The nature of the soils is of primary interest for the construction of the berms and roads associated with pond development. It is expected that the project engineer will develop a sampling and data collection plan at each of the three sites to generate the geotechnical information necessary for a preliminary analysis and for identifying costs of pond construction.

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6.0 INFORMATION NEEDS NOT ADDRESSED BY THIS STUDY

We acknowledge that there are data needs that this study will not address, as they are not technical in nature. This information will need to be gathered at some point during the evaluation of these three sites as alternative locations for evaporation pond development, and in the selection of one of these sites as a preferred alternative if evaporation ponds are selected as the preferred method of brine disposal.

6.1 Land Ownership

The willingness of land owners to sell their land for this project has not been assessed. Neither have we addressed the issues associated with the transfer of lands from one public entity (BLM) to another (Reclamation), or those associated with transfer of lands from private to public (Reclamation) ownership.

6.2 Right of Way

All of the sites required the installation of two pipelines, in the same trench, for the transfer of pumped brine and of fresh water for operational and environmental mitigation purposes. Right of way for that trench will need to be negotiated. Rights of way may also be required for extensions of other utilities such as electric service, natural gas, and water. This project has not concerned itself with such negotiations.

6.3 Road Improvement Permitting

The use of existing roads for construction, operation, and potentially transport of solid salts either to the Broad Canyon Landfill or to a market will need to be addressed. This analysis has called out which sites have such needs, but the issue of permits for road use, development, or improvement has not been addressed.

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7.0 SUMMARY AND USE OF THIS REPORT

The purpose of this report is to identify the methods by which the potential sites considered for the location of brine evaporation ponds were narrowed down to three preferred sites. A variety of selection criteria were arrived at in consultation with Reclamation staff and with evaluation of the most critical selection parameters. A total of 15 sites were initially identified. Six of those were removed from consideration prior to site visits. The remaining nine sites were visited in the field, and the selection criteria identified during consultation were quantified and described for each of those sites. All individuals involved in criteria selection and site visits scored each of the nine sites for pond construction suitability. The Amec Foster Wheeler team selected their top-ranked three sites and provided their recommendation to Reclamation. Reclamation staff confirmed and refined those selections. Three alternative sites, one adjacent or very close to each of the primary three sites but differing in land ownership, were mapped as well. Data needs for continuing the pond design and operational parameters were discussed, and plans are in process for acquiring the needed data.

This report serves as a preliminary basis for discussion among Reclamation's partners and stakeholders in the salinity control program to identify and evaluate the issues associated with the development of evaporation ponds for the disposal of brine as required to meet the goals of that program. The report will be used in conjunction with reports from the three other study projects for this program, which are the hydrogen sulfide management study, the ecological risk analysis, and the byproducts disposal study. Together, the reports of the results of these studies will allow Reclamation and its partners to pursue a rational and informed decision-making process for determining the optimal method of brine disposal.

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8.0 REFERENCES

Natural Resources Conservation Service. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Montrose County, Colorado. Montrose County Parcel Map. http://montrosecoparcel.mygisonline.com/

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APPENDIX A

SITE SELECTION MATRIX (DETAILS)

Paradox Valley Unit
Evaporation Ponds Site Selection
Evaluation Matrix

POND MAP NAME	LOCATION	LAT. LONG. (COORDS)	APPROX. SITE ELEV. (feet)	ELEV. CHANGE FROM INJECT. WELL TO SITE (4,970) (vertical feet)	ROAD DISTANCE FROM INJECT. WELL TO SITE (miles)	PIPELINE DISTANCE FROM INJECT. WELL TO SITE ALONG HWY 90 & CR GG25 (miles)	ROAD DISTANCE TO BROAD CANYON LANDFILL (miles)	LANDOWNER(S)	PIPELINE COST (Today's $)	NUMBER OF TRIPS PER TRUCK PER DAY TRUCKS NEEDED	NUMBER OF TRUCKS (rounded to whole truck)	FUEL COST TO HAUL TO LANDFILL COST PER TRUCK (Over 50 years)	TOTAL COST OF FUEL (Over 50 Years)	ONSITE SALT STORAGE FACILITY POSSIBLE?	FRESH WATER AVAILABLE?	FRESH WATER POND POTENTIAL?	LOCATED IN THE FLOODPLAIN	CONSTRUCTION COSTS	DRAINAGE PROTECTION ISSUES
Central	South of Hwy 90	38.15'42"N 108°47'06"W	5,428	458	8	8	25	Private	$5,913,600.00	(11 trips/truck/day) 5 trucks needed	5	$4,242,450.00	$21,212,250.00	Probably no (Pyles) Medium (Nicholas) High (BOR) Medium (Meduna)	Area may be too small.FW would have to be imported (Pyles). Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas) Surface, hard (BOR)	yes?	No (Nicholas)	Slope is 3.4% south of major drainage (Chesnut). This would increase const. cost (Pyles). Relatively flat for Paradox Valley - medium (Nicholas) Split by drainage, hard to construct-high cost (Meduna)	One small and one large drainage path (Pyles). Ponds will be divided by drainages and require protection from other drainages- med (Nicholas). Medium (BOR) High Potential Issues (Meduna)
Hamilton Canyon	Off Hwy 141, near existing Broad Canyon Landfill	38°10'31"N 108°29'20"W	6,000	1,030	30	27	2	Private	$19,958,400.00	(22 trips/truck/day) 2.5 trucks needed	3	$424,250.00	$1,272,750.00	Possible (Pyles) High (Nicholas) High (BOR) Use Broad Canyon or construct one (Meduna	FW would have to be imported (Pyles) Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas). Surface, hard (water rights?) (BOR)	yes	No	Slope appears to be about 1%. Lower const cost (Pyles). Low (Nicholas). Relatively flat at 1.3% (Scheidlinger and Chesnut) 1 drainage way to deal with, Lower construction of site, high pipeline cost (Meduna)	Low Low-one small drainageway to deal with (Meduna)
BLM	North of Hwy 90	38°16'16"N 108°45'52"W	5,392	422	8	8	25	BLM	$5,913,600.00	(12 trips/truck/day) 4.6 trucks needed	5	$4,242,450.00	$21,212,250.00	High (Nicholas) Medium (BOR) High-on BLM Land (Meduna)	FW would have to be imported (Pyles) Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas). Surface, hard (BOR)	yes	No	Slopes of 2.1 to 3.1% (Chesnut). High const costs (Pyles). Medium (Nicholas). Medium to lower end (Meduna)	Yes (Pyles) Ponds will be divided by drainages and require protection from other drainages-med (Nicholas). Low (BOR) Ouside most drainage-low (Meduna)
Landfill	Adjacent to and east of Broad Canyon Landfill property	38°09'32"N 108°31'31"W	6,256	1,286	32	25	0.5	Private and BLM	$18,480,000.00	(24 trips/truck/day) 2.3 trucks needed	3	$141,450.00 or Conveyor System ?	$424,350.00	Next to existing (Pyles & Meduna) High (Nicholas) High (BOR)	FW would have to be imported (Pyles) Easy, with some cost-fresh water will most likely have to be piped from the river (Nicholas). Surface, hard (water rights?) (BOR)	yes	No	Slope of about 2.6% S to N (Chesnut). High const cost (Pyles). Low (Nicholas) Lower construction cost of site, high pipeline cost. (Meduna)	Moderate (Pyles). Minor (Nicholas). Low (BOR). 1 drainageway to divert, fairly simple (Meduna)
Southwest Paradox	West Paradox: V Rd. and 900	38°20'49"N 108°52'32"W	5,017	47	5	4	35	Private	$2,956,800.00	(11 trips/truck/day) 5.5 trucks needed	6	$5,939,400.00	$35,636,400.00	Yes (Pyles) High (Nicholas) Low (BOR) High (Meduna)	FW would have to be imported, but relatively near (Pyles). Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas). Surface, easy (BOR)	yes	No	Slope 1.6% S to N. Flat E to W. Med const cost (Pyles) Low (Nicholas) Lower end (Meduna)	Low (Pyles) Ponds may be divided by drainages and require protection from other drainages-med (Nicholas) 1 drainage way to divert, divert to other drainage way, fairly simple (Meduna)
Northwest Paradox	W. Paradox (northeast of Southwest Paradox proposed pond location)	38°21'40"N 108°53'58"W	5172	202	6	4	36	Private and BLM	$2,956,800.00	(11 trips/truck/day) 5.5 trucks needed	6	$6,151,500.00	$36,909,000.00	Yes (Pyles) High (Nicholas) Low (BOR) High (Meduna)	FW very close from river (Pyles). Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas). Surface, easy (BOR)	yes	No	Slope about 0.9% W to E, and 0.7% S to N (Chesnut). Med const cost (Pyles). Low (Nicholas). Lowest (Pyles, Meduna, Chesnut)	Low (Pyles) Ponds may be divided by drainages and require protection from other drainages-med (Nicholas) Drainage conversion point, can be diverted, will increase $ (Meduna)
Paradox East	East of river, South of BOR facility	38°19'05"N 108°51'01"W	5,021	51	3.2	4	20.8	Private and BLM	$2,956,800.00	(11 trips/truck/day) 3.4 trucks needed	4	$4,819,500.00	$19,278,000.00	Maybe (Pyles) Low (Nicholas) Low (BOR)	FW close. Terrain has plusses and minuses. Need layout to tell. (Pyles). Easy, with some cost - fresh water would be available from existing pipeline that crosses the road at the bridge (Nicholas). Surface, easy (BOR)	no?	Some areas (Pyles) Yes (Nicholas)	Low (Nicholas). Complextopgraphy would drive up costs (Scheidlinger and Pyles)	Significant flash flood issue (Pyles). Low (Nicholas) High (BOR)
Divide	Divide (head of Paradox East)	38°13'16"N 108°39'42"W	5,802	832	13.5	13.3	10.5	BLM	$9,831,360.00	(17 trips/truck/day) 2.2 trucks needed	3	$1,606,500.00	$4,819,500.00	High (Pyles) High (Nicholas) Medium (BOR) High (Meduna)	FW would have to be imported (Pyles) Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas). Surface, hard (water rights?) (BOR)	yes	No. Yes (BOR)	Slope about 2.1% S to N (Chesnut). Med to high const cost (Pyles). Medium (Nicholas)	Moderate (Pyles) Ponds will be divided by drainages and require protection from other drainages-medium (Nicholas)
Thunderbolt	North of Thunderbolt Mine	38°14'11"N 108°42'29"W	5,617	647	11	11	13	Private	$8,131,200.00	(16 trips/truck/day) 2.3 trucks needed	3	$2,008,500.00	$6,025,500.00	Yes (Pyles) High (Nicholas) Medium (BOR) High (Meduna)	FW would have to be imported (Pyles) Easy, with some cost - fresh water will most likely have to be piped from the river (Nicholas). Surface, hard (BOR)	yes	Yes	Slope appears to be about 2.6% (Chesnut). Med const cost (Pyles). Low (Nicholas)	Moderate (Pyles) Ponds will be divided by drainages and require protection from other drainages-medium (Nicholas)
Red Rock Ranch	Immediately N of Hwy 90 W of bridge		4,955	-15	3.2	3,2	22	Private											
Dry Creek Basin	S of Hwy 90, W of mine		6,950	1,980	17.5	12.2	NA	BLM											
Davis Mesa	W of injection site		6,200	1,230	17	1	NA	BLM											
Airport	W of Naturita airport		5,800	830	27	16	NA	BLM and Montrose County											
Paradox Townsite	NE of pumping station		5,400	430	11	11	NA	Private											
Second Park	E of 141 N of Naturita		5,750	780	33	33	NA	Private											

Notes:

Did not visit; considered off table

Flood Plain Definition: A flat area where flood waters would collect and remain. Not a water channel.

Paradox Valley Unit
Evaporation Ponds Site Selection
Evaluation Matrix

POND MAP NAME	NEED NEW ROADS OR IMPROVE EXITING ROADS	ELECTRICAL ACCESS?	NEAR HOMES?	RELOCATE UTILITIES?	LOGISTICS (ROAD DISTANCE)	CONTIGOUS SITE?	PREVAILING WIND ISSUE?			OVERALL SITE RANK (Low-least desirable, High-most desirable)	OVERALL SITE RANK (Low-least desirable, High-most desirable)	OVERALL SITE RANK (Low-least desirable, High-most desirable)	OVERALL SITE RANK (Low-least desirable, High-most desirable)	OVERALL SITE RANK (Low-least desirable, High-most desirable)	OVERALL SITE RANK (Low-least desirable, High-most desirable)	OVERALL SITE RANK (Low-least desirable, High-most desirable)	SITE RANK COMMENTS
Central	New roads will be necessary (Nicholas) Minor (BOR) Crossing drainage for access (Meduna)	Nearby	No. Some visibility from Hwy 90.	No	Med	Yes No (Meduna)	Med			Medium	**low**, maybe small, high slope, drainage	**medium**, if landfill and fresh water pond area is available and H2S odor is not an issue.	Medium	high medium	Medium. A little too steep, far distance. Ownership auspicious.	Medium	Low, maybe small, high slope, drainage (Pyles) Reasonably good site from ecological standpoint (Fischer) Medium if landfill and freshwater pond area is available and H_2S Odor is not an issue. (Nicholas) Medium (Chestnut) Low, difficult to construct (Meduna) A little too steep, far distance, ownership auspicious (Scheidlinger) Medium (BOR)
Hamilton Canyon	Minor (Nicholas) Minor (BOR) Divert 1 CR HH31 around site (Meduna)	???	No	No	Close to existing landfill (Pyles) Difficult (Nicholas) Far from BOR (Meduna)	No (Pyles) No? (Nicholas) Yes (Meduna)	low			Medium	**medium**; good pond site		Low; shallow soils and too far	Lowest	Low. Too far distant; if we go that far, we should be adjacent to the landfill as below.	Medium	Depends on cost tradeoffs, good pond site (Pyles) Grass/sage habitat loss, high elevation, long pipeline (Fischer) Distant from populated areas, distant from well field, close to permitted disposal site. (Nicholas) Low, shallow soils and too far (Chestnut) Good pond site, long pipeline, several lift stations, close to landfill (Meduna) Low, too far, if we go that far, we should be adjacent to the landfill (Scheidlinger) Medium (BOR)
BLM	New roads will be necessary (Nicholas) Major (BOR) Improvement of CRGG25 (if salt is trucked to landfill, moderate if not. (Meduna)	No Yes (BOR)	No	No	Difficult (Nicholas) Medium (BOR)	Yes	low			Medium-High	**low**: probably high construction cost		Low: too far	High medium	Low. Nothing that is here that we can't do better elsewhere.	Medium	Low, likely very high cost pond construction (Pyles) Reasonably good site from ecological standpoint (Fischer) Low, other sites closer to the well field with landfill and freshwater pond options are available (Nicholas) Low, too far (Chestnut) Low, construction difficult due to drainage ways, better options available (Meduna) Low, nothing that is here that we can't do better elsewhere (Scheidlinger)
Landfill	Minor (Nicholas) Minor (BOR) Virtually none (Meduna)	No	No	No	Difficult (Nicholas) Far from BOR (Meduna)	Possibly, or reroute existing drainage. Yes (BOR) Reroute drainage (Meduna)	low			Medium	**medium**: good pond site	**medium** - distant from populated areas, distant from well field, close to permitted disposal site.	Low: shallow soils and too far	Low	Medium-high. Pipeline a BIG but one-time cost. Advantage of proximity is for a conveyor to be used for disposal. Willing seller. Fresh water may be an issue.	Medium	Depends on cost tradeoffs. Good pond site. Likely higher pond const costs than site 7. (Pyles) Better than Hamilton if part of existing disturbed area (Fischer) Medium - distant from populated areas, distant from well field, close to permitted disposal site (Nicholas) Low, shallow soils and too far (Chestnut) Site is good, but distance from injection site is far, can use conveyor system to existing landfill (Meduna) Medium-high, pipeline a BIG but one-time cost, advantage of proximity is for a conveyor to be used for disposal, willing seller, freshwater may be an issue (Scheidlinger) Medium (BOR)
Southwest Paradox	Minor (Nicholas) Minor (BOR) Improvement of CRGG25 (if salt is trucked to landfill, minor if not. (Meduna)	Nearby	Yes, but somewhat hidden (Pyles). No (Nicholas)	No	Easy Close to BOR, far from landfill (Meduna)	No (Pyles) Yes? (Nicholas) No (BOR) No or reroute drainage (Meduna)	Med			High	**med to high**: good facotrs all around	**high*** - close to well field, area available for fresh water pond and disposal site, easy access, utilities nearby, minor drainage issues, realtively flat	High (deep soils)	High. The cost of constructing an onsite landfill will be cheaper than trucking salt to existing landfill, this will reduce the overall cost and virtually remove fuel costs. That cash would construct an onsite landfill .	High. The topography can't be beat.	High	Med to High. Likely higher cost costs than site 15 (Pyles) Simialr to Northwest Paradox, but farther away and higher (Fischer) High-close to well field, area available for fresh water pond and disposal site, easy access, utilities nearby, minor drainage issues, realtively flat (Nicholas) High, deep soils (Chestnut) High, the cost of constructing an onsite landfill will likely be cheaper than trucking the salt to the existing landfill, this will reduce overall cost, some drainage ways to deal with. (Meduna) High, the topography can't be beat (Scheidlinger) High (BOR)
Northwest Paradox	Minor (Nicholas) Minor (BOR) Improvement of CRGG25 (if salt is trucked to landfill, minor if not. (Meduna)	Nearby	Yes, but somewhat hidden (Pyles). No (Nicholas)	No	Easy Close to BOR, far from landfill (Meduna)	No (Pyles) Yes? (Nicholas) No (BOR) No or reroute drainage (Meduna)	Med			High	**high**; good factors all around	**high*** - close to well field, area available for fresh water pond and disposal site, easy access, utilities nearby, minor drainage issues, realtively flat	High (deep soils)	High. The cost of constructing an onsite landfill will be cheaper than trucking salt to existing landfill, this will reduce the overall cost and virtually remove fuel costs. That cash would construct an onsite landfill .	High. The best in my opinion. Closest, flattest, hidden from view, plenty of space.	High	High, good factors all around.(Pyles) Proximity to river and FW ponds, low elevation (Fischer) High-close to well field, area available for fresh water pond and disposal site, easy access, utilities nearby, minor drainage issues, realtively flat (Nicholas) High, the cost of construing an onsite landfill will likely be cheaper than trucking the salt to the existing landfill, this will reduce overall cost, some drainage ways to deal with. (Meduna) High, best in my opinion. Closest, flattest, hidden from view, plenty of space (Sheidlinger) High (BOR)
Paradox East	Minor (Nicholas) Minor (BOR)	Nearby	Yurt in the middle. Other homes less than 2 miles across river. Lots of visibility.	Possible power & water	Adjacent to existing facilities, easy.	Yes (Pyles) No (Nicholas)	High			Low	**low to medium;** flood plain issues	**high***, if there is enough area for evap ponds, landfill, and fresh water pond, and proximity to populated areas and H2S are not issues.	Low	High. The cost of constructing an onsite landfill will be cheaper than trucking salt to existing landfill, this will reduce the overall cost and virtually remove fuel costs. That cash would construct an onsite landfill .	Low. Topography too variable, would have to be cut up too much.	Low	Low to Medium, cost to build levees may be high. Flood plain issues. Yurt in the middle, close to FW, possible landfill. (Pyles) Good proximity to freshwater for ponds, but too close to river and floodplain (Fischer) High, if there is enough area for evap ponds, landfill, and freshwater pond and proximity to BOR (Nicholas) Low (Chestnut) Low, likely unwilling owner, likely in floodplain, drainageways (Meduna) Low, topography too variable, would have to be cut up too much (Scheidlinger) Low (BOR)
Divide	New roads will be necessary (Nicholas) Minor (BOR)	Yes	No	Possible natural gas	Difficult (Nicholas) Medium (BOR)	Yes, moderate	Med			Low	**low to medium**: construction costs high	**low**, since other sites closer to the well field with landfill and fresh water pond options are available	Low: too far	Low	Low. Nothing that is here that we can't do better elsewhere.	Low	Low to Medium. Looks like a high costs site to build ponds (Pyles) Higher habitat quality than more northwestern sites (Fischer) Low, since other sites closer to the well field with landfill and freshwater available (Nicholas) Low, too far (Chestnut) Low, better options (Meduna) Low, nothing that is here that we can't do better elsewhere Low (BOR)
Thunderbolt	Minor (Nicholas) Minor (BOR)	Yes	May have to buy out 1 or 2 homes.	No	Medium (BOR)	No Yes (BOR)	Med			Low	**medium**: nice big site, medium sloped	**low**, since other sites closer to the well field with landfill and fresh water pond options are available	Medium-high	Medium	Medium. Plenty of room. Reasonably flat.	Low	Medium, nice big site, medium slopes, possible landfill site. (Pyles) Reasonably good site from ecological standpoint (Fischer) Low, since other sites are closer to the well field with landfill and freshwater options available (Nicholas) Medium-high (Chestnut) Medium-low if construct landfill may move up on list (Meduna) Medium, plenty of room, resonably flat (Sheidlinger) Low (BOR)
Red Rock Ranch										Not Considered							
Dry Creek Basin										Not Considered							
Davis Mesa										Not Considered							
Airport										Not Considered							
Paradox Townsite										Not Considered							
Second Park										Not Considered							