Paradox Valley Unit of the Colorado River Basin Salinity Control Program

Final Environmental Impact Statement Volume 4 – Appendices K-M



U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
Interior Region 7: Upper Colorado Basin
Grand Junction, Colorado

December 2020

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Appendix K – Visual Resources Analysis Report
Appendix L – Socioeconomic Analysis Report
Appendix M – Signed Programmatic Agreement with SHPO

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Appendix K

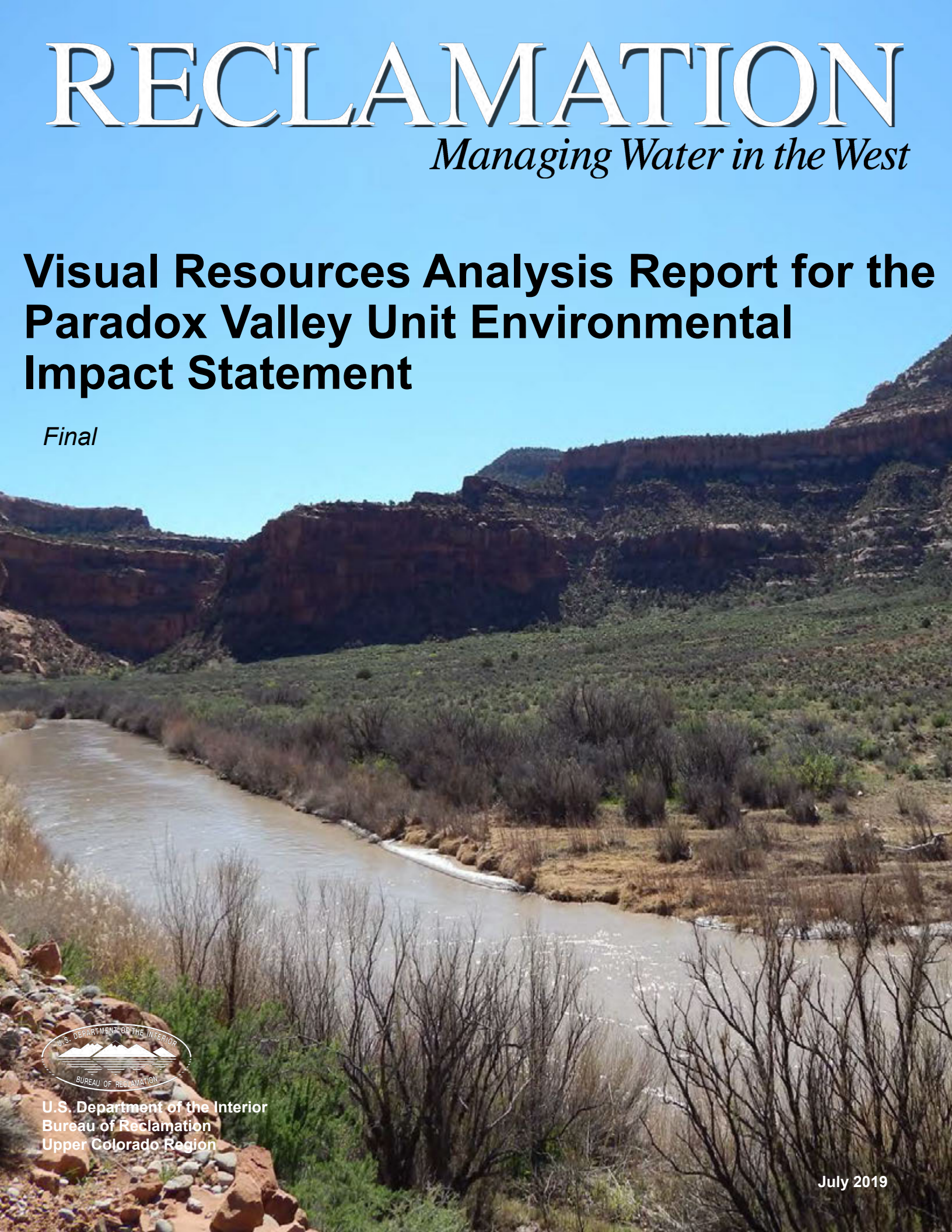
Visual Resources Analysis Report

RECLAMATION

Managing Water in the West

Visual Resources Analysis Report for the Paradox Valley Unit Environmental Impact Statement

Final



U.S. Department of the Interior
Bureau of Reclamation
Upper Colorado Region

July 2019

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ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
BLM	Bureau of Land Management
EIS	environmental impact statement
H_2S	hydrogen sulfide
Hwy-90	Colorado Highway 90
KOP	key observation point
NEPA	National Environmental Policy Act
O&M	operation and maintenance
OM&R	operation, maintenance, and replacement
PVU	Paradox Valley Unit
RMP	Resource Management Plan
TRFO	Tres Rios Field Office
UFO	Uncompahgre Field Office
VRI	Visual Resources Inventory
VRM	visual resource management
WAMS	well annulus monitoring system
WSA	wilderness study area
ZLD	zero liquid discharge

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Introduction

The Paradox Valley Unit (PVU) is authorized by Title II of the Colorado River Basin Salinity Control Act. The PVU has disposed of naturally occurring brine from the Paradox Valley via deep-well injection since 1996, but the well may be nearing the end of its useful life. As the well injection pressure increases and brine disposal rates are further reduced, continued brine control and disposal will still be needed. Continued salt control at the PVU would allow the continued enhancement and protection of the quality of water available in the Colorado River for use in the United States and the Republic of Mexico. It also would enable the United States to comply with its obligations under the agreement with Mexico of August 30, 1973.

The Bureau of Reclamation (Reclamation), as the lead federal agency, is preparing an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA). The proposed action is to continue to construct, operate and maintain facilities for collecting and disposing of saline groundwater in Paradox Valley. Reclamation conducted this visual resource analysis on three action alternatives being analyzed in the PVU EIS.

The Bureau of Land Management (BLM) is a cooperating agency on the EIS with a connected action. The BLM's connected action is to process Reclamation's request for land use authorization on public lands for collection and disposal of saline groundwater in Paradox Valley, as authorized by Title II of the Colorado River Basin Salinity Control Act.

Reclamation used the BLM visual resource management (VRM) system to analyze impacts on visual resources. It developed this report to describe the methods for analyzing impacts on visual resources using the BLM visual resource contrast rating process and the results of the analysis. Additionally, measures for minimizing impacts on visual resources are identified.

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Visual Resource Contrast Rating Process

The BLM VRM program responds to direction from Congress in the Federal Land Policy and Management Act of 1976 to manage public land in a way to protect the quality of scenic values. It also responds to requirements in the NEPA to analyze and disclose effects of Federal actions on the quality of the human environment. There are three key parts making up the VRM program that include maintaining records about the quality of scenic values related to public lands, establishing direction for managing those qualities and values in Resource Management Plans (RMP) as VRM Classes, and assessing all proposed actions to identify how the quality of scenic values will be effected and to determine if the proposed changes are allowable by the RMP VRM Class(es) (BLM 1984). This report's focus is on the third part of the BLM's VRM system to assess a proposed action. The process that BLM follows to assess how a proposal will alter the quality of scenic values is called the Visual Resource Contrast Rating process (BLM 1986). The proposed land modifications are examined to identify if and how new visual contrast would be introduced and assess if that new contrast would reduce the quality of scenic value of public land. The next step in the process is to determine if the new levels of visual contrast conform to the BLM's scenery management direction based on the RMP VRM Class(es). The final step is to identify opportunities to use design to resolve issues that may have been discovered with the proposal conforming to the VRM Class decisions.

If conformance with RMP direction is found unobtainable even with design considerations, decisions to amend the RMP VRM Class(es) or to withdraw and transfer land jurisdiction may result. Actions that result in a change in the scope of resource uses, terms, conditions, and decisions of federal agency land use plans, including the approval of this Project, may require an amendment of one or more of the listed RMPs. As required by 43 Code of Federal Regulations 1610.2(c), the BLM will notify the public of any potential amendment(s) to RMPs in a Notice of Intent to complete a Plan amendment. All Plan Amendments are subject to a 30-day protest period, a 60-day Governor's consistency review, and a resolution of protests. The BLM would need to adopt any plan amendments

after public review prior to implementing decisions in the Record of Decision. Once the administrative management questions are addressed this assessment contributes toward a mutual federal agency goal to identify opportunities to minimize effects of this proposal on the scenic quality of the human environment.

The degree to which a management activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape. The contrast can be measured by comparing the project features with the major features in the landscape. The basic design elements of form, line, color, and texture are used to make this comparison and to describe the visual contrast created by the project. This assessment process provides a means for determining visual impacts and for identifying measures to mitigate these impacts. This assessment is based on the conceptual level of design completed for each alternative evaluated in the EIS. Conclusions of the visual resource analysis will be included in the PVU EIS. A full description of the visual resource contrast rating process is available at https://www.blm.gov/sites/blm.gov/files/program_recreation_visual%20resource%20management_quick%20link_BLM%20Handbook%20H-8431-1%2C%20Visual%20Resource%20Contrast%20Rating.pdf.

BLM Form 8400-4--Visual Contrast Rating Worksheet was used to identify the visual contrast created by the proposed action alternatives. In order to complete the contrast rating worksheet, Reclamation obtained information for each of the three alternatives (described below). Interim VRM classes were identified for the proposed project area in the BLM's Uncompahgre Field Office (UFO), as well as finalized VRM classes in the Tres Rios Field Office (TRFO). Agency personnel selected and visited key observation points (KOPs) and prepared photo simulations to show how the project would affect the landscape.

To further assist with creating photo simulations, Reclamation prepared viewshed analyses. It used representative proposed project features to determine whether the proposed project features could be seen from the KOPs.

Proposed Project Description

The three action alternatives are as follows:

- Alternative B, Area B1—Construct a new injection well facility on Reclamation land south of Bedrock, Colorado and a new injection well on BLM land on Skein Mesa
- Alternative B, Area B2—Construct a new injection well facility complex on BLM-administered land on Monogram Mesa
- Alternative C—Install evaporation ponds along Colorado Highway 90 (Hwy-90)

- Alternative D—Use zero liquid discharge (ZLD) technology[1] east of Bedrock, Colorado

Below is a general summary description of the alternatives and a list of proposed project features for each alternative. These materials were used in filling out the contrast rating worksheets, which are grouped by alternative in **Appendices A**, **B**, **C**, and **D**. Design drawings associated with the proposed project features are also included in the appendices.

Under Alternative B, brine would be collected from the existing brine production well field and piped to a new deep injection well. Brine would be injected into a currently unpressurized block of the Leadville Formation. Areas B1 and B2 were analyzed as potential locations for a new injection well.

Alternative B, Area B1

Under this alternative, Reclamation would (**Figure 1** Alternative B, Area B1) construct a new injection well facility on Reclamation-owned land near the existing injection well and a new injection well on BLM-administered land on Skein Mesa. Alternative B, Area B1 would require construction of a new deep injection well (20-foot by 20-foot well annulus monitoring system [WAMS] building, with 12-foot-high eaves; a 10-foot-diameter by 10-foot-high WAMS liquid tank; an injection well head in the center of a 40-foot by 60-foot concrete pad; and solar panels); surface facilities (a 40-foot by 100-foot injection building, with 16-foot-high eaves); an underground storage tank area; a new 20-foot-wide graded dirt or base coarse access road, with two concrete box beam bridges across the Dolores River; a low-pressure underground pipeline to transport brine and water to Skein Mesa; aboveground power lines (32 to 37 feet maximum height for poles; power line height of 25 to 33 feet); and a 450-foot by 450-foot fenced perimeter around the injection facilities.

Construction of the new injection well would result in a temporary increase in traffic on Colorado Hwy 90 and possibly County Roads EE21, DD19, DD15, DD16 and DD9 due to heavy truck, delivery, and workforce traffic. Approximately 1,200 loads, averaging less than 110,000 lbs., would require ingress and egress over an approximately 100-day period during drilling of the injection well. The maximum load would have a semi-trailer length of 120 feet, a width of 16 feet, have 12 axles and weigh up to 170,000 lbs. Additionally, daily construction operations would require approximately 30 personnel. During peak construction, Reclamation anticipates approximately 20 to 25 additional vehicle trips per day on Colorado Hwy 90. Compared to the Station ID 103886 annual average daily traffic (AADT), this volume represents a temporary 7% daily increase in traffic.

[1]ZLD is a treatment process with the goal of removing all the liquid waste from a system. The focus of ZLD is to economically reduce wastewater and produce clean water that is suitable for reuse.

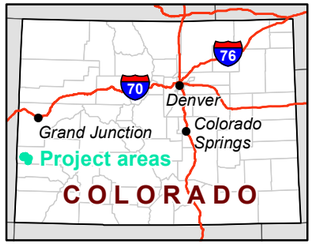
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KOP B
KOP C
KOP D
KOP E
KOP F
Above ground power lines to new Brine Injection Facility
New access road with 2 bridges across the Dolores River
New Injection Building
Skein Mesa New Injection Well
Skein Mesa Access Road (Extends another 10 miles)
Dd16 Rd
Y9 Rd
Dd9 Rd
90
Montrose County

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Figure 1: Alternative B, Area B1 Brine Injection Facility and Well

- Paradox Valley Unit project area
- Alternative B, Area B1 - Above ground power lines to new Brine Injection Facility
- Alternative B. Area B1 - New access road with 2 bridges across the Dolores River
- Skein Mesa Access Road
- Roads
- Alternative B, Area B1 - New Injection Buliding with fencing on south end of Reclamation Lands
- Alternative B, Area B1 - New Injection Well with fencing on Skein Mesa
- VRM Class I
- VRM Class II
- VRM Class III



Source: Reclamation GIS 2019, BLM GIS 2019
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Access to the new BIF would require approximately 1.3 miles of new road to be constructed on Reclamation land. Operating the new well would require a fewer number of employees as are currently present due to automation of the facilities. The traffic generated by these employees would not change the traffic volume on area roadways.

Accessing the top of Skein Mesa would require widening sections of existing County Road DD15 and County Road DD9. This would require modifying them to a total width of approximately 30 feet and installing road base along an approximately 10-mile segment. A new approximately ½-mile access road would be constructed from the county road to the well head location. During construction, all the loads cited above would utilize the identified county roads. During operation, traffic on these county roads would be minimal and occasional based upon operation, maintenance, and replacement (OM&R) needs as the facilities would be automated.

Alternative B, Area B2

This alternative (**Figure 2** Alternative B, Area B2) would construct a new injection well complex on BLM-administered land on Monogram Mesa, or alternatively, at Fawn Springs Bench, which is southwest of Monogram Mesa. Alternative B, Area B2 would require construction of a new deep injection well (a 10-foot-diameter by 10-foot-high WAMS liquid tank and an injection well head in the center of a 40-foot by 60-foot concrete pad), surface facilities (40-foot by 100-foot injection building, with 16-foot-high eaves [WAMS pump inside of this building]), an underground storage tank area, a 20-foot-wide graded dirt or base course access road, a brine pipeline and approximately 6 pumping stations (10.5 feet long, 20 feet wide, and 10.5 feet tall), aboveground power lines (32- to 37-foot maximum height for poles; power line height of 25 to 33 feet), and a 450-foot by 450-foot fenced perimeter around the injection facilities.

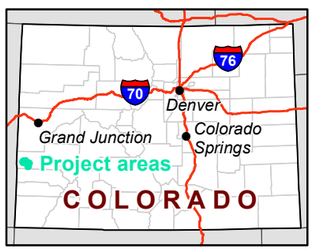
Construction of the new injection well would result in a temporary increase in traffic on Colorado Hwy 90 and County Roads EE21, DD19, FF16 and GG15. Approximately 1,200 semi-truck loads, averaging less than 110,000 lbs., would require ingress and egress over an approximately 100-day period during drilling of the injection well. The maximum load would have a semi-trailer length of 120 feet, a width of 16 feet, have 12 axles and weigh up to 170,000 lbs. During peak construction, Reclamation anticipates approximately 20 to 25 additional vehicle trips per day on Colorado Hwy 90. Compared to the Station ID 103886 AADT, this volume represents a temporary 7% daily increase in traffic. There would be a substantial temporary increase in traffic on the county roads due to the currently low volume of traffic on them.

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Figure 2: Alternative B, Area B2 Monogram Mesa Injection Well Project Area

- Paradox Valley Unit project area
- Alternative B, Area B2 - Above ground powerlines to new Brine Injection Facility
- Alternative B, Area B2 - Brine pipeline to injection facilities on Monogram Mesa
- Alternative B. Area B2 - New access road
- Fawn Springs Bench Electric Line
- Fawn Springs Bench Pipeline
- Proposed pipeline - Continues 5 miles to the northwest
- Roads
- Potential pumping station location
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
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For operation and maintenance (O&M) activities, traffic on Y11 Road would remain consistent with existing conditions. The increase in traffic on Colorado Hwy 90 would be minimal compared to the AADT. The traffic increase on County Roads EE21, DD19, FF16 and GG15 would be dependent upon OM&R needs and expected to be occasional and minimal. However, the traffic impacts on the county roads will still be noticeable as existing use on these roads is very low.

Alternative C

Under Alternative C, brine would be collected from the existing brine production well field and piped to a series of evaporation ponds. The facility would evaporate water from the brine, thereby allowing the solid salt to be harvested for disposal in an on-site salt landfill or to be used as a commodity. The conceptual pond system design includes an approximately 27-acre surge pond, 39-acre concentrator pond, 290 acres of crystallizer ponds, 24-acre bittern (remaining liquid) concentration pond, and 10-acre-foot bittern storage pond.

A hydrogen sulfide (H_2S) treatment system (72-foot by 117-foot metal building, with 16-foot-high eaves) would be included to remove H_2S prior to brine discharge into the evaporation ponds. Salt would be harvested from the evaporation ponds and disposed of in a 60-acre, onsite salt landfill. The salt landfill would reach an ultimate vertical height of approximately 100 feet above the ground surface. A freshwater wildlife pond would be constructed within the evaporation pond complex, and the bittern ponds would be netted to mitigate impacts to wildlife, particularly waterfowl. The evaporation pond complex would be located within approximately 1,530 acres, with an actual footprint of approximately 600 acres. This alternative would also include brine and freshwater pipelines, an electric line extension (32 to 37 feet maximum height for poles; power line height of 25 to 33 feet), ditches between all ponds, a V-shaped drainage ditch (10 to 15 feet wide) lined with gravel or a synthetic liner, new access roads around the ponds to the landfill, and an eight-foot-high perimeter fencing to exclude wildlife.

This alternative (**Figure 3** Alternative C) would use land on the north side of Hwy-90 in an area that would require Reclamation to withdraw land with a transfer of jurisdiction from the BLM and to and potentially purchase some land from private parties.

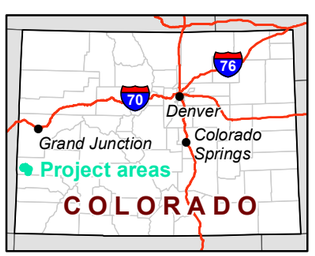
Construction of Alternative C would result in a temporary increase in traffic on Colorado Hwy 90 due to heavy truck, delivery, and workforce traffic. Approximately 80 semi-truck loads, averaging less than 110,000 lbs., would require ingress and egress over the course of the construction project, primarily concentrated during mobilization and demobilization of construction. During peak construction, Reclamation anticipates approximately 20 to 25 additional

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Figure 3: Alternative C Evaporation Ponds Project Area

- Paradox Valley Unit project area
- Bittern Pond
- Bittern Storage Pond
- Concentrator Pond
- Crystallizer Pond 1
- Crystallizer Pond 2
- Crystallizer Pond 3
- Crystallizer Pond 4
- Fresh Water Pond
- Hydrogen Sulfide Treatment Building
- Landfill Cells
- Surge Pond
- Wildlife fencing
- Proposed pipeline
- Relocated road alignment
- Evaporation pond to landfill road
- Roads
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
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vehicle trips per day on Colorado Hwy 90. Compared to the Station ID 103886 AADT, this volume represents a temporary 7% daily increase in traffic. Also, County Road BB16 currently lies within the project site and would need to be rerouted around the perimeter of the site.

All operations of the evaporation pond system, including harvesting and disposing of the salt in a landfill, would occur within the study area boundary. The amount of increased traffic on Colorado Hwy 90 would be approximately 6 vehicle trips per day. Compared to the Station ID 103886 AADT, this volume represents a 2% daily increase in traffic.

Alternative D

Under Alternative D, brine would be collected from the existing brine production well field and piped to a centralized treatment plant (ZLD technology complex). The permanent facility would cover approximately 80 acres. Approximately 150,000 square feet of building space would be required at a height of about 40 feet to protect the equipment from the weather and prevent freezing. This footprint includes the space required for salt drying prior to landfill disposal. The facility would be operated to evaporate and condense water from the brine, resulting in a solid salt and freshwater stream.

A 60-acre on-site landfill would be constructed to permanently store the evaporated salt. The landfill would be located on BLM-managed land, and would contain six 10-acre cells, which would be constructed over the course of the 50-year life of the project. The salt landfill would reach an ultimate vertical height of about 115 feet, with approximately 100 feet rising above the surrounding ground surface. The landfill would be designed, constructed, and operated in accordance with Subtitle D of the Resources Conservation and Recovery Act and the Code of Colorado Regulations for Solid Waste Disposal Sites and Facilities (6 CCR 1007-2 Part 1). This alternative would also include a 20-foot-wide graded dirt or base course access road to building from County Road Y11 and from the ZLD building to landfill, a natural gas pipeline along Hwy-90, an electric line extension (32- to 37-foot maximum height for poles; power line height of 25 to 33 feet), and 8-foot-high perimeter fencing to exclude wildlife.

Alternative D (**Figure 4** Alternative D) would be north of Hwy-90, directly east of the town of Bedrock, and would require the BLM to grant a right-of-way and/or withdrawal with transfer of jurisdiction.

Construction of Alternative D would result in a temporary increase in traffic on Colorado Hwy 90 and Y11 Road due to heavy truck, delivery, and workforce traffic. Over the course of construction, Reclamation anticipates approximately 15 to 20 additional vehicle trips per day on Colorado Hwy 90. Compared to the Station ID 103886 AADT, this volume represents a temporary 6% daily increase in traffic.

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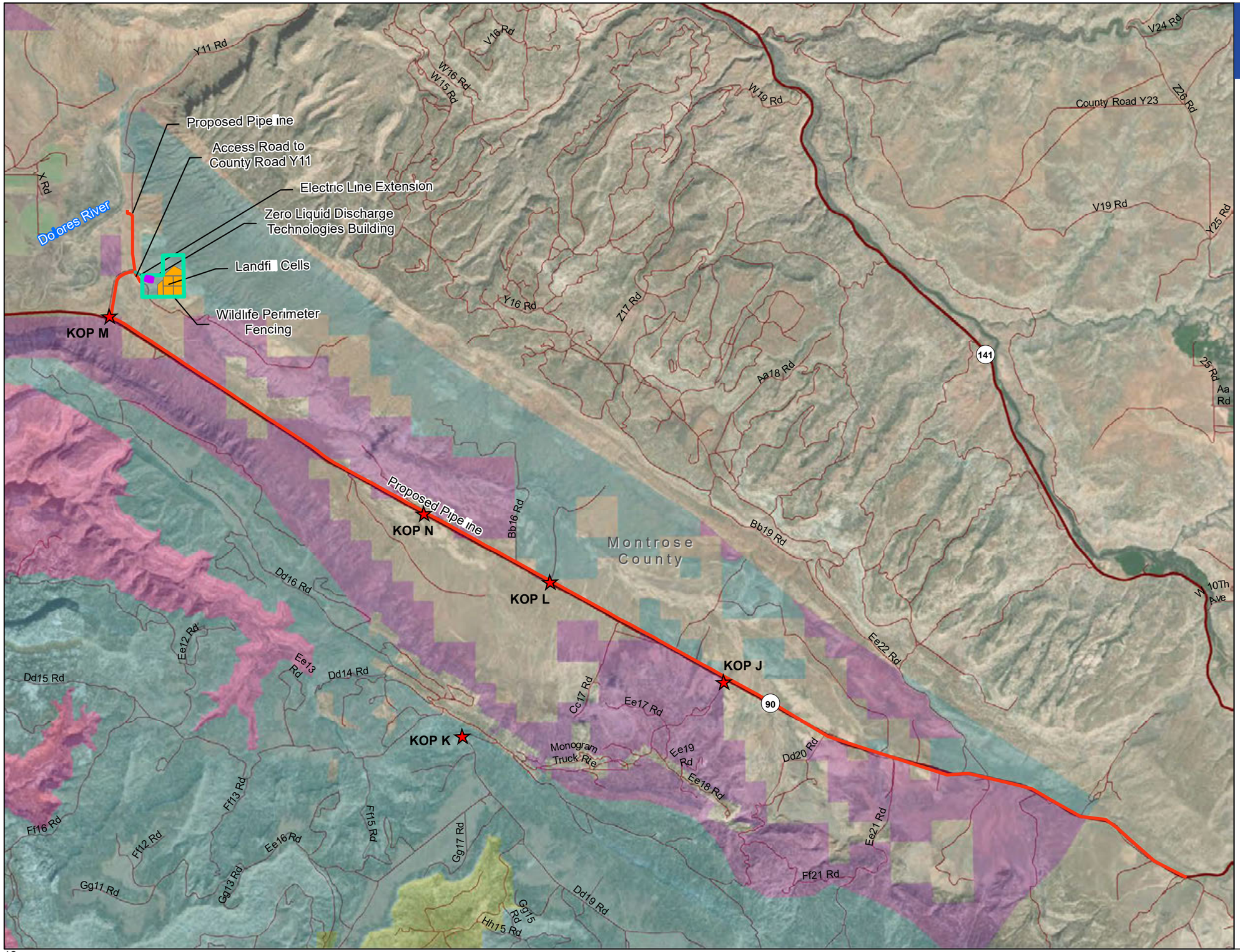
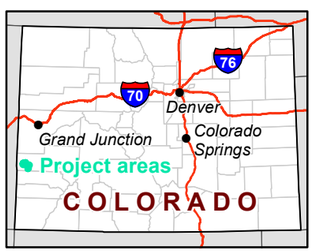


Figure 4: Alternative D ZLD Technologies

- Paradox Valley Unit project area
- Zero Liquid Discharge Technologies building
- Landfill cells
- Proposed pipeline
- Electric line extension
- Roads
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
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For O&M activities, traffic on Hwy 90 and Y11 Road would increase slightly over existing conditions. An increase of approximately 4 vehicle trips per day over existing conditions would be observed. Compared to the Station ID 103886 AADT, this volume represents a 1% daily increase in traffic. A majority of the operations, including collection and disposal of the salt in a landfill, would occur within the study area boundary.

Project Site Descriptions

The section below outlines existing project site descriptions for each of the project areas, including a brief description of each site's existing values.

Alternative B, Area B1

Alternative B, Area B1 is located on Reclamation land south of Bedrock, Colorado and on BLM land on Skein Mesa. The project site on Reclamation land is located near the Dolores River within the Dolores River Canyon. The Dolores River Canyon is an enclosed valley, with large, steep cliffs along the eastern, southern, and western sides. The main development located within the Dolores River Canyon consists of existing Reclamation facilities, the Y9 recreation trail, and the BLM Bedrock recreation campground site.

The project site on BLM land is located on Skein Mesa. Skein Mesa is a large, flat, remote mesa that provides panoramic views of the Dolores River Canyon and Paradox Valley. The only development on Skein Mesa consists of the existing dirt access road and existing Reclamation monitoring sites.

Alternative B, Area B2

Alternative B, Area B2 is located on BLM-administered land on Monogram Mesa and alternatively, on Fawn Springs Bench. Monogram Mesa is a large, flat mesa south of the main corridor of Paradox Valley. The only development on Monogram Mesa consists of existing access roads, powerlines, and several abandoned mining sites. The approximately 6 pumping stations are located along Hwy-90 and County Road EE21.

Fawn Springs Bench is a wide, flat plain area below Monogram Mesa to the south. The only development on Fawn Springs Bench consists of existing access roads, powerlines, and several abandoned mining sites.

Alternative C

Alternative C is located along Colorado Hwy-90, in the main corridor of Paradox Valley. The majority of the land in Alternative C consists of either undeveloped land or sparsely developed agricultural and grazing land. There are no residences located near the evaporation complex site. The main development in this area consists of existing access roads, powerlines, fencing, and other smaller agricultural and ranching infrastructure.

Alternative D

Alternative D is located on undeveloped land or sparsely developed agricultural and grazing land east of Bedrock, Colorado. There are no residences near the ZLD complex site. The main development located in this area consists of existing access roads, powerlines, fencing, and existing Reclamation facilities.

VRM Classes for the Proposed Project Area

The land use planning process is the key tool that the BLM used to protect resources and manage lands. During the planning process, objectives are set to protect visual resources, based on a spectrum of allowable modification grouped into four VRM Classes. Class I and II areas are the most valued; Class III areas represent a moderate value, and Class IV areas represent the least value. While VRM class conformance determinations are only applicable to BLM-administered lands, Reclamation is conducting this Contrast Rating analysis described in this Report to facilitate an evaluation of visual impacts in the Paradox Valley Unit Environmental Impact Statement in order to fulfill its obligations under NEPA.

Management objectives for each of the VRM classes are as follows, and **Figure 5** Existing Visual Analysis shows the VRM classes for the proposed project area:

- Class I—The objective of this class is to preserve the character of the landscape. It provides for natural ecological changes but does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- Class II—The objective of this class is to retain the character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- Class III—The objective of this class is to partially retain the character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- Class IV—The objective of this class is to provide for management activities that require major modifications of the landscape character. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention; however, every attempt should be made to minimize the impact of these activities, through careful location, minimal disturbance, and basic element repetition.

Based on **Figure 5** Existing Visual Analysis, the alternatives are in the following VRM class areas:

- Alternative B, Area B1—VRM Class III
- Alternative B, Area B2—VRM Classes II, III, and IV
- Alternative C—VRM Classes II and III
- Alternative D—VRM Classes II and III

The VRM classes within the UFO are currently considered interim, while the TRFO VRM classes have been finalized in the TRFO RMP.[2] The UFO RMP is silent on VRM classes for this area. Based on the visual resource inventory (VRI) and the Proposed UFO RMP/EIS, the UFO has determined that the interim VRM classes for this area are the same as those for the Proposed RMP. The VRM classes for the alternatives are identified on the contrast rating worksheets in **Appendices A**, **B**, **C**, and **D**.

Key Observation Points

The contrast rating is conducted from the most critical viewpoints (called KOPs). This is done to determine the degree of contrast on the landscape created by the proposed action from existing and future conditions; such contrasts would be seen by various observers, such as recreationists, motorists, and residents.

KOPs are usually along commonly traveled routes or at other likely observation points. They were selected by a team consisting of Reclamation, the BLM, and a contractor, after completing various mapping exercises, including reviewing visual resource inventory (VRI) data from the BLM and mapping analyses to determine areas that could be viewed within a 5-mile radius of the proposed project area (BLM GIS 2019; Reclamation GIS 2019). These areas are residences, transportation corridors, and recreation areas. **Figure 6** shows the locations of all the KOPs, and **Table 1** lists the various observers or concerns associated with each KOP. Note that a single KOP can be associated with more than one alternative.

On April 17 and 18, 2019, a site visit was conducted to each KOP to obtain characteristic landscape descriptions. Site visits also aided in filling out the contrast rating worksheets, which are in **Appendices A**, **B**, **C**, and **D**. Also, the appendices include location sketch figures, showing KOPs associated with specific alternatives.

A KOP does not necessarily need to have a direct view of a proposed alternative; it can be selected as a KOP because, for example, it is near an alternative and there is public concern for the scenery. This would give rise to public concern for potential changes to the landscape from a proposed

[2] In the absence of established VRM classes and when planning a project, interim VRM classes may be determined, using existing or updated VRM inventory data that conform to RMP land allocations (BLM Manual 8400.06(A)(3)).

alternative. As an example, KOP B is at a campground on the Dolores River. Campgrounds are popular locations for outdoor recreation where the scenery influences enjoyment. KOP B is also on the border of the project area for Alternative B, Area B1. The location and type of use of this area contributed to the identification of this as a KOP, as described in **Table 1**. However, Alternative B, Area B1 project features are not visible from this KOP. This type of condition exists for certain KOPs, depending on the alternative.

Zero Liquid Discharge

Brine Injection Facility Well

90

Evaporation Ponds

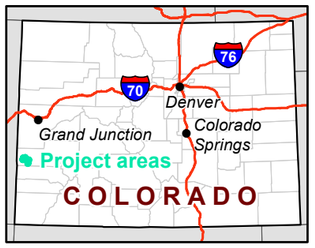
Montrose County

Monogram Mesa Injection Well

RECLAMATION
Managing Water in the West

Figure 5: Existing Visual Analysis

- Paradox Valley Unit project area
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV
- Roads



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_Intro_VRM.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

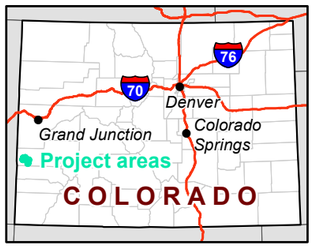
0 0.5 1
Miles

RECLAMATION
Managing Water in the West

Figure 6: Key Observation Points

- Paradox Valley Unit project area
- Bureau of Land Management
- Private
- Roads
- Key observation points (KOPs)

KOP O
KOP A
KOP B
KOP C
KOP D
KOP E
KOP F
KOP M
KOP N
KOP L
KOP K
KOP G
KOP H
KOP I
KOP J
KOP P
KOP Q
Zero Liquid Discharge
Brine Injection Facility Well
Evaporation Ponds
Monogram Mesa Injection Well
Montrose County
90
141



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_Intro_ObservationPoints.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

0 0.55 1.1
Miles

Table 1
Key Observation Points

KOP	Alternatives	Potential Observers	Rationale for KOP
A	B, Area B1; C	Bedrock residents	This KOP is on a public use trail in the town of Bedrock, near residences and a boat ramp/river entry point for the Dolores River. The KOP is on a slightly elevated slope and provides a view of the northern entrance to the Dolores River Canyon. The KOP point of view faces south, toward the Dolores River Canyon.
B	B, Area B1; C	Recreationists in campground	This KOP is near the BLM Bedrock recreation campground on the Dolores River. This campground contains four camping sites that are accessible year-round. The KOP is also on the border of the Alternative B, Area B1 project area. The KOP point of view faces south, toward the Dolores River Canyon.
C	B, Area B1	Recreationists in Dolores River Canyon wilderness study area (WSA)	This KOP is located on the Y9 recreation trail in the Dolores River Canyon. Recreationists in the Dolores River Canyon frequent this trail year-round. This KOP point of view faces southeast, toward the Dolores River.
D	B, Area B1	Recreationists in Dolores River Canyon WSA	This KOP is located on the Y9 recreation trail in the Dolores River Canyon. Recreationists in the Dolores River Canyon frequent this trail year-round. Additionally, river recreationists use the Dolores River seasonally for water-based recreation activities. This KOP point of view faces southeast, toward the Dolores River.
E	B, Area B1	Recreationists in Dolores River Canyon WSA and eligible Dolores River wild and scenic river segment; linear KOP along river	This KOP is located off the Y9 recreation trail in the Dolores River Canyon, at an entry point to the Dolores River. Recreationists in the Dolores River Canyon frequent this trail year-round. Additionally, river recreationists use the Dolores River seasonally for water-based recreation. This KOP point of view faces east and downriver.

KOP	Alternatives	Potential Observers	Rationale for KOP
F	B, Area B1	Recreationists at overlook	This KOP is located at an overlook on Skein Mesa, at a dispersed camping area. This overlook provides panoramic views of the Dolores River Canyon, Dolores River Canyon WSA, and Paradox Valley. It is one of the first overlooks accessible from the southeast, the typical direction from which to access this area of Skein Mesa. Although recreationists visit this KOP for the primary views to the north from the overlook, this does not prevent them from looking in other directions. While recreationists can access this site year-round, much of this area is remote and not commonly traveled, with a limited number of travelers visiting this site per year. This KOP point of view faces southwest. It is important to note that the KOP is at the overlook instead of on the roads to the overlook. This is because recreationists visit the area for the views from the overlook, not the views from the roads leading to it.
G	B, Area B2	County Road DD19 motorists and recreationists	This KOP is located at Monogram Mesa. Motorists and recreationists use Monogram Mesa for dispersed recreation opportunities. While motorists and recreationists can access this site year-round, much of this area is remote and not commonly traveled, with a limited number of travelers visiting this site per year. The project area would only be visible to travelers for a limited amount of time from the road. This KOP point of view faces south-southwest.
H	B, Area B2	Recreationists	This KOP is located at Fawn Springs Bench. Recreationists use Fawn Springs Bench for dispersed recreation opportunities. While recreationists can access this site year-round, much of this area is remote and not commonly traveled, with a limited number of travelers visiting this site per year. The project area would only be visible to travelers for a limited amount of time. This KOP point of view faces southwest.
I	C	Sightseeing recreationists	This KOP is located at the base of Sawtooth Ridge. The area surrounding the KOP is visited by a limited number

KOP	Alternatives	Potential Observers	Rationale for KOP
			of sightseeing recreationists. This KOP faces northwest.
J	B, Area B2; C, D	Hwy-90 motorists and recreationists; linear KOP between KOP J and KOP N	This KOP is located on Hwy-90. Motorists traveling on Hwy-90 frequently pass by this KOP, which is in a major travel corridor in the area. It is also at the intersection of Hwy-90 and County Road DD19. This increases viewing opportunities and is used to access recreation areas around Monogram Mesa. This KOP point of view faces northwest.
K	B, Area B2; C, D	Monogram Mesa recreationists	This KOP is on County Road EE16 near Monogram Mesa. Recreationists use Monogram Mesa for dispersed recreation opportunities year-round. This KOP point of view faces northeast, and provides panoramic views of Paradox Valley.
L	B, Area B2; C, D	Hwy-90 motorists	This KOP is on Hwy-90, and motorists frequently pass this KOP. It is a major travel corridor in the area. This KOP point of view faces northwest.
M	B, Area B2; C, D	Hwy-90 motorists	This KOP is on Hwy-90, and motorists frequently pass this KOP. It is a major travel corridor in the area. It is also at the intersection of the highway and County Road Y11, which increases viewing opportunities. This KOP point of view faces northeast.
N	B, Area B2; C, D	Hwy-90 motorists; linear KOP between KOP J and KOP N	This KOP is on Hwy-90, and motorists frequently pass this KOP. It is a major travel corridor in the area. This KOP point of view faces northwest.
O	C, D	Hwy-90 motorists and Bedrock residents	This KOP is on Hwy-90, at the Bedrock Store. Motorists traveling on Hwy-90 frequently pass this KOP. It is a major travel corridor in the area. This KOP point of view faces east and southeast.
P	C	County Road EE22 (Long Park Road) recreationists	This KOP is on County Road EE22 on Sawtooth Ridge, near the highest point that is accessible by car and at a pullout along the road. Recreationists use this area to access Sawtooth Ridge for dispersed recreation opportunities. While recreationists can access this site year-round, this area is remote and not commonly traveled, with a limited number of travelers visiting this site per year. This KOP point of view faces southwest, toward Paradox Valley.
Q	B, Area B2	County Road EE21 motorists and recreationists	This KOP is located on County Road EE21. Motorists and recreationists use this road for travel and recreation

KOP	Alternatives	Potential Observers	Rationale for KOP
			opportunities year-round. This KOP point of view faces Northwest, toward Paradox Valley.

Viewshed Analysis and Photo Simulations

Reclamation prepared viewshed analyses to identify the potential for proposed project features to be seen from KOPs. The agency used representative proposed project features for the viewshed analyses; it selected them based on their potential location in the project area, their prominence on the landscape, and their height. Reclamation took into consideration the knowledge that taller proposed project features would capture the greatest area in a viewshed for proposed project features to be seen from KOPs. The viewshed analyses are in **Appendices A**, **B**, **C**, and **D**.

Although the location and type of use of an area contributed to the identification of a KOP, Reclamation used viewshed analyses to confirm the visibility of representative proposed project features from KOPs. As the viewshed analyses show, sometimes the representative proposed project features are visible from KOPs and sometimes they are not.

Based on the results of the viewshed analyses, if representative proposed project features could not be seen from an alternative's KOP, then a photo simulation of the representative proposed project features was not completed. This is because there would be no visible changes to the characteristic landscape; however, contrast rating worksheets and photos showing existing conditions are still provided for documentation in **Appendices A**, **B**, **C**, and **D**.

Note that the proposed project would result in pipeline scars that would be visible from KOPs associated with Alternative B Area B2, Alternative C, and Alternative D. For these pipelines, the simulations depict scars and early revegetation conditions. To reduce redundant information or images for the reader, only pipeline scars in photo simulations for KOP B under Alternative C, KOP N under Alternative B Area B2, Alternative C, and Alternative D, and KOP Q under Alternative B Area B2 were prepared. Those photo simulations represent the degree of contrast at other KOPs containing pipeline scars.

Using the photographs obtained during the site visit, Reclamation created photo simulations (which can be found in **Appendices A**, **B**, **C**, and **D**) of the proposed project to aid in completing the contrast rating worksheets. The purpose of photo simulations are as follows:

- To depict proposed project features for visualizing the relative scale and extent of the proposed project when viewed from KOPs
- To evaluate the contrast created by the proposed project in order to develop appropriate measures to minimize visual impacts

For Alternative C, simulations of the landfill were prepared for project years 10 and 25, year 10 being shortly after the salt would be harvested from the evaporation ponds and disposed of in the landfill; year 25 would be about midway through the life of the project. For Alternative D, simulations of the ZLD area were prepared for years 5 and 25 from initiation. This was done to show how changes to visual resources would differ between 5 years after project implementation and about midway through the life of the project. All other simulations depict conditions during project operation.

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VRM Class Objective Conformance

Degree of Contrast

Using the proposed project description information, contrast rating worksheets were completed in the proposed project area. The agency used KOP information collected during the site visit, the viewshed analyses, and photo simulations to determine the degree of contrast in the landscape for each alternative's proposed features. It measured the overall contrast by comparing the proposed project features with the major features in the landscape. The basic design elements of form, line, color, and texture were used to make this comparison and to describe the visual contrast between the proposed project and the land, waterbodies, vegetation, and structures (see contrast rating worksheets in **Appendices A**, **B**, **C**, and **D**).

In rating the overall degree of contrast in the rating worksheets, Reclamation considered distance, angle of observation, length of time the project could be viewed, its relative size or scale, and the season of use, light conditions, recovery time for successful revegetation, spatial relationships, atmospheric conditions, and motion. A concise summary of the factors for each alternative and KOP is in **Table 2**, below.

Table 2
Factors Considered for Rating Degree of Contrast

Alt.	KOP	Distance to Project Boundary (Miles)	Angle of Observation	Length of Time the Project is in View	Relative Size or Scale	Season of Use	Light Conditions	Recovery Time	Landscape Composition/Spatial Position/Backdrop	Atmospheric Conditions	Motion
B, Area B1	A	0.5	Direct view	Intermittent	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Enclosed; Valley floor; Land	None	N/A
B, Area B1	B	Project area not visible									
B, Area B1	C	0.4	Direct view and side view	Constant	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Enclosed; Valley floor; Land	None	N/A
B, Area B1	D	0.2	Direct view and side view	Constant	Similar to characteristic landscape features	Year-round for trail users; seasonal for river users	Not affected	Permanent disturbance	Enclosed; Valley floor; Land	None	N/A
B, Area B1	E	Project area not visible									
B, Area B1	F	Project area not visible									
B, Area B2	G	0.06	Direct view	Intermittent	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Panoramic; Plain; Sky	None	N/A

Alt.	KOP	Distance to Project Boundary (Miles)	Angle of Observation	Length of Time the Project is in View	Relative Size or Scale	Season of Use	Light Conditions	Recovery Time	Landscape Composition/Spatial Position/Backdrop	Atmospheric Conditions	Motion
B, Area B2	H	0.14	Direct view; Elevated KOP	Constant	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Focal; Side-slope; Land	None	N/A
B, Area B2	J	0.03	Direct view and side view	Intermittent	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Panoramic; Plain; Land	None	N/A
B, Area B2	K	2.2	Direct view; Elevated KOP	Constant during recovery; None after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Panoramic; Plateau/mesa; Land	None	N/A
B, Area B2	L	0.1	Direct view and side view	Intermittent	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Panoramic; Plain; Land	None	N/A
B, Area B2	M	0 (pipeline runs across KOP on road)	Side view; Lowered KOP	Constant during recovery; none after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Focal; Plain; Land	None	N/A
B, Area B2	N	0.3 to pump station) 0 to pipeline (pipeline runs across KOP on road)	Direct view and side view	Intermittent	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Focal; Plain; Land	None	N/A

Alt.	KOP	Distance to Project Boundary (Miles)	Angle of Observation	Length of Time the Project is in View	Relative Size or Scale	Season of Use	Light Conditions	Recovery Time	Landscape Composition/Spatial Position/Backdrop	Atmospheric Conditions	Motion
B, Area B2	Q	0.03	Direct view	Intermittent	Similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Focal; Side-slope; Sky	None	N/A
C	A	Project area not visible									
C	B	~0.1	Direct view and side view	Constant during recovery; None after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Enclosed; Slope-toe; Land	None	N/A
C	I	1.3	Direct view; Elevated KOP	Constant	Not similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Panoramic; Ridgetop; Land	None	N/A
C	J	Project area not visible									
C	K	2.2	Direct view; Elevated KOP	Constant	Not similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Panoramic; Plateau/mesa; Land	Potential for low clouds	N/A
C	L	0.1	Direct view and side view	Constant	Not similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Panoramic; Plain; Land	None	N/A

Alt.	KOP	Distance to Project Boundary (Miles)	Angle of Observation	Length of Time the Project is in View	Relative Size or Scale	Season of Use	Light Conditions	Recovery Time	Landscape Composition/Spatial Position/Backdrop	Atmospheric Conditions	Motion
C	M	0 (pipeline runs across KOP on road)	Side view; Lowered KOP	Constant during recovery; none after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Focal; Plain; Land	None	N/A
C	N	0 (pipeline runs across KOP on road)	Direct view and side view	Constant during recovery; none after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Focal; Plain; Land	None	N/A
C	O	Project area not visible									
C	P	Project area not visible									
D	J	0.03 (pipeline runs across KOP on road)	Direct view and side view	Constant during recovery; none after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Panoramic; Plain; Land	None	N/A
D	K	2.2	Direct view; elevated KOP	Constant during recovery; None after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Panoramic; Plateau/mesa; Land	Potential for low clouds	N/A
D	L	0.1 (pipeline runs across KOP on road)	Direct view and side view	Constant during recovery; none after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Panoramic; Plain; Land	None	N/A

Alt.	KOP	Distance to Project Boundary (Miles)	Angle of Observation	Length of Time the Project is in View	Relative Size or Scale	Season of Use	Light Conditions	Recovery Time	Landscape Composition/Spatial Position/Backdrop	Atmospheric Conditions	Motion
D	M	0.5	Side view; Lowered KOP	Constant	Not similar to characteristic landscape features	Year-round	Not affected	Permanent disturbance	Focal; Plain; Land	None	N/A
D	N	0 (pipeline runs across KOP on road)	Direct view and side view	Constant during recovery; none after recovery	Similar to characteristic landscape features	Year-round	Not affected	Approximately 5 to 10 years	Focal; Plain; Land	None	N/A
D	O	Project area not visible									

VRM Class Conformance

Reclamation based the proposed project's conformance with the BLM Resource Management Plan VRM Class objectives on the degree of contrast in the completed contrast rating worksheets (see **Appendices A**, **B**, **C**, and **D**). Descriptions of conformance with VRM class objectives are provided in **Table 3**, below.

Table 3
VRM Class Conformance Determination

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
B, Area B1	A	The proposed project features visible from this KOP are utility poles (~32–37 feet maximum height) with utility lines (~25–33 feet maximum height). Although the KOP is approximately 0.5 miles outside the proposed project boundary, it is approximately 1 mile from proposed project features. The level of change to the characteristic landscape is low. At this distance, the degree of contrast created by the utility poles and lines is weak.	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.
B, Area B1	B	The proposed project area and features are not visible from this KOP, due to gently sloping hills that block views. Although the KOP is on the project boundary, it is approximately 0.55 miles from proposed project features. There is no degree of contrast.	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.
B, Area B1	C	The proposed project features visible from this KOP are the ~40- by 100-foot injection building and utility poles (~32–37 feet maximum height) with utility lines (~25–33 feet maximum height). The KOP is approximately 0.15 miles from proposed project features. At this distance, the degree of contrast created by the injection building and utility poles and lines is weak. Although the utility pole color allows them to blend with the color of the background, there are no other natural or artificial landscape elements of similar height. The level of change to the characteristic landscape is low, and the degree of contrast is weak.	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.
B, Area B1	D	The proposed project features visible from this KOP are the ~40- by 100-foot injection building, the ~20-foot-wide access road, box beam bridge, utility poles (~32–37 feet maximum height) with utility lines (~25–33 feet maximum height), injection well, and ~450- by 450-foot perimeter fence. Although the KOP is next to the proposed project boundary, it is approximately 0.25 miles from proposed project features. The level of change	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		to the characteristic landscape is high. At this distance, the degree of contrast created by the proposed project features is strong.	
B, Area B1	E	The proposed project area and features are not visible from this KOP, due to diagonal hillsides and vegetation that block views. Although the KOP is approximately 0.08 miles outside the proposed project boundary, the KOP is approximately 0.7 miles from the closest proposed project features. As a viewer travels along the river and closer to KOP D and proposed project features, the degree of contrast is expected to increase to strong. At this KOP, however, there is no degree of contrast.	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.
B, Area B1	F	The proposed project area and features are not visible from this KOP, due to a rugged horizontal ridge that blocks views. Although the KOP is approximately 0.13 miles outside the project boundary, it is approximately 0.44 miles from proposed project features. There is no degree of contrast. While the proposed project area is not visible from this KOP, the proposed project area could be visible to travelers on roads to and from the KOP. The proposed project area would likely be visible to travelers only for the limited amount of time it is in the viewshed of the road. During that time, the injection well head in the center of a 40-foot by 60-foot concrete pad may attract attention; however, it would not dominate the view of the casual observer during the time it is in view from the road.	The proposed project features meet VRM Class III objectives.
B, Area B2	G	The proposed project features visible from this KOP are utility poles (~32-37 feet maximum height) with utility lines (~25–33 feet maximum height). The pipeline, access road, injection facilities, and most of the utility poles to the south and southwest would not be visible, due to screening by vegetation. The level of change to the characteristic landscape is low. The degree of contrast created by the utility poles with utility lines is weak.	This would conform with the VRM Class III objectives.
B, Area B2	H	The proposed project feature visible from this KOP is an injection building (~40 feet wide by 100 feet long, with ~16-foot-high eave), pipeline scar, and the ~20-foot-wide access road. The KOP is on the pipeline and approximately 0.35 miles from the building. Most of the injection building complex is obscured by topography and vegetation. The	The proposed project feature conforms with VRM Class III and IV objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetation area would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as revegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	
B, Area B2	J	The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar. The KOP is approximately 0.03 miles from the scar, which would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar after installation, the degree of contrast could be minimized or eliminated. Although the color of the revegetation would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the revegetation area matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	The proposed project feature conforms with VRM Class II objectives.
B, Area B2	K	The proposed project feature visible from this KOP would be the ~20-foot-wide pipeline scar. The KOP is approximately 2.2 miles from the proposed project feature. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as	The proposed project feature conforms with VRM Class II objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		the revegetation area matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	
B, Area B2	L	The proposed project area and features are not visible from this KOP. Although the KOP is approximately 0.1 miles from the proposed pipeline under Alternative C, this project feature is not visible from the KOP; this is due to the topography and vegetation that block views. There is no degree of contrast.	The proposed project features conform with VRM Class II and III objectives.
B, Area B2	M	The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar. The KOP is approximately 0 miles from the proposed project feature, as the pipeline scar would run directly across the KOP. The scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	The proposed project feature conforms with VRM Class III objectives.
B, Area B2	N	The proposed project features visible from this KOP are a pump station (~10.5 feet long, 20 feet wide, and 10.5 feet tall) and ~20-foot-wide pipeline scar. The KOP is approximately 0.3 miles from the pump station and 0 miles from the pipeline scar. The pump station would be partially obstructed by vegetation. Although the earth-tone color of the pump station allows it to blend with the color of the surroundings and background, there are no other natural or artificial features of similar height. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, the sparse new vegetation would eventually resemble the surrounding	The proposed project feature conforms with VRM Class II objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		vegetation. The level of change to the characteristic landscape would become low as the new vegetation matures. Eventually, the degree of contrast created by the proposed project features would be weak.	
B, Area B2	Q	The proposed project features visible from this KOP are a pump station (~10.5-feet long, 20-feet wide, and 10.5-feet tall) and a ~20-foot-wide pipeline scar. The KOP is approximately 0.03 miles from the pump station and 0.03 miles from the pipeline scar. The pump station would be partially obstructed by topography. Although the earth-tone color of the pump station allows it to blend with the color of the surroundings and background, there are no other natural or artificial features of similar height. Also, the angular appearance and prominence of the pump station in the landscape would attract attention. But it would not be visible for an extended period, due to its size and topography. The pipeline scar would be parallel to the road and obstructed by topography. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape and the degree of contrast created by the proposed project feature would be moderate.	Taking into consideration the limited extent and duration of the view of the pump station on a hilly and winding road, the proposed project features conform with VRM Class II objectives.
C	A	The proposed project area and features are not visible from this KOP. Although the KOP is approximately 0.2 miles from the proposed pipeline under Alternative C, this project feature is not visible from the KOP, due to vegetation and plateau slopes that block views. There is no degree of contrast.	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.
C	B	The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar from the proposed pipeline. The KOP is approximately 0.1 miles from the proposed project feature. The pipeline scar would be parallel to the road. The topography would not change, and the pipeline scar would be obstructed by vegetation. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as this vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	
C	1 (10 years)	The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres), the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), and landfill. The KOP is approximately 1.3 miles from proposed project features. The color of some of the project features would attract attention. Additionally, the size of many of the project features, such as the evaporation pond complex, the H_2S treatment system building, the landfill, and the utility fencing, would not allow them to blend with the background; this would attract viewer attention. The proposed project features would attract attention but would not dominate the view; consequently, the level of change to the characteristic landscape would be moderate. At this distance, and given that the KOP is on an elevated ridgetop, the degree of contrast created by the project features would be moderate.	The proposed project features conform with VRM Class III objectives.
C	1 (25 years)	The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres), the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), and landfill. The KOP is approximately 1.3 miles from proposed project features. The color of some of the project features would attract attention. Additionally, the size of many of the project features, such as the evaporation pond complex, the H_2S treatment system building, the landfill, and the utility fencing, do not allow them to blend with the background; this would attract viewer attention. The proposed project features attract attention but do not dominate the view; consequently, the level of change to the characteristic landscape would be moderate. At this distance and given that the KOP is on an elevated ridgetop, the degree of contrast created by the project features would be moderate.	The proposed project features conform with VRM Class III objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
C	J	The proposed project area and features are not visible from this KOP, which is approximately 1.7 miles from proposed project area and features. At this distance, project features would not be visible from the KOP, due to gently sloping hills, rocks, and vegetation that block views of the project area. There would be no degree of contrast.	The proposed project features meet VRM Class II and III objectives.
C	K (10 years)	The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres), one freshwater pond, totaling ~6 acres, the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), landfill, and access roads. The KOP is approximately 2.2 miles from proposed project features. There are no other natural or artificial landscape elements of similar height, so the height of these project features would attract attention. Additionally, the color and size of the project features would not allow them to blend into the background and so would attract viewer attention. The proposed project features would dominate the view and would be a major focus of viewer attention; consequently, the level of change to the characteristic landscape would be high. At this distance and given that the KOP is on an elevated plateau/mesa, the degree of contrast created by the project features would be strong, even with implementation of mitigation measures.	The proposed project features do not conform with VRM Class II and III objectives.
C	K (25 years)	The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres, one freshwater pond, totaling ~6 acres, the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), landfill, and access roads. The KOP is approximately 2.2 miles from the proposed project features. There are no other natural or artificial landscape elements of similar height, so the height of these project features would attract attention. Additionally, the color and size of the project features would not allow them to blend with the background and would attract viewer attention. The degree of contrast from the landfill would be greater than during the 10-year period due to the increased size of the landfill. The proposed project features would dominate the view and would be a major focus of viewer attention; consequently, the level of change to the characteristic landscape would high. At this distance and given that the KOP is	The proposed project features do not conform with VRM Class II and III objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		on an elevated plateau/mesa, the degree of contrast created by the project features would strong, even with implementation of mitigation measures.	
C	L	The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres, one freshwater pond, totaling ~6 acres, the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), access roads, utility fencing, and an electric line extension (~32–37 feet maximum height for poles; power line maximum height of ~25–33 feet). The KOP is approximately 0.1 miles from proposed project features. Although the color of some of the project features, such as the utility poles, allows them to blend with the color of the background, there are no other natural or artificial landscape elements of similar height, so the height of these project features would attract attention. Additionally, the color and size of many of the project features, such as the evaporation pond complex, the H_2S treatment system building, the access roads, and the utility fencing, would not allow the project features to blend into the background and would attract viewer attention. The proposed project features would dominate the view and be a major focus of viewer attention; consequently, the level of change to the characteristic landscape is high. At this distance, the degree of contrast created by the project features is strong.	The proposed project features do not conform with VRM Class III objectives.
C	M	The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar. The KOP is approximately 0 miles from the proposed project feature, and the pipeline scar would run directly across the KOP. It would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	The proposed project feature conforms with VRM Class II objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
C	N	The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0 miles from the proposed project feature, and the pipeline scar would run directly across the KOP. It would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	The proposed project feature conforms with VRM Class II objectives.
C	O	The proposed project area and features are not visible from this KOP, which is approximately 0.8 miles from proposed pipeline under Alternative C; however, this project feature is not visible from the KOP, due to vegetation and plateau slopes that block views. There is no degree of contrast.	The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.
C	P	The proposed project area and features are not visible from this KOP, which is approximately 1.0 miles from the proposed project area and features under Alternative C. At this distance, project features would not be visible from the KOP, due to a large rolling ridge that blocks views of the project area. There would be no degree of contrast. While the proposed project area is not visible from this KOP, it could be visible to travelers on roads to the KOP. The proposed project area would likely be visible to travelers only for the limited amount of time it is in the viewshed of the road. Travelers would also be farther from the proposed project area during their approach to the KOP.	The proposed project features conform with VRM Class II and III objectives.
D	J	The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.03 miles from the proposed project feature. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The pipeline scar would be obstructed by	The proposed project feature conforms with VRM Class II objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		vegetation. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low, as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	
D	K	The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar from a proposed pipeline. The KOP is approximately 2.2 miles from the proposed project feature. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	The proposed project feature conforms with VRM Class II objectives.
D	L	The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.0 miles from the proposed project feature, and the pipeline scar would run directly across it. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the sparse new vegetation would eventually resemble the surrounding vegetation. The level	The proposed project feature conforms with VRM Class II objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		of change to the characteristic landscape would become low as the vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	
D	M (5 years)	The proposed project feature visible from this KOP is the landfill, a ~150,000-square-foot building, and a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.5 miles from the proposed project features at the ZLD facility. The greatest contrast created by the building would be its height and angular form. Similarly, the greatest contrast created by the landfill would be its height; however, it could resemble nearby hills, once reclamation is complete. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. The degree of contrast with the other project features would only be minimized. Although the color of the new vegetation would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would attract attention but would not dominate the view. The degree of contrast created by the proposed project feature would be moderate.	The proposed project features conform with VRM Class III objectives.
D	M (25 years)	The proposed project feature visible from this KOP is the landfill, a ~150,000-square-foot building, and a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.5 miles from the proposed project features at the ZLD facility. The greatest contrast created by the building would be associated with its height and angular form. Similarly, the greatest contrast created by the landfill would be its height; however, it could resemble nearby hills, once reclamation is complete. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar after installation, the degree of contrast could be minimized or eliminated for the pipeline scar.	The proposed project features conform with VRM Class III objectives.

Alternative	KOP	Degree of Contrast	VRM Class Conformance Determination
		The degree of contrast with the other project features would only be minimized. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would attract attention but would not dominate the view. The degree of contrast created by the proposed project feature would be moderate.	
D	N	The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0 miles from the proposed project feature, and the pipeline would run directly across the KOP. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low, as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak.	The proposed project feature conforms with VRM Class II objectives.
D	O	The proposed project area and features are not visible from this KOP, which is approximately 2.1 miles from the proposed project area and features under Alternative D. At this distance, project features would not be visible from the KOP, due to the distance and plateau slopes that blocks views of the project area. There is no degree of contrast.	The proposed project features conform with VRM Class III objectives.

Design Features and Mitigation Measures

The design features and mitigation measures recommended to help minimize the visual contrast of the proposed action alternatives are those listed in **Table 4**, below. None of the design features and mitigation measures, however, would change the conformance determination identified above in **Table 3**. Nevertheless, the design features and mitigation measures would still minimize impacts on visual resources.

Table 4
Design Features and Mitigation Measures

Alternative	KOP	Design Features and Mitigation Measures
B, Area B1	A	No mitigation measures required
B, Area B1	B	No mitigation measures required
B, Area B1	C	• Ensure use of earth-tone paints[3] for the injection building; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the injection building after construction; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate around the base of utility poles, as needed • Relocate the closest portion of the utility pole route off the flat bench on the east side of the river to the east so that it more closely follows the slope-toe
B, Area B1	D	• Ensure the use of earth-tone paints for the injection building; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate the area around the injection building and access road after construction; minimize clearing size by, for example, stripping vegetation only where necessary
B, Area B1	E	No mitigation measures required
B, Area B1	F	No mitigation measures required
B, Area B2	G	No mitigation measures required

[3] See BLM's Standard Environmental Color Chart (https://www.blm.gov/policy/ib-2014-051). This chart is available by request from BLM_OC_PMDS@blm.gov.

Alternative	KOP	Design Features and Mitigation Measures
B, Area B2	H	• Ensure use of earth-tone paints for the injection building, injection well complex, and pump stations; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the injection building, injection well complex, and pump stations after construction; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate the pipeline scar and around access road
B, Area B2	J	Revegetate the pipeline scar
B, Area B2	K	Revegetate the pipeline scar
B, Area B2	L	No mitigation measures required
B, Area B2	M	Revegetate the pipeline scar
B, Area B2	N	• Ensure the use of earth-tone paints for the pump station; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the pump station after construction; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate the pipeline scar
B, Area B2	Q	• Ensure the use of earth-tone paints for the pump station; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the pump station after construction; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate the pipeline scar
C	A	No mitigation measures required
C	B	Revegetate the pipeline scar
C	I	• Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate around the edge of the access roads and evaporation ponds
C	J	No mitigation measures required
C	K	• Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate around the edge of the access roads and evaporation ponds • So that the proposed project footprint would be on less BLM-administered land, relocate and reconfigure the proposed project footprint farther to the southeast, on the north side of the highway, or to the south, on the south side of the highway; alternatively, reconfigure the proposed project footprint so that it is on BLM-administered land only managed as VRM Class III

Alternative	KOP	Design Features and Mitigation Measures
C	L	• Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary • Revegetate around the edge of the access roads and evaporation ponds • So that the proposed project footprint would be on less BLM-administered land, relocate and reconfigure the proposed project footprint farther to the southeast, on the north side of the highway, or to the south, on the south side of the highway; alternatively, reconfigure the proposed project footprint so that it is on BLM-administered land only managed as VRM Class III
C	M	Revegetate the pipeline scar
C	N	Revegetate the pipeline scar
C	O	No mitigation measures required
C	P	No mitigation measures required
D	J	Revegetate the pipeline scar
D	K	Revegetate the pipeline scar
D	L	Revegetate the pipeline scar
D	M	• Ensure use of earth-tone paints for the ZLD facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss • Revegetate around the base of the ZLD facility building after construction; minimize the clearing size by, for example, stripping vegetation only where necessary • Revegetate around the edge of access roads, the pipeline scar, and utility poles • Revegetate landfill and contour landfill to resemble nearby topography
D	N	Revegetate the pipeline scar
D	O	No mitigation measures required

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Findings

The following is a summary of the visual resource analysis:

- Only the Skein Mesa proposed project area footprint under Alternative B, Area B1 is on BLM-administered land, which is designated as VRM Class III. Alternative B, Area B1 would conform with the VRM class objective for this area. Design features and mitigation measures would not change the conformance determination; however, the design features and mitigation measures in **Table 4** would minimize the impacts on visual resources.
- Under Alternative B, Area B2, the proposed project features would be on BLM-administered land designated as VRM Class II, III, or IV. The proposed project features would either not be seen from the KOPs because they would be obstructed by the existing landscape conditions or would be seen but would still conform with VRM class objectives. Design features and mitigation measures would not change the conformance determination; however, the design features and mitigation measures in **Table 4** would minimize the impacts on visual resources.
- Under Alternative C, the proposed project features would be on BLM-administered land designated VRM Class II or III. The size and scale of the proposed project features in a nearly undeveloped area would not conform with VRM class objectives. Design features and mitigation measures would not change the conformance determination; however, the design features and mitigation measures in **Table 4** would minimize the impacts on visual resources.
- Under Alternative D, the proposed project features would be on BLM-administered land designated VRM Class II or III. The proposed project features would either not be seen from the KOPs because they would be obstructed by existing landscape conditions or would be seen but would still conform with VRM class objectives. Design features and mitigation measures would not change the conformance determination;

however, the design features and mitigation measures in **Table 4** would minimize the impacts on visual resources.

- The pipeline scars would be visible from the KOPs associated with Alternatives B Area B2, Alternative C, and Alternative D. The activities associated with the pipeline construction would not allow the character of the landscape to be retained. The level of change to the characteristic landscape would be moderate to high, mostly because of construction equipment and supplies. Construction would be visible and would attract the attention of the casual observer, mostly because of the proximity of the pipelines to travel routes. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast would be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation, the short, sparse new vegetation would eventually mirror the surrounding vegetation. The topography would not change. The level of change to the characteristic landscape would eventually be low. The degree of contrast created by the pipeline scar would be weak, so all pipelines would conform with VRM Class II, III, and IV objectives in the future.
- For Alternative C, the evaporation pond area simulations were prepared for years 10 and 25; year 10 would be near the start of salt disposal in the landfill and year 25 would be about midway through the life of the project. For Alternative D, the ZLD area simulations were prepared for years 5 and 25; year 5 would be near the start of salt disposal in the landfill and year 25 would be about midway through the life of the project. This was done to show how proposed project features would change throughout its life. In all cases, however, the conformance determination would be the same, regardless of the time period.

In conclusion, only Alternative C would not conform with VRM class objectives. All action alternatives would create contrast in the landscape. Due to their locations, Alternatives B-Area B2 and D would create the lowest contrast ratings, and Alternative C would create the highest. Because of the relatively small footprint under Alternative B, Area B1 on BLM-administered land, there would be limited instances where it would be subject to VRM class objectives; however, Alternative B, Area B1 would still create strong contrast ratings. Alternative B, Area B1 is also next to special management areas (Dolores River Canyon WSA and eligible Dolores River wild and scenic river segment) that can be affected by visual intrusions from Alternative B, Area B1.

References

BLM (United States Department of the Interior, Bureau of Land Management). 1984. Manual 8400—Visual Resource Management. Rel. 8-24, BLM, Washington, DC. April 5, 1984.

_____. 1986. Handbook H-8431-1—Visual Resource Contrast Rating. Rel. 8-30. BLM, Washington, DC. January 17, 1986.

BLM GIS. 2019. Visual Resource Inventory Data provided by the Bureau of Land Management for the Paradox Valley Visual Resource Analysis.

Reclamation GIS. 2019. Data provided by the Bureau of Reclamation for the Paradox Valley Visual Resource Analysis.

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Appendix A

Alternative B, Area B1

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APPENDIX A

1 Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

2 Viewshed Analyses for Representative Proposed Project Features
Note: Viewshed analyses were prepared for representative proposed project features to identify their ability to be seen from the key observation points.

3 Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos
Note: Key observation points B, E, and F do not have photo simulations because project features are not visible from the key observation point.

4 Proposed Project Design Drawings

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Appendix A

Alternative B, Area B1: Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

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KOP A

KOP B

KOP C

KOP D

KOP E

Y9 Rd

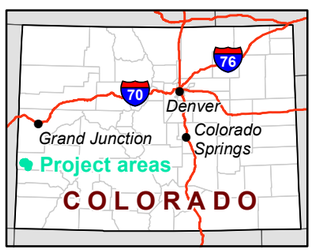
Dd16 Rd

Montrose County

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Alternative B, Area B1
Location Sketch KOP A-E

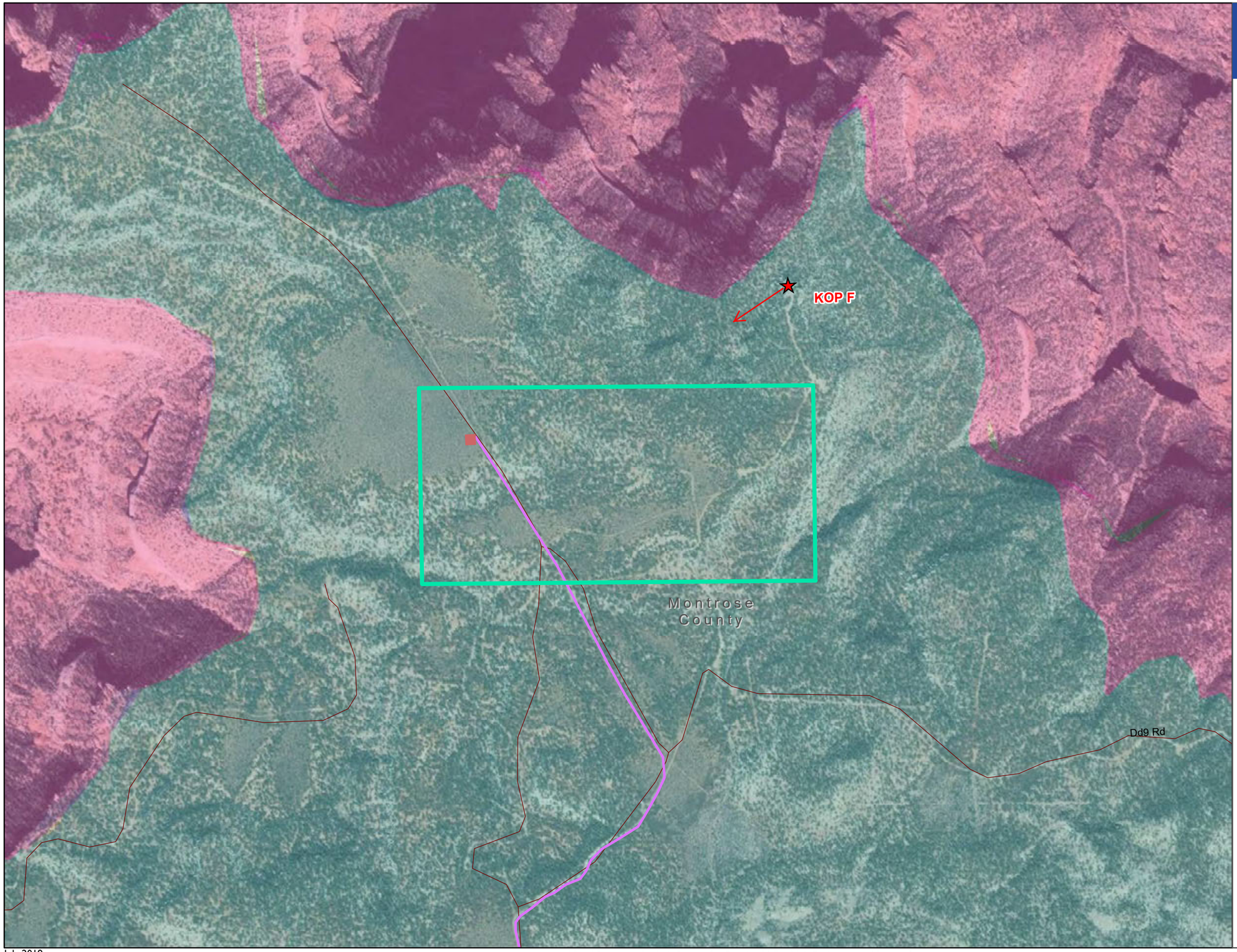
- Paradox Valley Unit project area
- Alternative B, Area B1 - Above ground power lines to new BIF
- Alternative B, Area B1 - New access road with 2 bridges across the Dolores River
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1 - New Injection Buliding with fencing on south end of Reclamation Lands
- VRM Class I
- VRM Class II
- VRM Class III



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_B1_1.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

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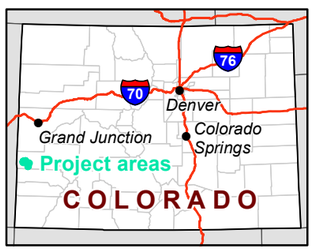
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Alternative B, Area B1
Location Sketch KOP F

- Paradox Valley Unit project area
- Proposed road improvement along 10 miles of Skein Mesa Access Road
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1 - New Injection Well with fencing on Skein Mesa
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_B1_2.mxd
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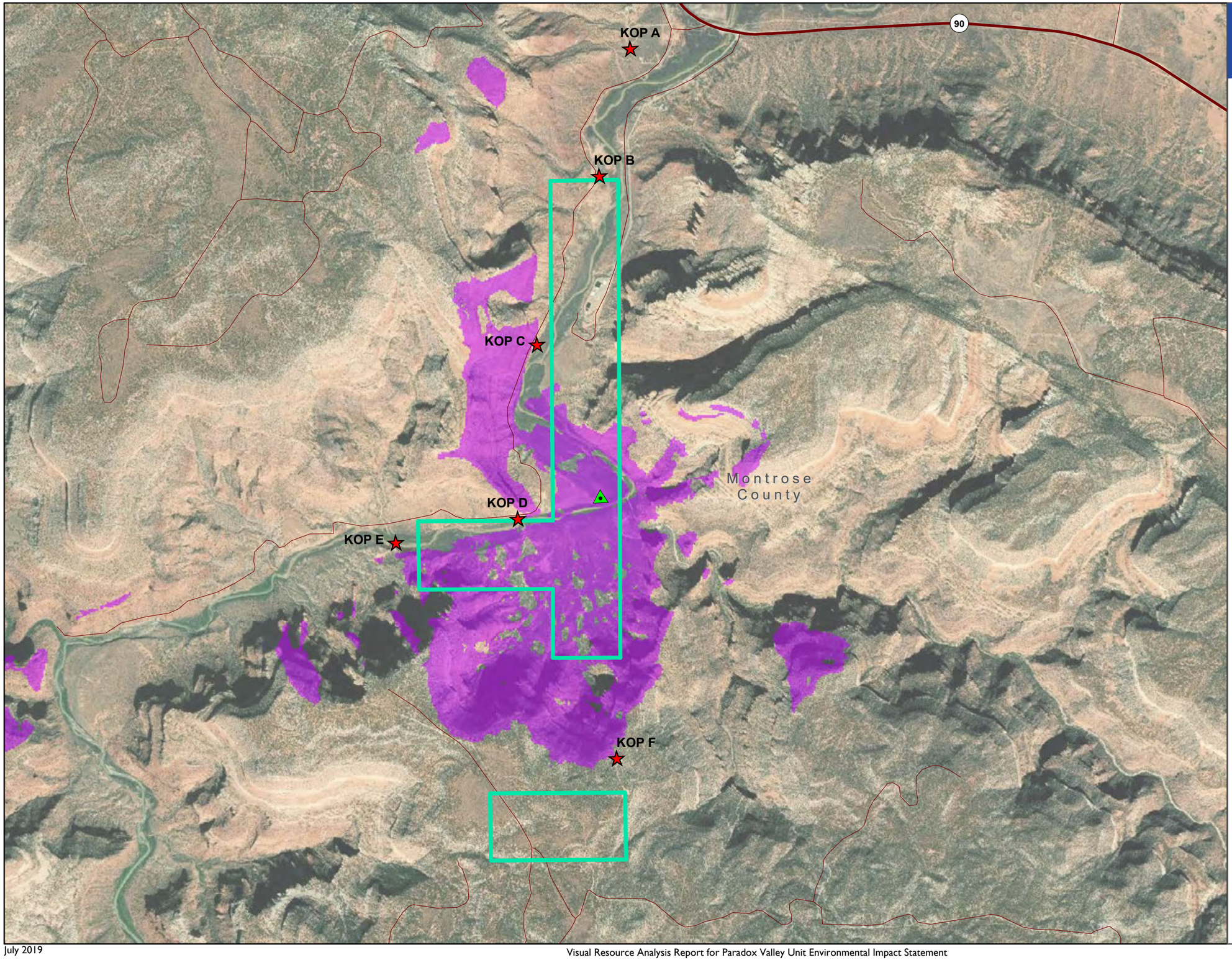
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Appendix A

Alternative B, Area B1: Viewshed Analyses for Representative Proposed Project Features

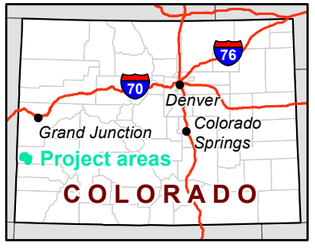
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Managing Water in the West

Viewshed for Alternative B, Area B1 Representative Electrical Pole 1

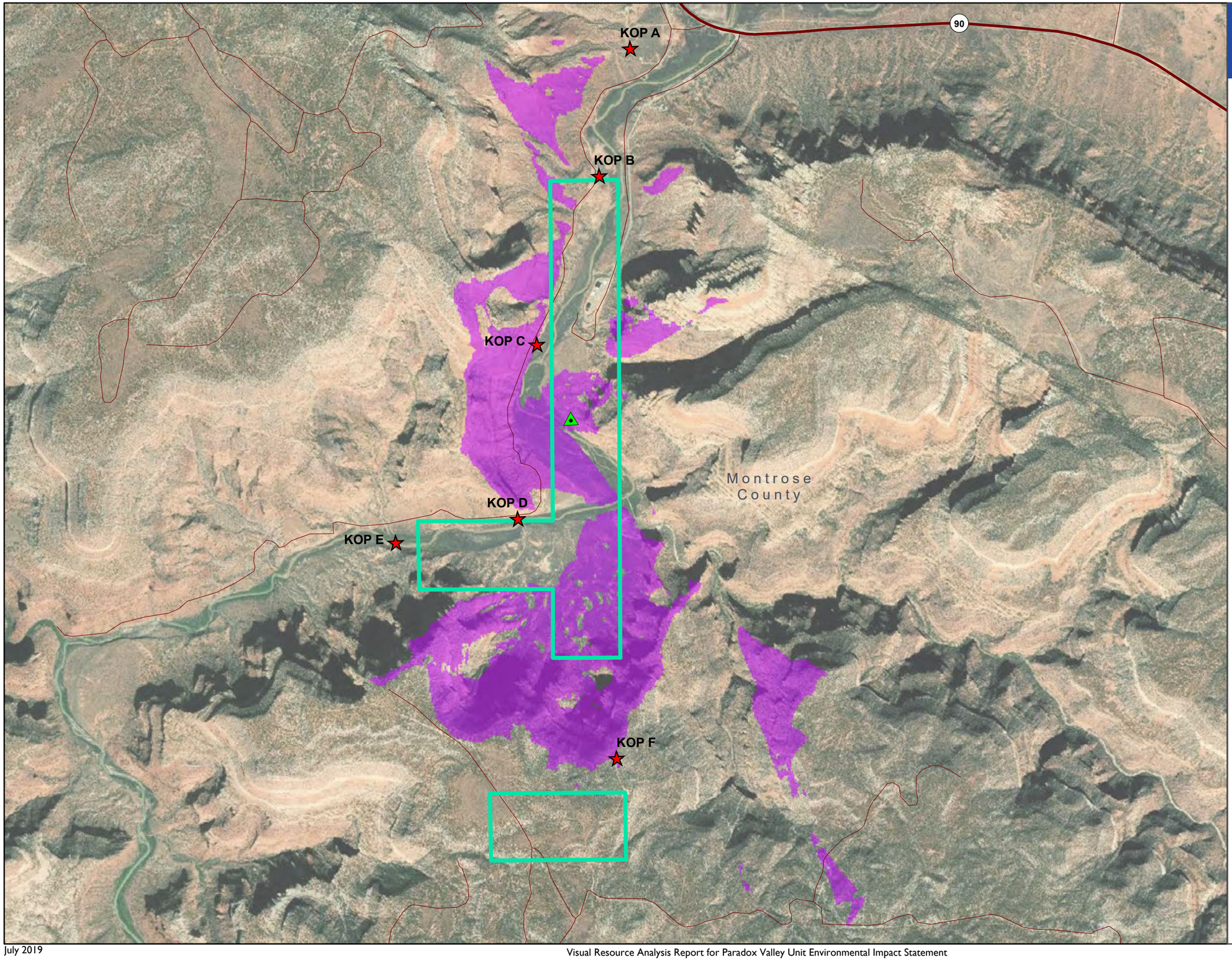
- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1- representative electrical pole 1 (37 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PV\Uvisual_viewshed_ID1.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

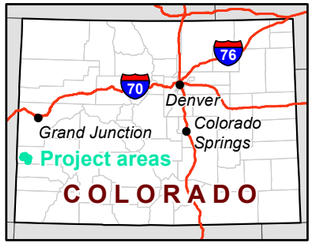
0 0.15 0.3
Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B1, Area B1 Representative Electrical Pole 2

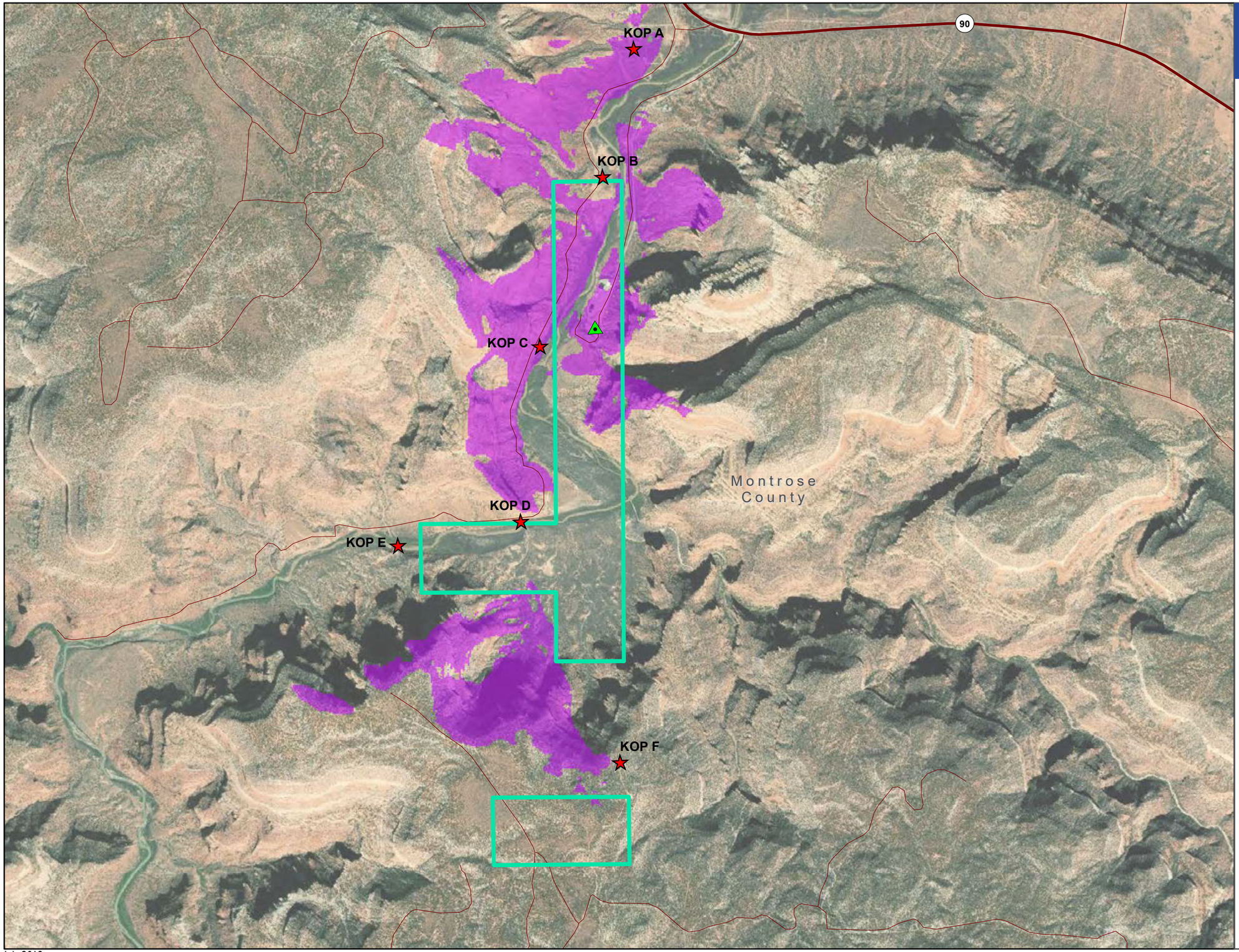
- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1- representative electrical pole 2 (37 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID2.mxd
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N

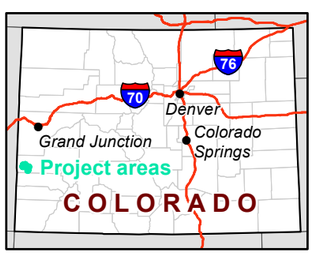
0 0.15 0.3
Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B1 Representative Electrical Pole 3

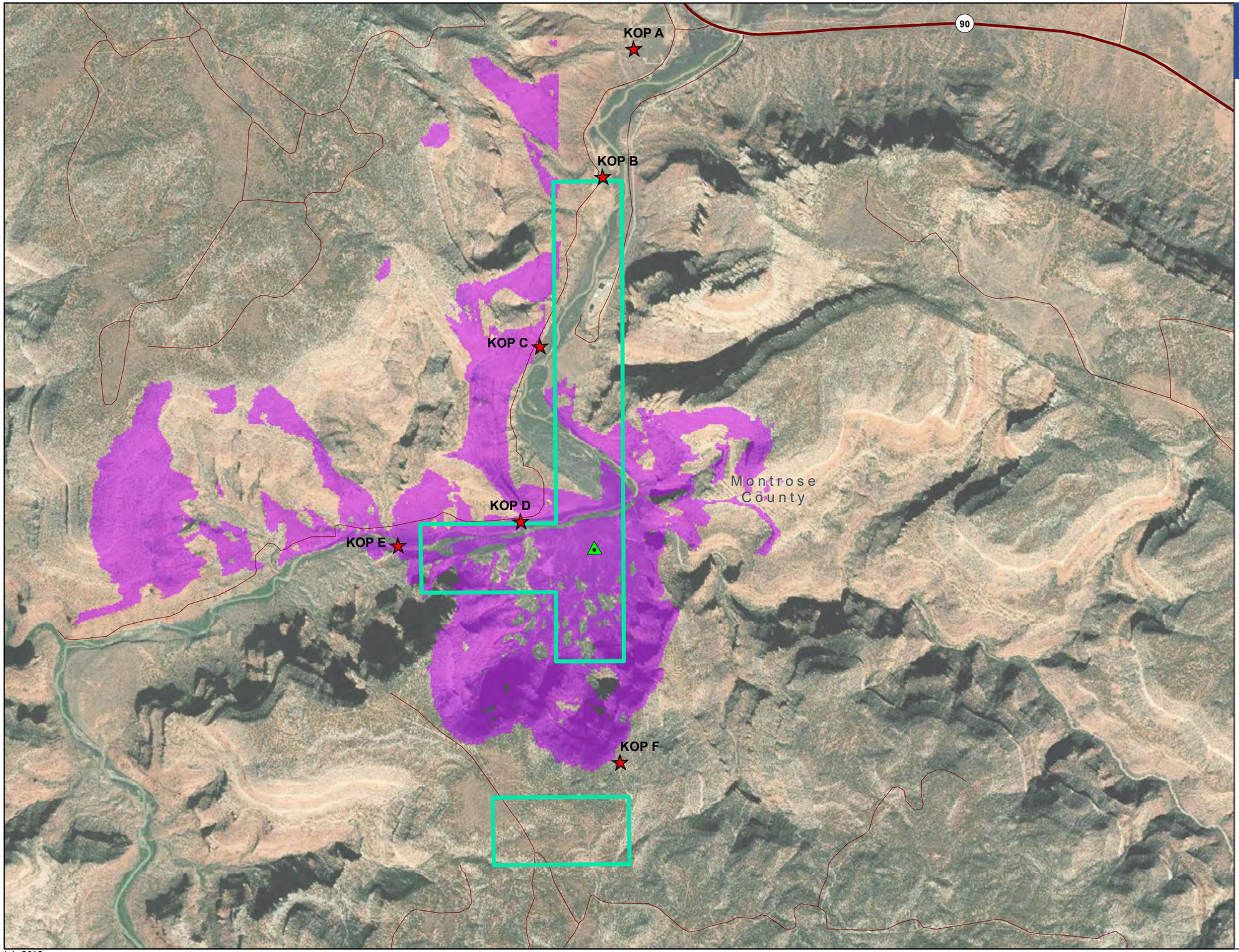
- Paradox Valley Unit project
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1- representative electrical pole 3 (37 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PV\Visual_viewshed_ID3.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

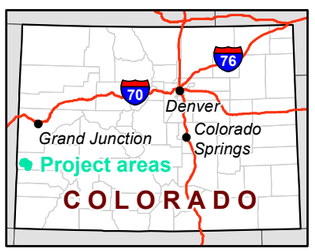
0 0.15 0.3
Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B1 Representative Electrical Pole 4

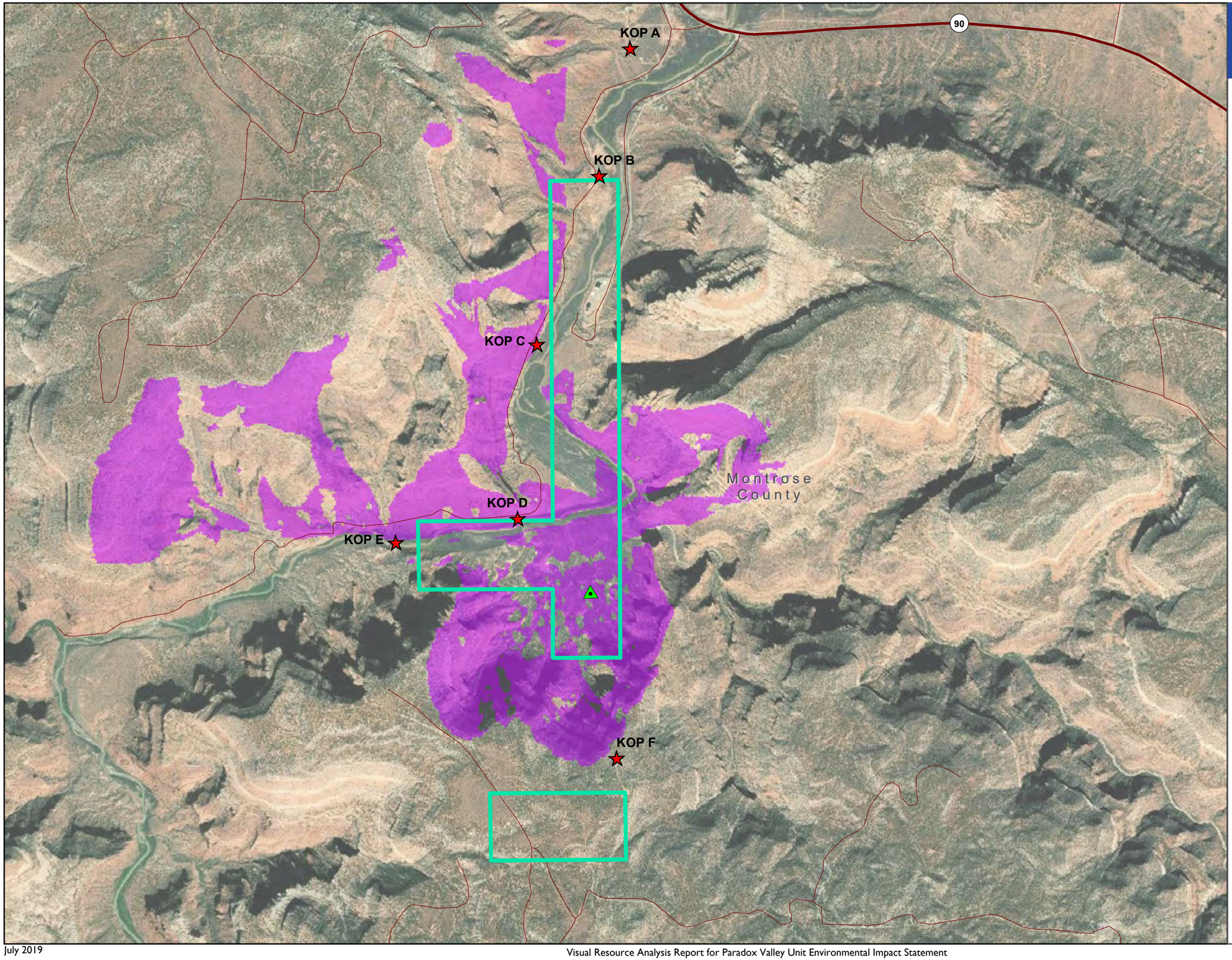
- Paradox Valley Unit project
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1- representative electrical pole 4 (37 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID4.mxd
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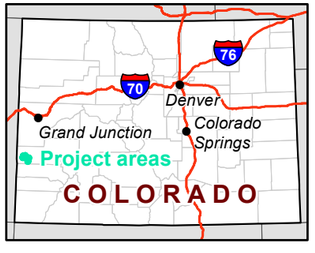
0 0.15 0.3
Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B1 Injection Building

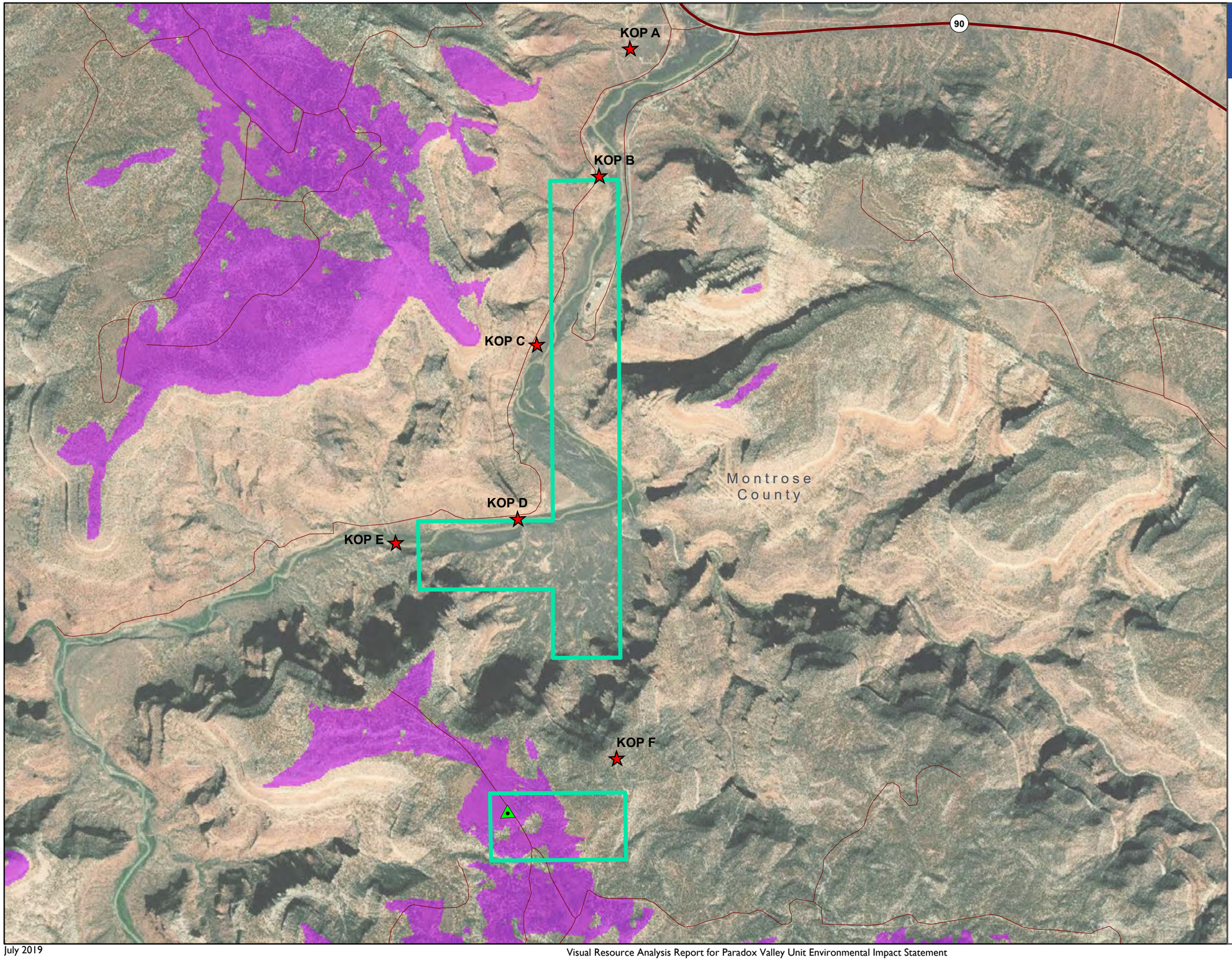
- Paradox Valley Unit project
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1- injection building (16 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PV\Visual_viewshed_ID5.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

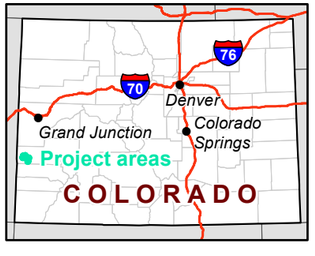
0 0.15 0.3
Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B1 Injection Well; WAMS Building

- Paradox Valley Unit project
- Roads
- Key observation points (KOPs)
- Alternative B, Area B1- injection well; WAMS building (12 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PV\Visual_viewshed_ID6.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

0 0.15 0.3
Miles

Appendix A

Alternative B, Area B1: Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP A (Alternative B, Area B1)

3. VRM Class None (not BLM-administered land)

4. Location

Township 47 N

Range 18 W

Section 19

5. Location Sketch

Refer to Appendix A Alternative B, Area B1 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind gentle sloping hills and uneven terrain	Short, rounded and ovate, asymmetrical	Rectangular houses and facility buildings, strands of utility lines, regularly spaced utility poles
LINE	Horizontal and diagonal, complex, converging	Horizontal and diagonal	Horizontal/vertical buildings, diagonal utility lines, vertical utility poles
COLOR	Rust, dark umber, light umber, light brown, tan	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer)	Pale green house, white and tan house, light grey facility buildings, light brown utility pole, light grey utility lines
TEX-TURE	Uneven and striated plateaus behind smooth and uniform hills	Coarse, stippled bushes and shrubs, medium grain	Stippled buildings and utility pole, smooth utility lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind gentle sloping hills and uneven terrain	Short, rounded and ovate, asymmetrical	Existing: Rectangular houses and facility buildings, strands of utility lines, regularly spaced utility poles New: Strands of utility lines, regularly spaced utility poles
LINE	Horizontal and diagonal, complex, converging	Horizontal and diagonal	Existing: Horizontal buildings, diagonal utility lines, vertical utility poles New: Diagonal utility lines, vertical utility poles
COLOR	Rust, dark umber, light umber, light brown, tan	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt orange bushes (in spring and winter)/olive green bushes (in summer)	Existing: Pale green house, white and tan house, light grey facility buildings, light brown utility pole, light grey utility lines New: Light grey utility lines, light brown utility poles
TEX-TURE	Uneven and striated plateaus behind smooth and uniform hills	Coarse, stippled bushes and shrubs, medium grain	Existing: Smooth buildings, smooth utility lines, stippled utility pole New: Smooth utility lines, stippled utility poles

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)
ELEMENTS	Form				X				X			X		Evaluator's Names Date 04/17/2019
	Line				X				X			X		Amanda Biedermann
	Color				X				X				X	Lindsay Chipman
	Texture				X				X			X		

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are utility poles (~32–37 feet maximum height) with utility lines (~25–33 feet maximum height). Although the KOP is approximately 0.5 miles outside the proposed project boundary, it is approximately 1 mile from proposed project features. The level of change to the characteristic landscape is low. At this distance, the degree of contrast created by the utility poles and lines is weak. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land at this location.

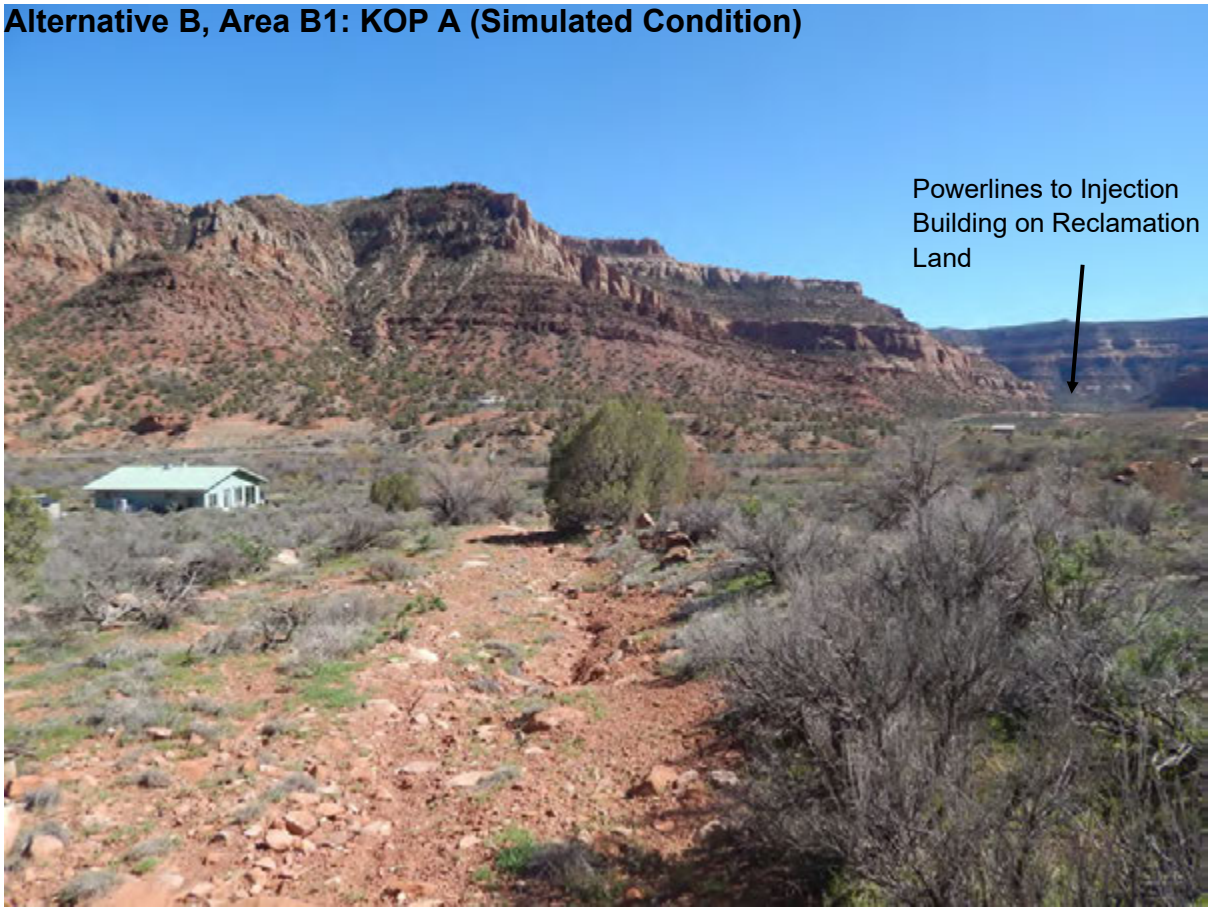
Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative B, Area B1: KOP A (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,017ft
Compass Direction of Photo: South
Timeframe for Simulated Condition: 10 years



Alternative B, Area B1: KOP A (Simulated Condition)



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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP B (Alternative B, Area B1)

3. VRM Class None (not BLM-administered land)

4. Location
Township 47 N
Range 18 W
Section 30

5. Location Sketch
Refer to Appendix A Alternative B, Area B1 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind gently sloping hills	Short, rounded and ovate	Flat roads
LINE	Horizontal and diagonal, complex, converging	Horizontal and diagonal, abrupt edge	Horizontal and diagonal
COLOR	Rust, dark umber, light orange, light brown, tan	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer)	Light umber roads
TEX-TURE	Uneven and striated plateaus behind smooth and uniform hills	Coarse, stippled bushes and shrubs, medium grain, moderately smooth	Smooth roads

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMEN	Form				X				X				X
	Line				X				X				X

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann

	Color				X				X				X	Lindsay Chipman
	Texture				X				X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP, due to gently sloping hills that block views. Although the KOP is on the project boundary, it is approximately 0.55 miles from proposed project features. There is no degree of contrast. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative B, Area B1: KOP B (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 4,974ft
Compass Direction of Photo: South
Timeframe for Simulated Condition: 10 years



Project Area Not Visible: No Simulation

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/18/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP C (Alternative B, Area B1)

3. VRM Class None (not BLM-administered land)

4. Location

Township 47 N

Range 18 W

Section 30

5. Location Sketch

Refer to Appendix A Alternative B, Area B1 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind steeper sloping convex hills and uneven terrain	Short, rounded, and ovate bushes	Rectangular buildings. Discrete, narrow line of fencing.
LINE	Horizontal and diagonal, complex, converging, hard and bold	Horizontal and diagonal	Vertical buildings. Horizontal fence lines, vertical fence poles.
COLOR	Rust, dark umber, light orange, light brown, tan, dark brown	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer), light green and yellow bushes/shrubs (in spring), light umber-tipped bushes (in spring)/light green (in summer)	Grey/tan buildings. Grey fence.
TEX-TURE	Uneven/rough and striated, smooth and uniform	Medium grain, moderately smooth, mostly uniform	Smooth buildings. Stippled fence lines and poles.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus, behind steeper sloping convex hills and uneven terrain	Short, rounded, and ovate bushes	Existing: Rectangular buildings. Discrete, narrow line of fencing. New: Rectangular injection building, strands of utility lines, regularly spaced utility poles
LINE	Horizontal and diagonal, complex, converging, hard and bold	Horizontal and diagonal	Existing: Vertical buildings. Horizontal fence lines, vertical fence poles. New: Vertical injection building, diagonal utility lines, vertical utility poles

COLOR	Rust, dark umber, light orange, light brown, tan, dark brown	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt orange bushes (in spring and winter)/olive green bushes (in summer), light green and yellow bushes/shrubs (in spring), light orange-tipped bushes (in spring)/light green (in summer)	Existing: Grey/tan buildings. Grey fence. New: Earth-toned injection building, light grey utility lines, light brown utility poles
TEX-TURE	Uneven/rough and striated, smooth and uniform	Medium grain, moderately smooth, mostly uniform	Existing: Smooth buildings. Stippled fence lines and poles. New: Smooth injection building, smooth utility lines, stippled utility poles

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form				X				X			X		Evaluator's Names Date 04/18/2019
	Line				X				X			X		Amanda Biedermann
	Color				X				X			X		Lindsay Chipman
	Texture				X				X			X		

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are the ~40- by 100-foot injection building and utility poles (~32–37 feet maximum height) with utility lines (~25–33 feet maximum height). The KOP is approximately 0.15 miles from proposed project features. At this distance, the degree of contrast created by the injection building and utility poles and lines is weak. Although the utility pole color allows them to blend with the color of the background, there are no other natural or artificial landscape elements of similar height. The level of change to the characteristic landscape is low, and the degree of contrast is weak. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

- Ensure use of earth-tone paints for the injection building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the injection building after construction; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the base of utility poles, as needed
- Relocate the closest portion of the utility pole route off the flat bench on the east side of the river to the east so that it more closely follows the slope-toe

Alternative B, Area B1: KOP C (Existing Condition)

Date: 04/18/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 4,979ft
Compass Direction of Photo: Southeast
Timeframe for Simulated Condition: 10 years



Alternative B, Area B1: KOP C (Simulated Condition)



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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/18/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP D (Alternative B, Area B1)

3. VRM Class None (not BLM-administered land)

4. Location

Township 47 N

Range 18 W

Section 31

5. Location Sketch

Refer to Appendix A Alternative B, Area B1 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind flat terrain, wide and gently curved river	Low, rounded and ovate bushes, asymmetrical, conical short trees	None
LINE	Horizontal and diagonal, complex and converging in plateau, horizontal and simple in front of plateau, curving horizontal river line	Horizontal and diagonal, abrupt edges	None
COLOR	Rust, dark umber, light umber, light brown, tan, dark brown, muddy brown river	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer), light green and yellow bushes/shrubs (in spring)	None
TEX-TURE	Uneven/rough and striated in plateau, smooth and uniform in front of plateau; smooth river	Coarse, stippled bushes and shrubs, medium grain, moderately smooth, dense and scattered areas	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind flat terrain, wide and gently curved river	Low, rounded and ovate bushes, asymmetrical, conical short trees, interrupted, flattened	Rectangular injection building, vertical utility fence, flat access road, flat bridge, strands of utility lines, regularly spaced utility poles
LINE	Horizontal and diagonal, complex and converging in plateau, horizontal and simple in front of plateau, curving horizontal river line, interrupted	Horizontal and diagonal, abrupt edges, disrupted, flattened	Vertical injection building, vertical utility fence, horizontal access road, horizontal bridge, diagonal utility lines, vertical utility poles
COLOR	Rust, dark umber, light umber, light brown, tan, dark brown, muddy brown river	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer), light green and yellow bushes/shrubs (in spring)	Earth-toned injection building, grey utility fence, light tan/dull white access road, grey bridge, light grey utility lines, light brown utility poles
TEX-TURE	Uneven/rough and striated in plateau, smooth and uniform in front of plateau; smooth river	Coarse, stippled bushes and shrubs, medium grain, moderately smooth, dense and scattered areas, flattened	Smooth injection building, stippled utility fence, smooth access road, smooth bridge, smooth utility lines, stippled utility poles

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form				X		X			X				Evaluator's Names Date 04/18/2019
	Line			X			X			X				Amanda Biedermann
	Color				X				X	X				Lindsay Chipman
	Texture				X		X			X				

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are the ~40- by 100-foot injection building, the ~20-foot-wide access road, box beam bridge, utility poles (~32–37 feet maximum height) with utility lines (~25–33 feet maximum height), injection well, and ~450- by 450-foot perimeter fence. Although the KOP is next to the proposed project boundary, it is approximately 0.25 miles from proposed project features. The level of change to the characteristic landscape is high. At this distance, the degree of contrast created by the proposed project features is strong. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

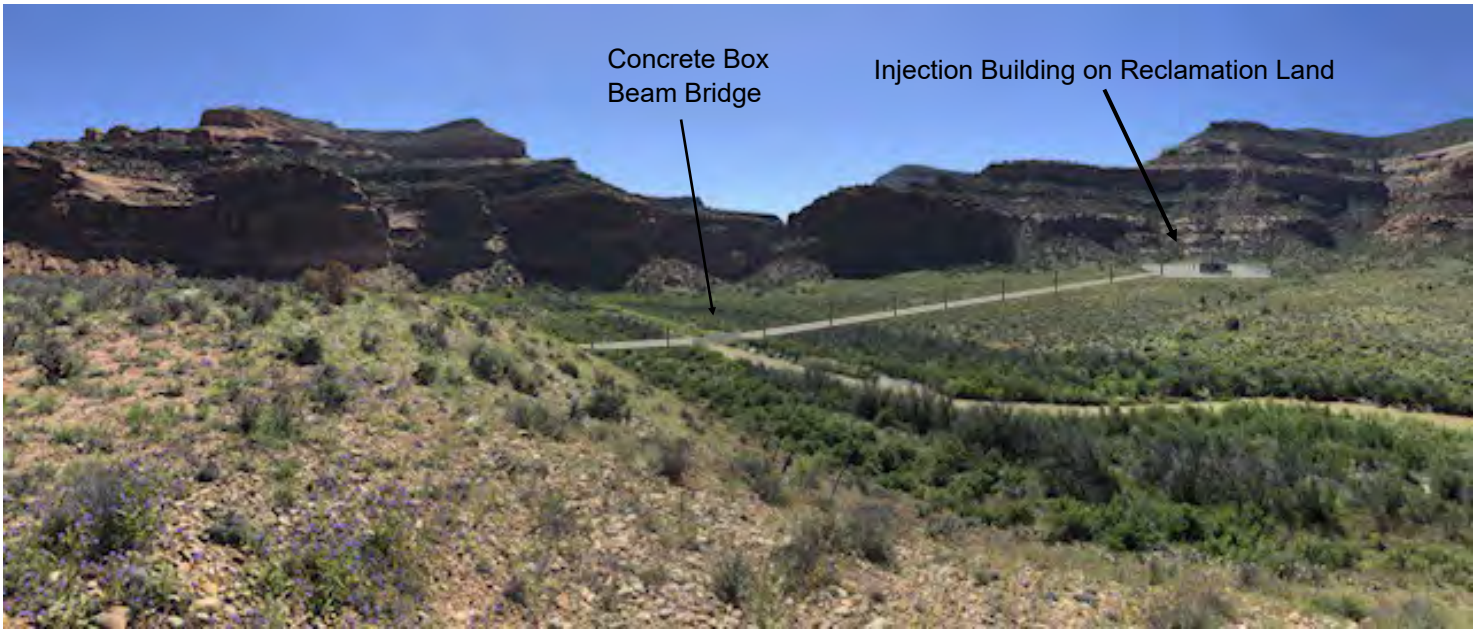
- Ensure the use of earth-tone paints for the injection building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate the area around the injection building and access road after construction; minimize clearing size by, for example, stripping vegetation only where necessary

Alternative B, Area B1: KOP D (Existing Condition)

Date: 04/18/2019
Camera: iPhone 8; 12-megapixel camera
Elevation of KOP: 5,027ft
Compass Direction of Photo: Southeast
Timeframe for Simulated Condition: 10 years



Alternative B, Area B1: KOP D (Simulated Condition)



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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/18/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP E (Alternative B, Area B1)

3. VRM Class None (not BLM-administered land)

4. Location
Township 47 N
Range 19 W
Section 36

5. Location Sketch
Refer to Appendix A Alternative B, Area B1 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus, diagonal hillsides, rippled and flat river	Low, rounded and ovate bushes, asymmetrical, straight and vertical taller brush close to river	None
LINE	Horizontal and diagonal, complex and converging; curving horizontal river	Horizontal and diagonal	None
COLOR	Rust, dark umber, light umber, light brown, tan, dark brown, muddy brown river	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), light green and yellow bushes/shrubs (in spring), light red/light brown brush	None
TEX-TURE	Uneven/rough and striated, rough hillsides; smooth river	Coarse, stippled bushes and shrubs, dense and clumped near river, uneven	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X				X
	Line				X				X				X
	Color				X				X				X

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/18/2019
Amanda Biedermann
Lindsay Chipman

	Texture				X				X				X

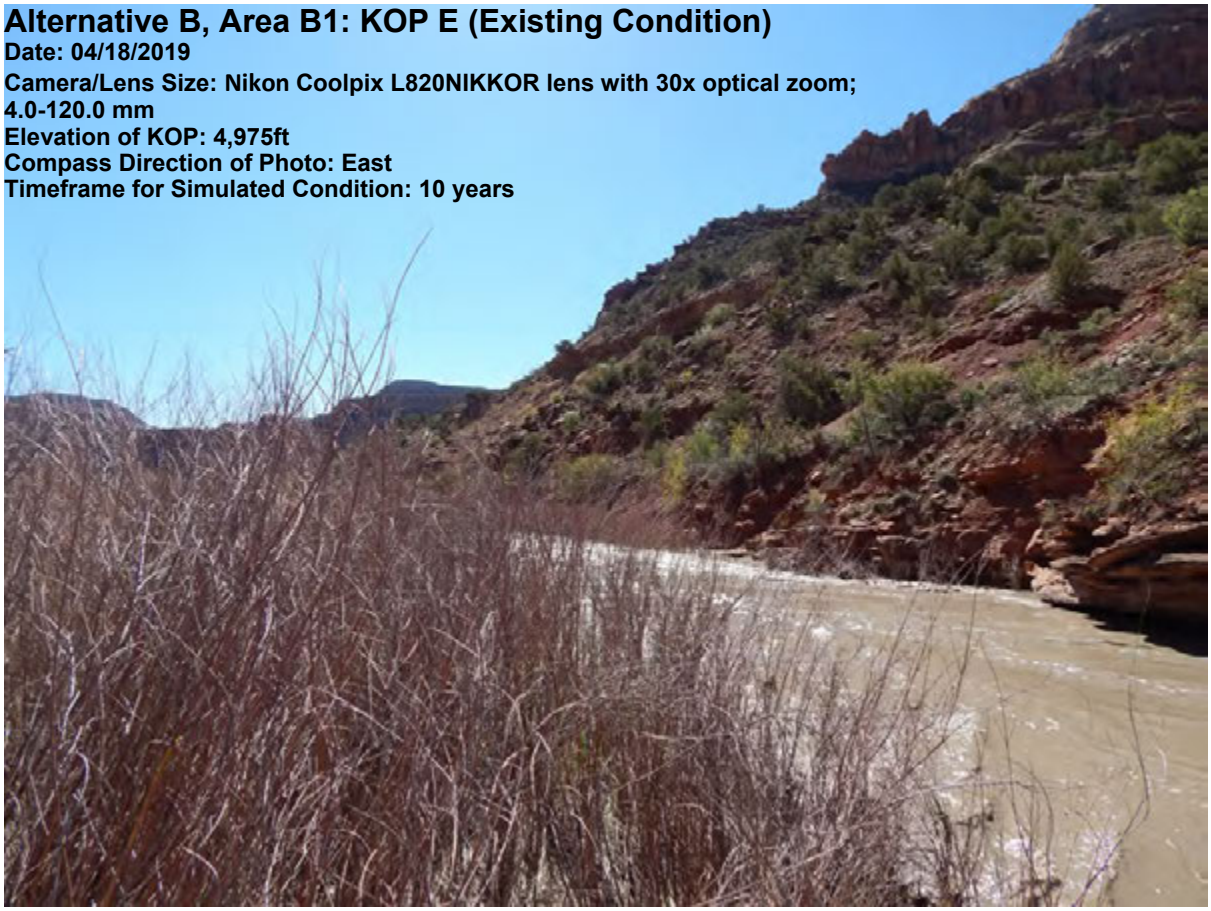
SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP, due to diagonal hillsides and vegetation that block views. Although the KOP is approximately 0.08 miles outside the proposed project boundary, the KOP is approximately 0.7 miles from the closest proposed project features. As a viewer travels along the river and closer to KOP D and proposed project features, the degree of contrast is expected to increase to strong. At this KOP, however, there is no degree of contrast. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

No mitigation measures required.



Project Area Not Visible: No Simulation

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/18/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP F (Alternative B, Area B1)

3. VRM Class III

4. Location
Township 46 N
Range 18 W
Section 6

5. Location Sketch
Refer to Appendix A Alternative B, Area B1 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Diagonal and rugged slope, rugged horizontal ridge, rugged slope	Low rounded bushes, taller asymmetrical trees	None
LINE	Horizontal and diagonal	Horizontal and diagonal	None
COLOR	Dull white, light tan, light brown, light orange, rust	Olive and dark green trees (year-round), bright green trees (year-round), sage-colored bushes (year-round), burnt umber trees/bushes	None
TEX-TURE	Smooth, even, uniform	Dense, continuous, medium grain, even	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X				X
	Line				X				X				X
	Color				X				X				X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/18/2019
Amanda Biedermann
Lindsay Chipman

	Texture				X				X				X

SECTION D. (Continued)

Comments from item 2.

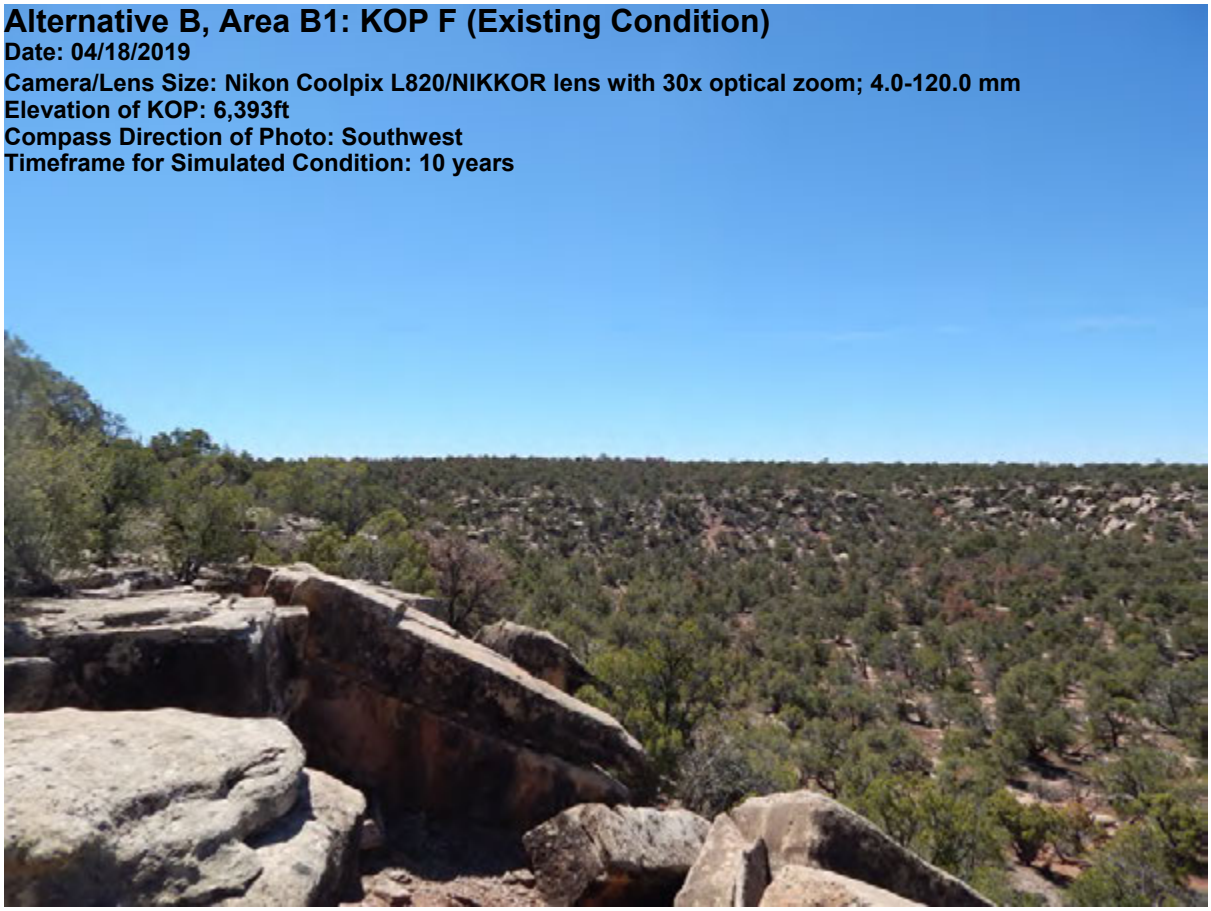
The proposed project area and features are not visible from this KOP, due to a rugged horizontal ridge that blocks views. Although the KOP is approximately 0.13 miles outside the project boundary, it is approximately 0.44 miles from proposed project features. There is no degree of contrast. The proposed project features meet VRM Class III objectives.

While the proposed project area is not visible from this KOP, the proposed project area could be visible to travelers on roads to and from the KOP. The proposed project area would likely only be visible to travelers for the limited amount of time it is within the viewshed of the road. During that time, the injection well head in the center of a 40-foot by 60-foot concrete pad may attract attention but would not dominate the view of the casual observer.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative B, Area B1: KOP F (Existing Condition)
Date: 04/18/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,393ft
Compass Direction of Photo: Southwest
Timeframe for Simulated Condition: 10 years



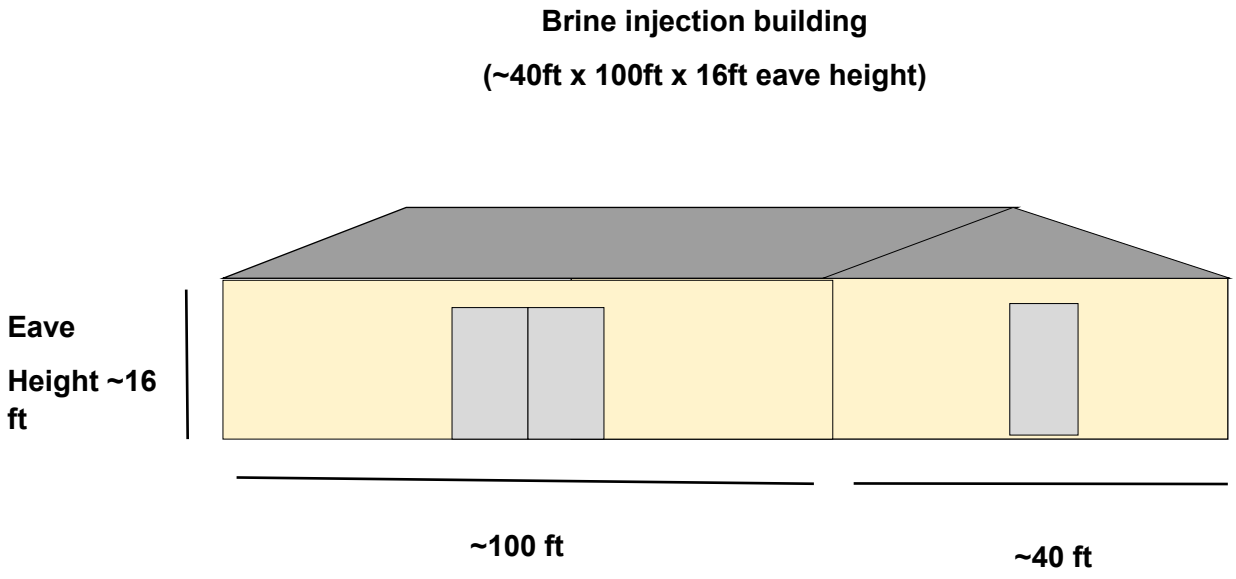
Project Area Not Visible: No Simulation

Appendix A

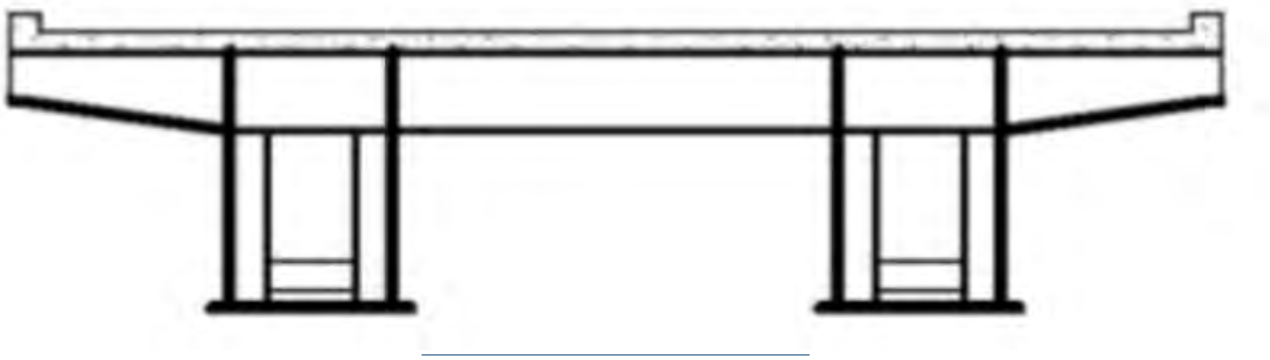
Alternative B, Area B1: Proposed Project Design Drawings

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Alternative B, Area B1: Brine Injection Building



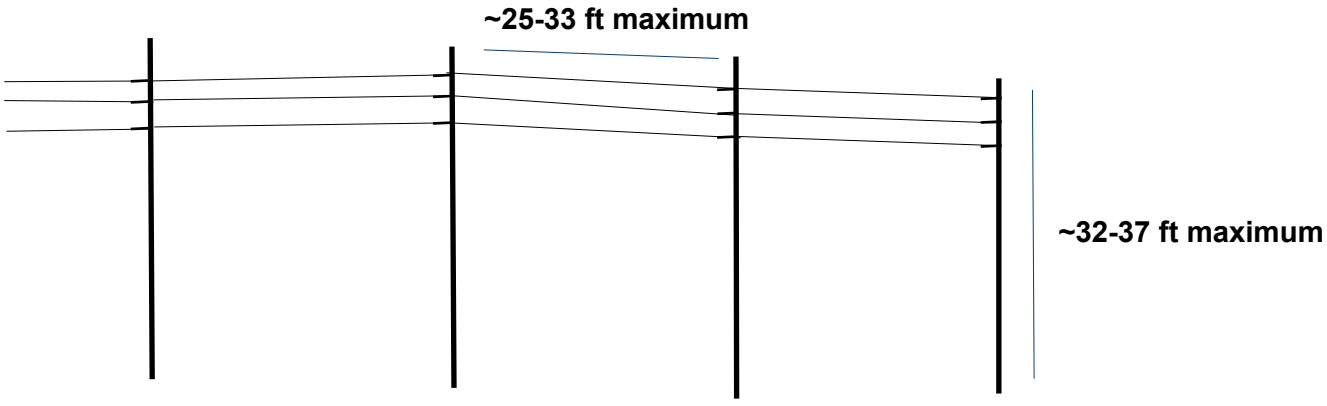
Alternative B, Area B1: Concrete Box Beam Bridge



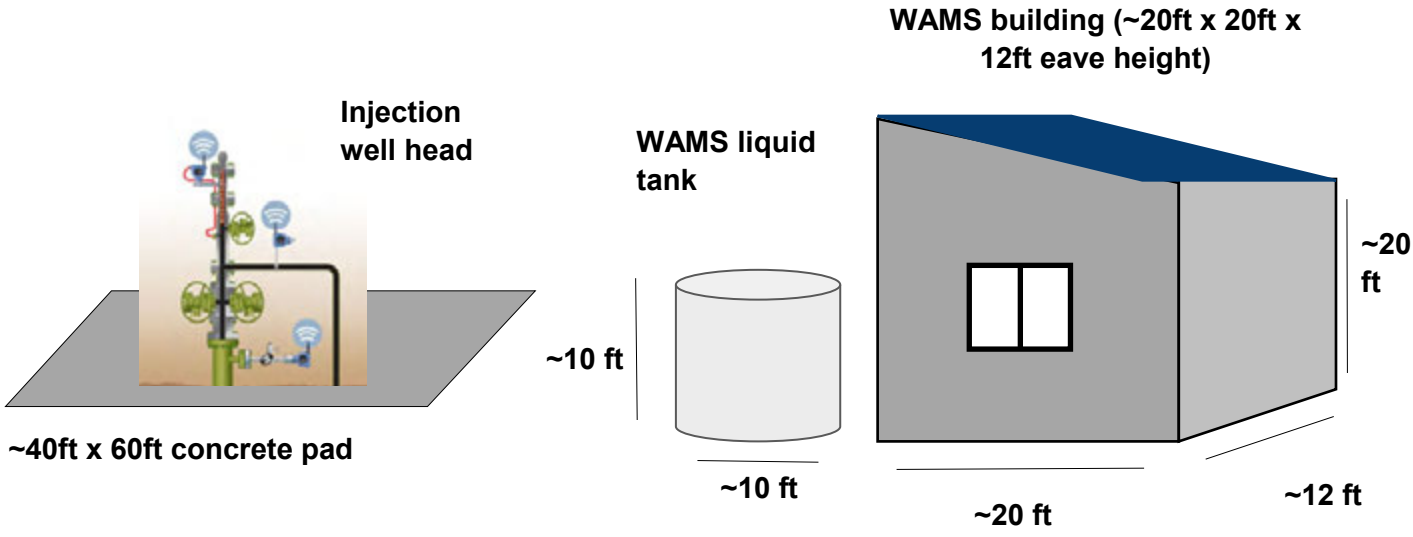
~100 ft

Alternative B, Area B1: Powerlines

Above ground power lines (~32-37 feet maximum height for poles; power line height ~25-33 feet)



Alternative B, Area B1: Injection Well Complex



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Appendix B

Alternative B, Area B2

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APPENDIX B

1 Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

2 Viewshed Analyses for Representative Proposed Project Features
Note: Viewshed analyses were prepared for representative proposed project features to identify their ability to be seen from the key observation points.

3 Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos
Note: Only a pipeline scar would be visible from key observation points J, K, L, and M. To streamline the presentation of photo simulations, only pipeline scars in photo simulations for KOP B for Alternative C, KOP N for Alternatives B, Area B2, C, and D, and KOP Q for Alternative B, Area B2 were prepared. Those photos simulations containing pipeline scars were used as representative pipeline scar photo simulations when analyzing impacts on visual resources at other key observation points containing pipeline scars when completing contrast rating worksheets.

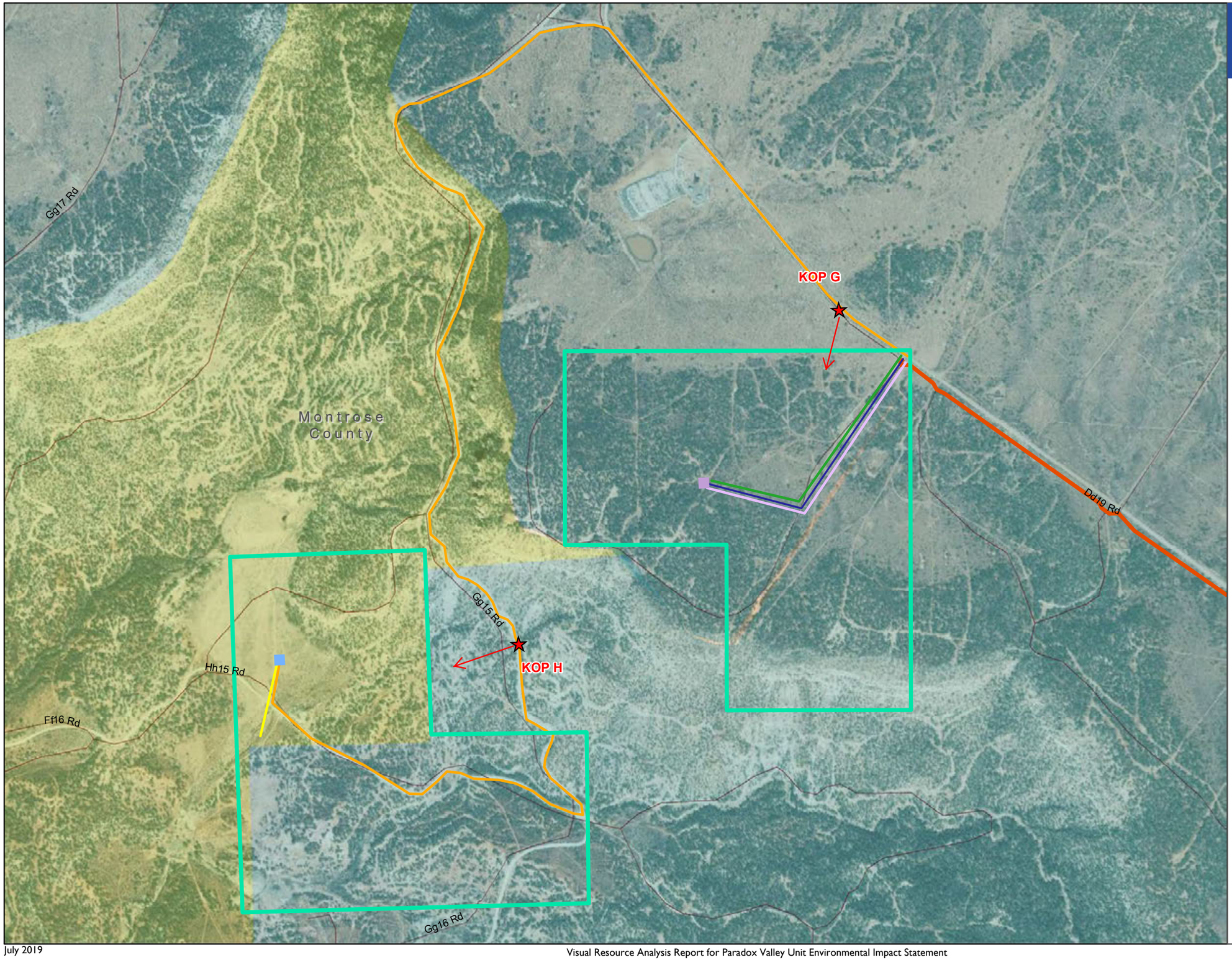
4 Proposed Project Design Drawings

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Appendix B

Alternative B, Area B2: Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

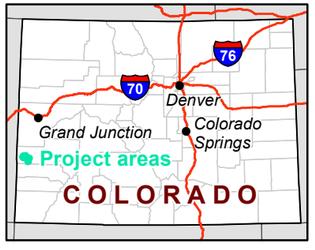
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RECLAMATION
Managing Water in the West

Alternative B, Area B2
Location Sketch KOP G and H

- Paradox Valley Unit project area
- Proposed pipeline
- Alternative B, Area B2 - Above ground powerlines to new Brine Injection Facility
- Alternative B, Area B2 - Brine pipeline to injection facilities on Monogram Mesa
- Alternative B, Area B2 - New access road
- Fawn Springs Bench Electric Line
- Fawn Springs Bench Pipeline
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2 - New Injection Building and Well With Fencing on Monogram Mesa
- Alternative B, Area B2 - New Injection Building and Well With Fencing on Fawn Springs Bench (backup to Monogram Mesa location)
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_B2_1.mxd
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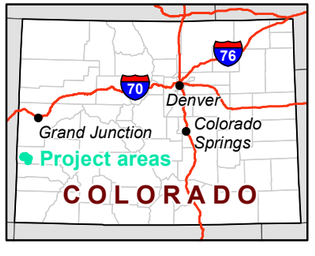
0 0.07 0.14
Miles



RECLAMATION
Managing Water in the West

Alternative B, Area B2
Location Sketch KOP Q

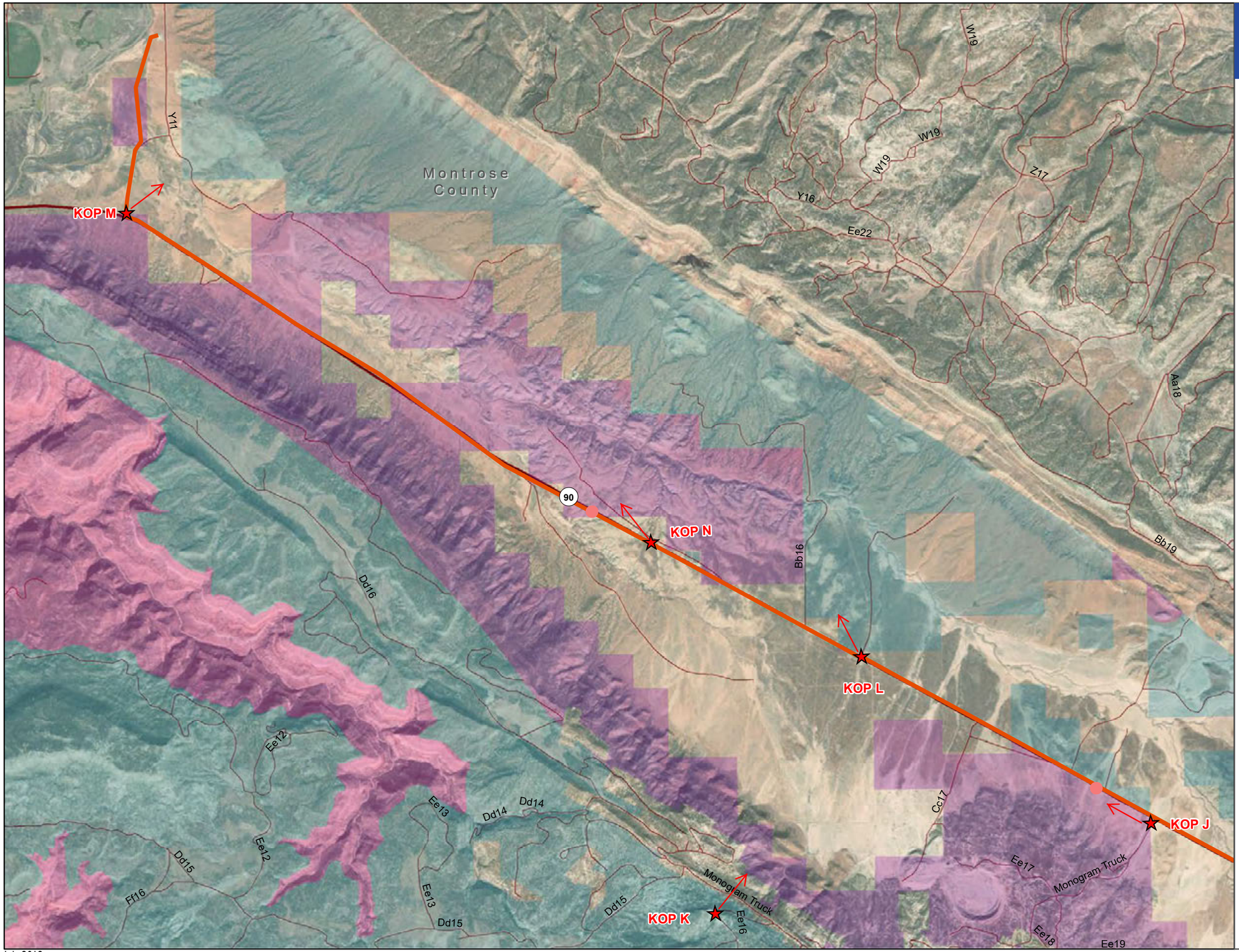
- Paradox Valley Unit project area
- Proposed pipeline
- Roads
- Key observation points (KOPs)
- Preliminary pump station
- VRM Class II



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
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PV\Visual_Sketch_B2_2.mxd
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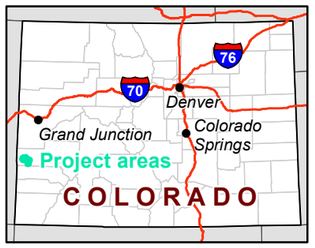
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RECLAMATION
Managing Water in the West

Alternative B, Area B2
Location Sketch
KOP J, K, L, M, N

- Paradox Valley Unit project
- Proposed pipeline
- Roads
- Key observation points
- Preliminary pump station
- VRM Class I
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
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PVUvisual_Sketch_B2_3.mxd
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Miles

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Appendix B

Alternative B, Area B2: Viewshed Analyses for Representative Proposed Project Features

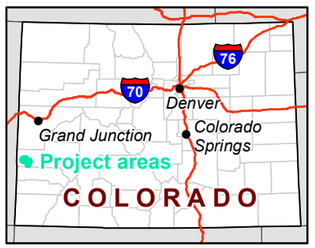
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RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Injection Building Fawn Springs Bench

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- injection building (16 ft)
- Visible

KOP M
KOP N
KOP L
KOP J
KOP K
KOP Q
KOP G
KOP H
Monogram Mesa
Fawn Springs Bench
90
141
Montrose County
San Miguel County



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
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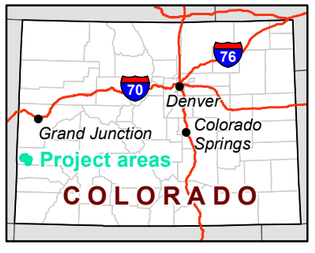
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Miles

RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Potential Pumping Station Location

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- potential pumping station location (12 ft)
- Visible

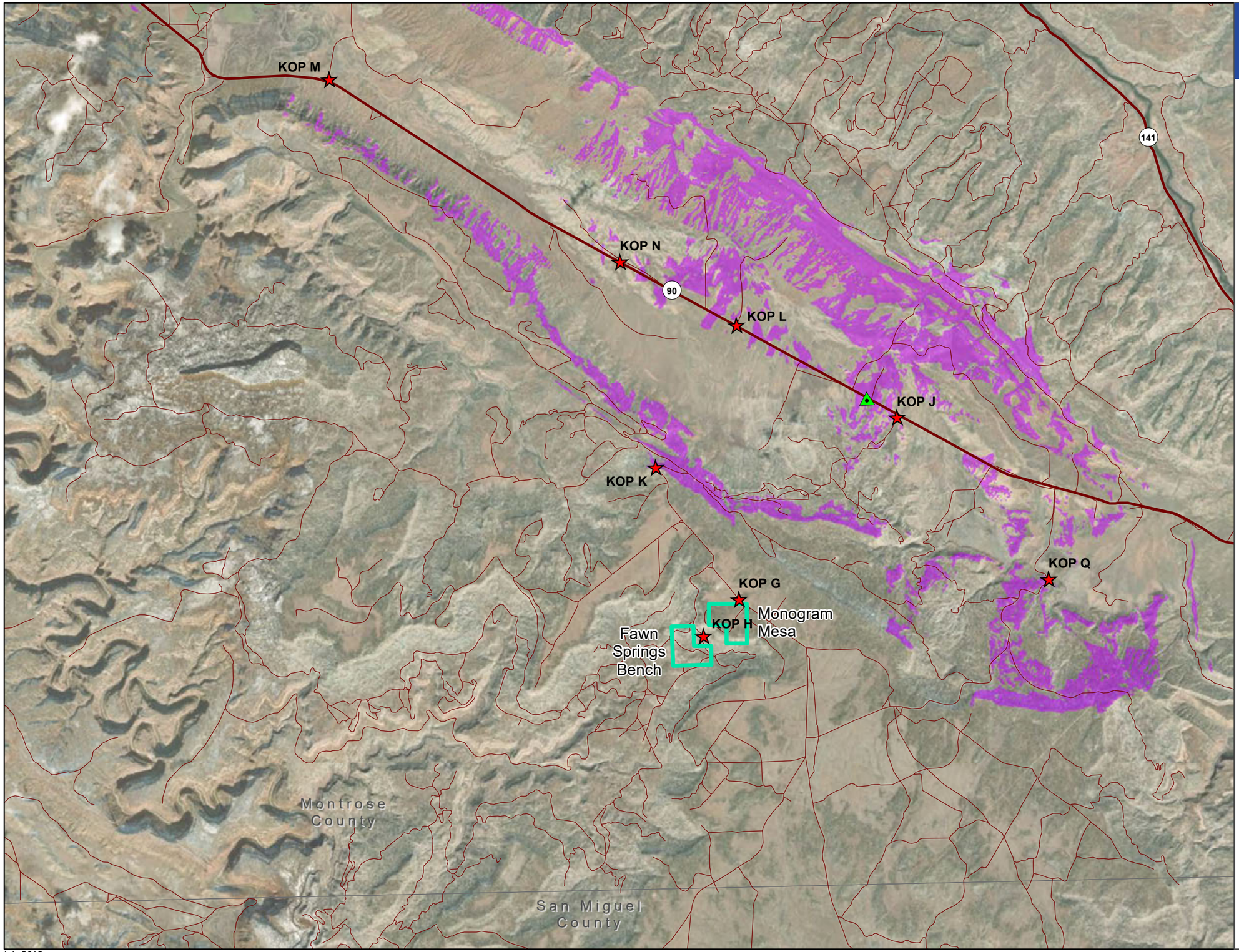
KOP M
KOP N
KOP L
KOP J
KOP K
KOP Q
KOP G
KOP H
Monogram Mesa
Fawn Springs Bench
90
141
Montrose County
San Miguel County



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
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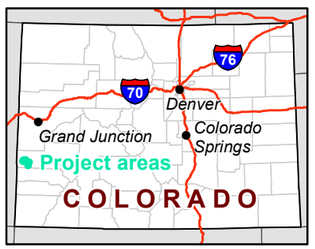
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Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Potential Pumping Station Location

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- potential pumping station location (12 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
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Western Colorado Area Office
July 15, 2019
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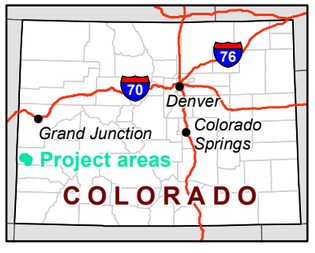
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Miles

RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Potential Pumping Station Location

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- potential pumping station location (12 ft)
- Visible

KOP M
KOP N
KOP L
KOP J
KOP K
KOP Q
KOP G
KOP H
Monogram Mesa
Fawn Springs Bench
90
141
Montrose County
San Miguel County



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
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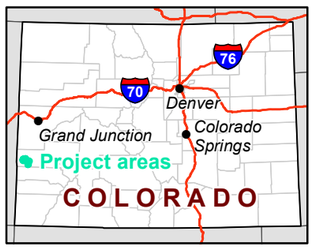
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Miles

RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Electric Line Fawn Springs Bench

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- electric line (37 ft)
- Visible

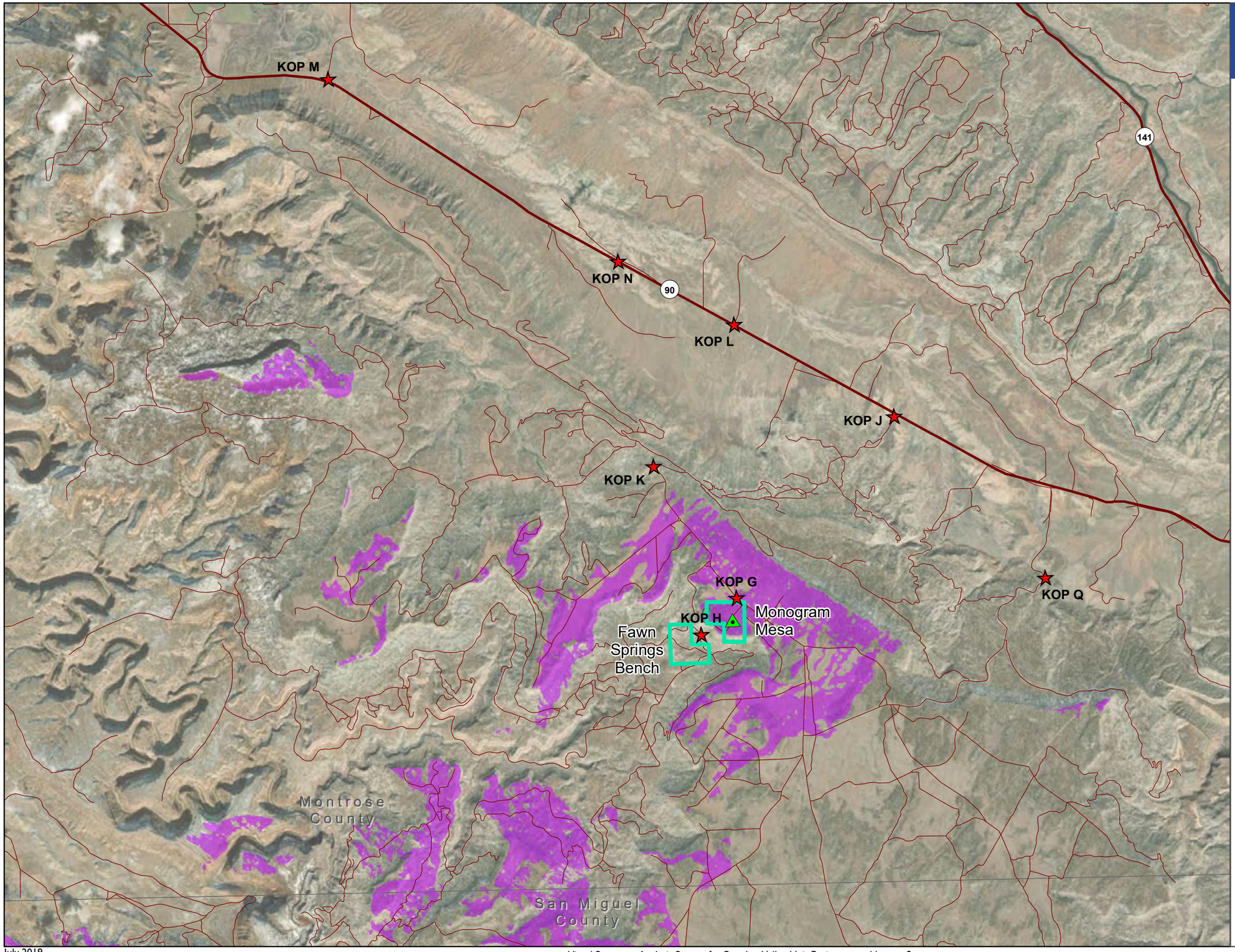
KOP M
KOP N
KOP L
KOP J
KOP K
KOP Q
KOP G
KOP H
Monogram Mesa
Fawn Springs Bench
90
141
Montrose County
San Miguel County



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
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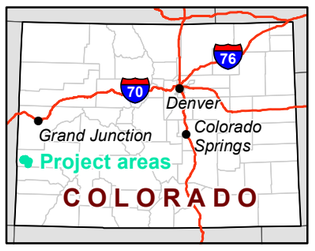
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Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Electric Line Monogram Mesa

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- electric line (37 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
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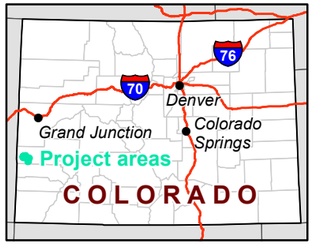
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Miles

RECLAMATION
Managing Water in the West

Viewshed for Alternative B, Area B2 Injection Building Monogram Mesa

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative B, Area B2- injection building (16 ft)
- Visible

KOP M
KOP N
KOP L
KOP J
KOP K
KOP G
KOP H
KOP Q
Monogram Mesa
Fawn Springs Bench
90
141
Montrose County
San Miguel County



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_viewshed_ID9.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

0 0.65 1.3
Miles

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Appendix B

Alternative B, Area B2: Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP G (Alternative B, Area B2)

3. VRM Class III

4. Location

Township 46 N

Range 17 W

Section 29

5. Location Sketch

Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Indistinct plateaus, flat, horizontal and linear	Low, rounded and ovate bushes, taller rounded and triangular trees	Flat gravel pile
LINE	Horizontal, smooth, simple, continuous, broken mountains and plateaus in background	Horizontal, smooth, simple, abrupt edge	Horizontal gravel pile
COLOR	Light brown, tan, light umber	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), sage-colored bushes (year-round)	Grey gravel pile
TEX-TURE	Smooth, even, uniform in background	Coarse, stippled bushes and shrubs, scattered, continuous, medium grain	Rocky, bumpy gravel pile

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Indistinct plateaus, flat/horizontal and linear	Low, rounded and ovate bushes, taller rounded and triangular trees	Existing: Flat gravel pile New: Strands of utility lines, regularly spaced utility poles
LINE	Horizontal, smooth, simple, continuous, broken mountains and plateaus in background	Horizontal, smooth, simple	Existing: Horizontal gravel pile New: Diagonal utility lines, vertical utility poles
COLOR	Light brown, tan, light umber	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), sage-colored bushes (year-round)	Existing: Grey gravel pile New: Light grey utility lines, light brown utility poles
TEX-TURE	Smooth/even, uniform in background	Coarse, stippled bushes and shrubs, scattered, continuous, medium grain	Existing: Rocky, bumpy gravel pile New: Smooth utility lines, stippled utility poles

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)
ELEMENTS	Form				X				X			X		Evaluator's Names Date 04/17/2019 Amanda Biedermann Lindsay Chipman
	Line				X				X			X		
	Color				X				X			X		
	Texture				X				X			X		

SECTION D. (Continued)

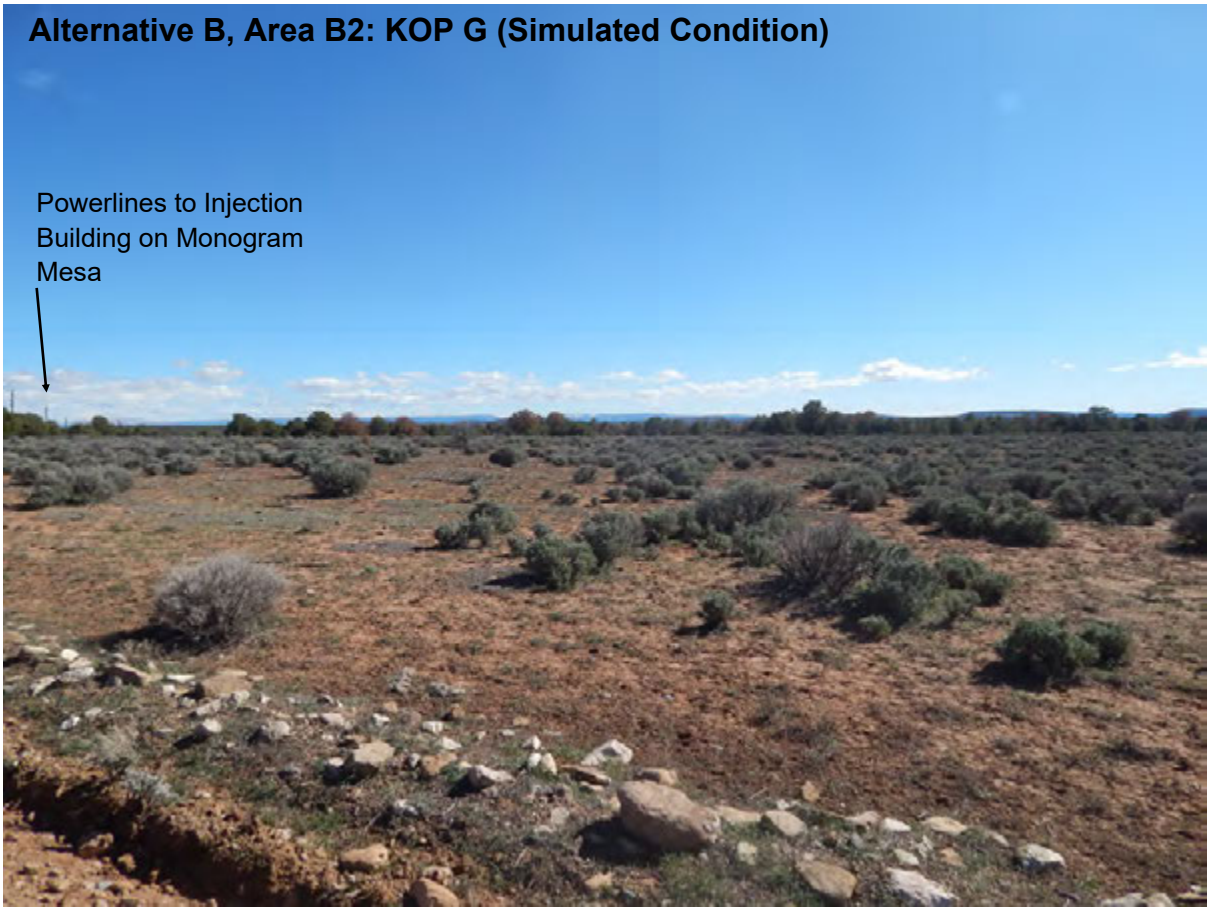
Comments from item 2.

The proposed project features visible from this KOP are utility poles (~32-37 feet maximum height) with utility lines (~25–33 feet maximum height). The pipeline, access road, injection facilities, and most of the utility poles to the south and southwest would not be visible, due to screening by vegetation. The level of change to the characteristic landscape is low. The degree of contrast created by the utility poles with utility lines is weak. This would conform with the VRM Class III objectives.

Additional Mitigating Measures (See item 3)

No mitigation measures required.


Alternative B, Area B2: KOP G (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,945ft
Compass Direction of Photo: South southwest
Timeframe for Simulated Condition: 10 years


Alternative B, Area B2: KOP G (Simulated Condition)
Powerlines to Injection Building on Monogram Mesa

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP H (Alternative B, Area B2)

3. VRM Class III and IV

4. Location

Township 46 N

Range 17 W

Section 32

5. Location Sketch

Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat plateaus in background, flat/horizontal and linear hills, some gentle sloping hills,	Low, rounded and ovate bushes, taller rounded and triangular trees, conical trees	Indistinct and rounded, flat gravel roads
LINE	Horizontal, diagonal, smooth, broken mountains and plateaus in background	Horizontal and diagonal, smooth	Horizontal, diagonal
COLOR	Light tan/white, light brown, tan, light grey	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), sage-colored bushes (year-round)	Light brown, tan, grey/dull white gravel roads
TEX-TURE	Smooth, even, uniform	Dense trees/bushes/shrubs, continuous, medium grain, uniform	Smooth gravel roads

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat plateaus in background, flat/horizontal and linear hills, some gentle sloping hills, linear pipeline scar	Low, rounded and ovate bushes, taller rounded and triangular trees, conical trees	Existing: Indistinct and rounded, flat gravel roads New: Rectangular injection building, flat access road
LINE	Horizontal, diagonal, smooth, broken mountains and plateaus in background, diagonal pipeline scar	Horizontal and diagonal, smooth	Existing: Horizontal, diagonal New: Vertical injection building, horizontal access road
COLOR	Light tan/white, light brown, tan, and light grey; tan pipeline scar	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), sage-colored bushes (year-round)	Existing: Light brown, tan, grey/dull white gravel roads New: Earth-toned injection building, tan access road
TEX-TURE	Smooth, even, and uniform; smooth pipeline scar	Dense trees/bushes/shrubs, continuous, medium grain, uniform	Existing: Existing: Horizontal, diagonal New: Smooth injection building, smooth access road

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X				X		Evaluator's Names Date 04/17/2019 Amanda Biedermann Lindsay Chipman
	Line			X				X				X		
	Color			X					X			X		
	Texture			X				X				X		

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is an injection building (~40 feet wide by 100 feet long, with 16-foot-high eave), pipeline scar, and the ~20-foot-wide access road. The KOP is on the pipeline and approximately 0.35 miles from the building. Most of the injection building complex is obscured by topography and vegetation. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetation area would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as revegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class III and IV objectives.

Additional Mitigating Measures (See item 3)

- Ensure use of earth-tone paints for the injection building, injection well complex, and pump stations; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the injection building, injection well complex, and pump stations after construction; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate pipeline scar and around access road

Alternative B, Area B2: KOP H (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,472ft
Compass Direction of Photo: Southwest
Timeframe for Simulated Condition: 10 years



Alternative B, Area B2: KOP H (Simulated Condition)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP J (Alternative B, Area B2)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 14

5. Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain with some rounded mounds backed by steeply rising plateaus	Strips of short, rounded, somewhat indistinct shrubs, flat, low grass	Strands of utility lines, isolated utility poles
LINE	Horizontal, vertical, and diagonal	Horizontal and diagonal, abrupt edge	Diagonal utility lines, horizontal and vertical utility poles
COLOR	Light brown, tan, rust	Dark green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	Light to dark grey utility lines, dark brown utility poles
TEX-TURE	Smooth, bumpy, striated	Smooth grass to moderately rough and patchy shrubs	Smooth utility lines and stippled poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain with some rounded mounds backed by steeply rising plateaus; interruption from linear pipeline scar	Strips of short, rounded, somewhat indistinct shrubs; flat, low grass; interrupted, flattened	Existing: Strands of utility lines, isolated utility poles New: No new project structures
LINE	Horizontal, vertical, and diagonal; broken, horizonal pipeline scar	Horizontal and diagonal, abrupt edge, discontinuous, flattened	Existing: Diagonal utility lines, horizontal and vertical utility poles New: No new project structures
COLOR	Light brown, tan, rust, tan pipeline scar	Dark green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	Existing: Light to dark grey utility lines; dark brown utility poles New: No new project structures
TEX-TURE	Smooth, stippled, striated, contrasting, smooth pipeline scar	Smooth grass to moderately rough and patchy shrubs, flattened	Existing: Smooth utility lines and poles New: No new project structures

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
EL	Form			X				X					X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019

	Line			X				X					X	Amanda Biedermann Lindsay Chipman
	Color			X					X				X	
	Texture			X				X					X	

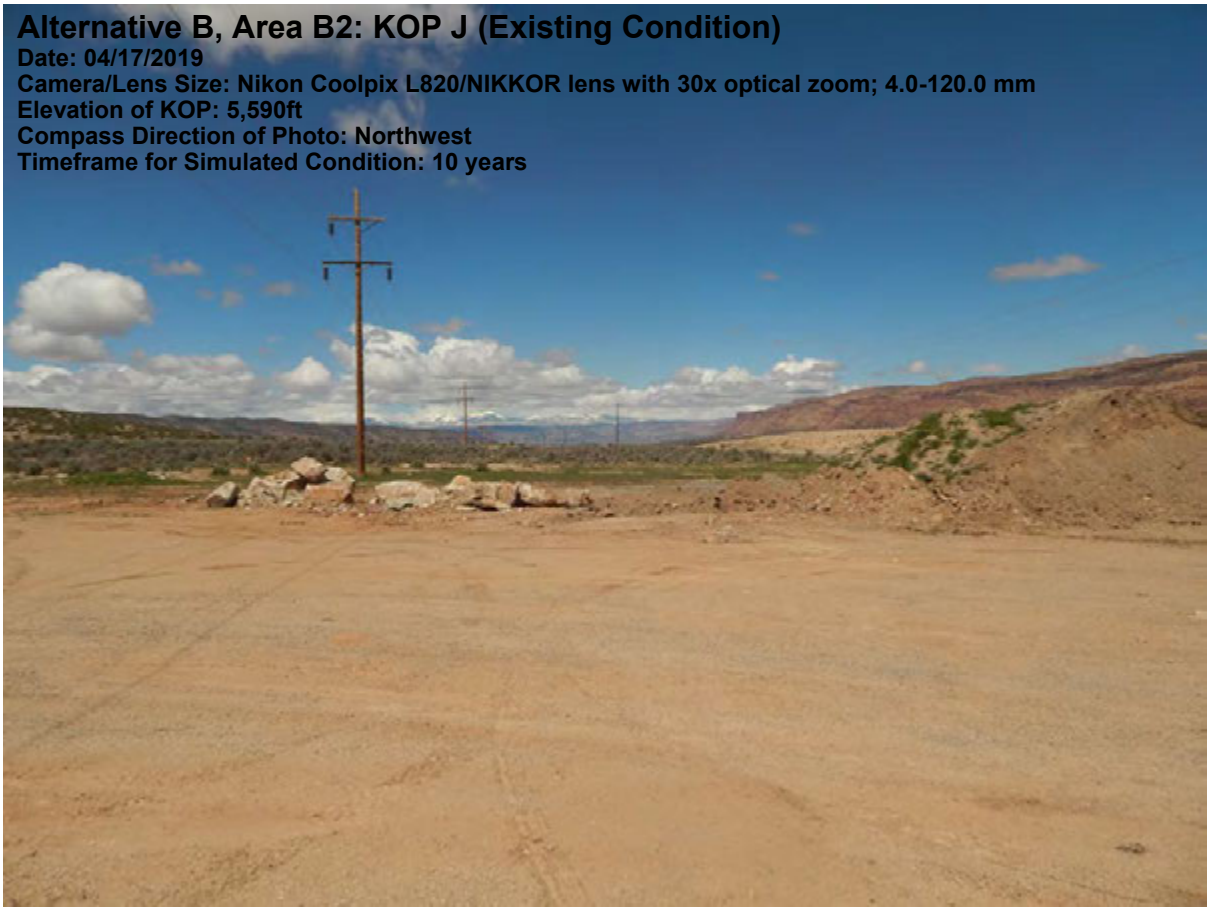
SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar. The KOP is approximately 0.03 miles from the scar, which would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar after installation, the degree of contrast could be minimized or eliminated. Although the color of the revegetation would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the revegetation area matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.



Pipeline Scar Not Simulated—See Alternative B, Area B2 KOPs N and Q for examples of pipeline scars.

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(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP K (Alternative B, Area B2)

3. VRM Class II and none (not BLM-administered land)

4. Location
Township 46 N
Range 17 W
Section 18

5. Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat expanse backed by steeply rising plateaus and jagged peaks	Jagged trees; flat grass/shrubs	Flat, linear roads and discrete, narrow, linear power lines
LINE	Horizontal, diagonal, vertical	Horizontal, diagonal, vertical	Horizontal and diagonal roads; diagonal power lines
COLOR	Light to medium brown, rust, light to medium grey, white	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks	Light brown roads, dark grey power lines
TEX-TURE	Coarse to smooth, striated, jagged	Coarse and clumped, smooth and gridded	Smooth, gridded roads, smooth power lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat expanse interrupted; backed by steeply rising plateaus and jagged peaks; interruption from linear pipeline scar	Jagged trees, flat grass/shrubs, interrupted	Existing: Flat, linear roads and discrete, narrow, linear power lines New: No new project structures visible
LINE	Horizontal, diagonal, vertical, gridded/broken, horizonal pipeline scar	Horizontal, diagonal, vertical, discontinuous	Existing: Horizontal and diagonal roads; diagonal power lines New: No new project structures visible
COLOR	Light to medium brown, rust, light to medium grey, white, tan pipeline scar	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks	Existing: Light brown roads, dark grey and power lines New: No new project structures visible
TEX-TURE	Coarse to smooth, striated, jagged, contrasting, smooth pipeline scar	Coarse and clumped, smooth and gridded	Existing: Smooth, gridded roads, smooth power lines New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☒ Yes ☐ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP would be the ~20-foot-wide pipeline scar. The KOP is approximately 2.2 miles from the proposed project feature. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the revegetation area matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

Alternative B, Area B2: KOP K (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,946ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 10 years



Pipeline Scar Not Simulated—See Alternative B, Area B2 KOPs N and Q for examples of pipeline scars.

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DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP L (Alternative B, Area B2)

3. VRM Class II and III

4. Location
Township 46 N
Range 17 W
Section 8

5. Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau	Short, flat, patchy	None
LINE	Horizontal, vertical, and diagonal	Horizontal and diagonal, diffuse edge	None
COLOR	Light brown, tan, rust	Light green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	None
TEX-TURE	Smooth to striated	Patchy grass to low/moderately coarse shrubs	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

	FEATURES											
	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS Form				X				X				X
ELEMENTS Line				X				X				X
ELEMENTS Color				X				X				X
ELEMENTS Texture				X				X				X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann
Lindsay Chipman

SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP. Although the KOP is approximately 0.1 miles from the proposed pipeline under Alternative C, this project feature is not visible from the KOP; this is due to the topography and vegetation that block views. There is no degree of contrast. The proposed project features conform with VRM Class II and III objectives.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative B, Area B2: KOP L (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,441ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Project Area Not Visible: No Simulation

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VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP M (Alternative B, Area B2)

3. VRM Class III

4. Location
Township 47 N
Range 18 W
Section 21

5. Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau	Short, rounded, patchy shrubs; linear bands and a few solitary mounds	Discrete, narrow lines of fencing
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal, shrubs rugged in foreground	Horizontal fence lines, vertical fence poles
COLOR	Light to medium-reddish brown, rust, tan	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Dark grey fence lines, light brown poles
TEX-TURE	Smooth, striated, slightly rough	Patchy, moderately coarse, becoming smother and more uniform	Stippled fence lines and poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau; interruption from linear pipeline scar	Short, rounded, patchy shrubs; linear bands and a few solitary mounds, interrupted	Existing: discrete, narrow lines of fencing New: No new project structures visible
LINE	Horizontal, vertical, and diagonal; broken/discontinuous, horizontal pipeline scar	Horizontal, vertical, and diagonal, shrubs rugged in foreground, discontinuous	Existing: Horizontal fence lines, vertical fence poles New: No new project structures visible
COLOR	Light to medium-reddish brown, rust, tan; tan pipeline scar	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Existing: Dark grey fence lines, ash brown poles New: No new project structures visible
TEX-TURE	Smooth, striated, slightly rough, smooth pipeline scar	Patchy, moderately coarse, becoming smoother and more uniform	Existing: Stippled fence lines and poles New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☒ Yes ☐ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar. The KOP is approximately 0 miles from the proposed project feature, as the pipeline scar would run directly across the KOP. The scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

Alternative B, Area B2: KOP M (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,025ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 10 years



Pipeline Scar Not Simulated—See Alternative B, Area B2 KOPs N and Q for examples of pipeline scars.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP N (Alternative B, Area B2)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 6

5. Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to gently sloping terrain; lined by steeply rising plateaus; jagged peaks in background	Short, flat, patchy grass; clumped, rounded shrubs	Discrete, narrow lines of fencing; flat, slightly curving road
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal, abrupt edges	Horizontal fence/utility lines and road, vertical fence/utility poles
COLOR	Light to medium-reddish brown	Light green grass in spring/summer, light brown grass in fall/winter, dark green, pale yellow shrubs	Dark grey to dark brown fence lines and poles, light grey road, dark grey utility poles
TEX-TURE	Smooth to striated	Patchy grass to moderately coarse shrubs	Smooth road, stippled fence/utility poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to steep terrain, interrupted, lined by steeply rising plateaus; jagged peaks in background; flat, linear pipeline scar	Short, flat, patchy grass; clumped, rounded shrubs; interrupted, flattened	Existing: Discrete, narrow lines of fencing; flat, slightly curving road New: Geometric, isolated, prominent pump station
LINE	Horizontal, vertical, diagonal, broken, horizontal pipeline scar	Horizontal, vertical, diagonal, discontinuous, flattened	Existing: Horizontal fence/utility lines and road, vertical fence/utility poles New: Vertical and horizontal pump station
COLOR	Light to medium-reddish brown, tan pipeline scar	Light green grass in spring/summer, light brown grass in fall/winter, dark green, pale yellow shrubs	Existing: Dark grey to dark brown fence lines and poles, light grey road, dark grey utility poles New: Earth-toned pump station
TEX-TURE	Smooth to striated, discontinuous; smooth pipeline scar	Patchy grass to moderately coarse shrubs, flattened	Existing: Smooth road, stippled fence/utility poles New: Smooth pump station

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X				X		Evaluator's Names Date 04/17/2019
	Line			X				X				X		Amanda Biedermann
	Color			X					X			X		Lindsay Chipman
	Texture			X				X				X		

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are a pump station (~10.5 feet long, 20 feet wide, and 10.5 feet tall) and ~20-foot-wide pipeline scar. The KOP is approximately 0.3 miles from the pump station and 0 miles from the pipeline scar. The pump station would be partially obstructed by vegetation. Although the earth-tone color of the pump station allows it to blend with the color of the surroundings and background, there are no other natural or artificial features of similar height. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, the sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the new vegetation matures. Eventually, the degree of contrast created by the proposed project features would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

- Ensure the use of earth-tone paints for the pump station; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the pump station after construction; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate the pipeline scar

Alternative B, Area B2: KOP N (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,404ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Alternative B, Area B2: KOP N (Simulated Condition)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Alternatives Study

2. Key Observation Point KOP Q (Alternative B, Area B2)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 25

5. Refer to Appendix B Alternative B, Area B2 project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat and gently sloped terrain backed by rugged plateaus with steep walls	Rounded, rugged, triangular, patchy	Flat, linear gravel road
LINE	Horizontal, vertical, diagonal	Horizontal, vertical, diagonal	Diagonal, slightly curving road
COLOR	Light brown, light to medium grey, rust	Medium to dark green and medium grey and brown in foreground; medium green in mid/background	Light to medium grey road
TEX-TURE	Rough, jagged rocks in foreground; transitioning into smooth hills and plateaus in background	Patchy, coarse in foreground, smooth in background	Smooth to moderately rough road

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat and gently sloped terrain backed by rugged plateaus with steep walls; interruption from linear pipeline scar	Rounded, rugged, triangular, patchy, interrupted, flattened	Existing: Flat linear gravel road New: Geometric, isolated, prominent pump station
LINE	Horizontal, vertical, diagonal, broken; horizontal pipeline scar	Horizontal, vertical, diagonal, discontinuous, flattened	Existing: Diagonal, slightly curving road New: Vertical pump station
COLOR	Light brown, light to medium grey, rust, tan pipeline scar	Medium to dark green and medium grey and brown in foreground; medium green in mid/background	Existing: Light to medium grey road New: Earth-toned pump station
TEX-TURE	Rough, jagged rocks in foreground; smooth hills and plateaus in background, smooth pipeline scar	Patchy, coarse in foreground, smooth hills in background, flattened	Existing: Smooth to moderately rough road New: Smooth pump station

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form			X				X			X		
	Line			X				X			X		

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann

	Color			X					X		X			Lindsay Chipman
	Texture			X				X			X			

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are a pump station (~10.5-feet long, 20-feet wide, and 10.5-feet tall) and a ~20-foot-wide pipeline scar. The KOP is approximately 0.03 miles from the pump station and 0.03 miles from the pipeline scar. The pump station would be partially obstructed by topography. Although the earth-tone color of the pump station allows it to blend with the color of the surroundings and background, there are no other natural or artificial features of similar height. Also, the angular appearance and prominence of the pump station in the landscape would attract attention. But it would not be visible for an extended period, due to its size and topography. The pipeline scar would be parallel to the road and obstructed by topography. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape and the degree of contrast created by the proposed project feature would be moderate. Taking into consideration the limited extent and duration of the view of the pump station on a hilly and winding road, the proposed project features conform with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

- Ensure the use of earth-tone paints for the pump station; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the pump station after construction; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate the pipeline scar

Alternative B, Area B2: KOP Q (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,944ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Alternative B, Area B2: KOP Q (Simulated Condition)



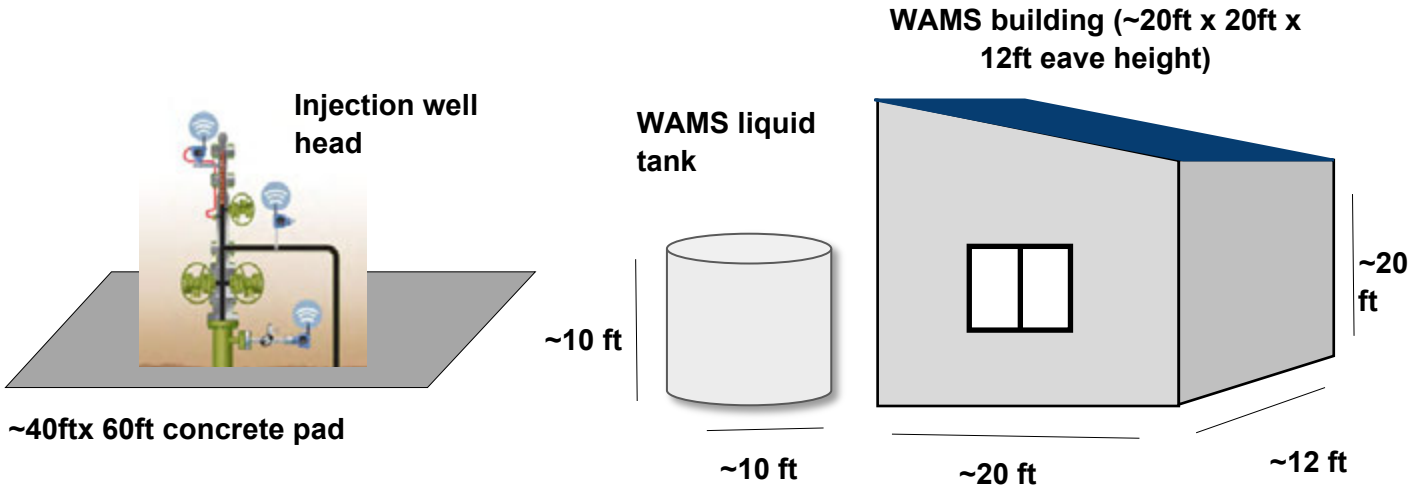
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Appendix B

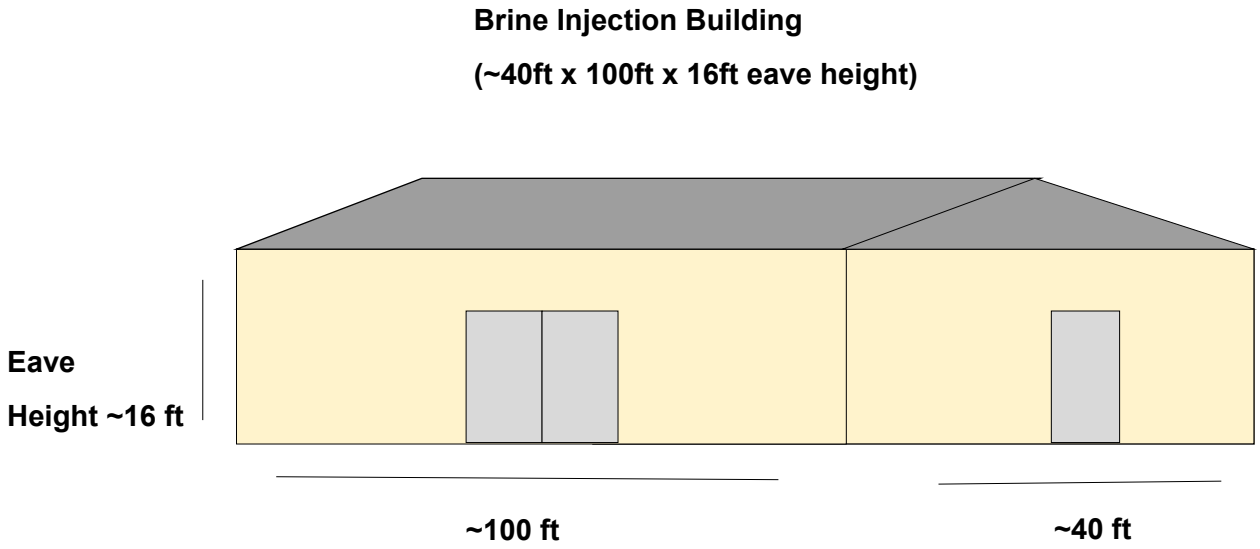
Alternative B, Area B2: Proposed Project Design Drawings

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Alternative B, Area B2: Injection Well Complex

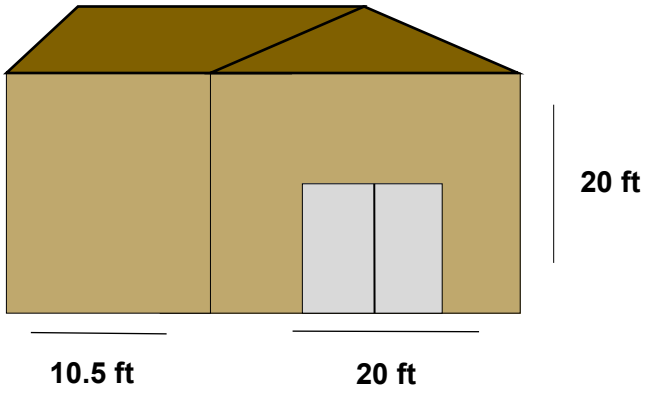


Alternative B, Area B2: Brine Injection Building



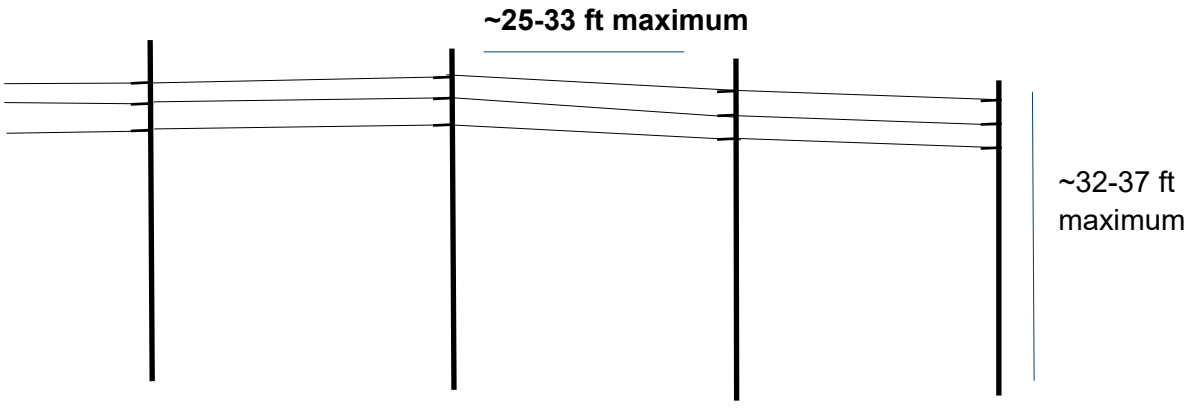
Alternative B, Area B2: Pump Station

Pump Station Building (~10.5ft x 20ft x 20ft)



Alternative B, Area B2: Powerlines

Above ground power lines (~32-37 feet maximum height for poles; power line height ~25-33 feet)



Appendix C

Alternative C

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APPENDIX C

1 Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

2 Viewshed Analyses for Representative Proposed Project Features
Note: Viewshed analyses were prepared for representative proposed project features to identify their ability to be seen from the key observation points.

3 Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos
Note: Key observation points A, J, O, and P do not have photo simulations because project features are not visible from the key observation point. Only a pipeline scar would be visible from key observation point M. To streamline the presentation of photo simulations, only pipeline scars in photo simulations for KOP B for Alternative C, KOP N for Alternatives B, Area B2, C, and D, and KOP Q for Alternative B, Area B2 were prepared. Those photos simulations containing pipeline scars were used as representative pipeline scar photo simulations when analyzing impacts on visual resources at other key observation points containing pipeline scars when completing contrast rating worksheets.

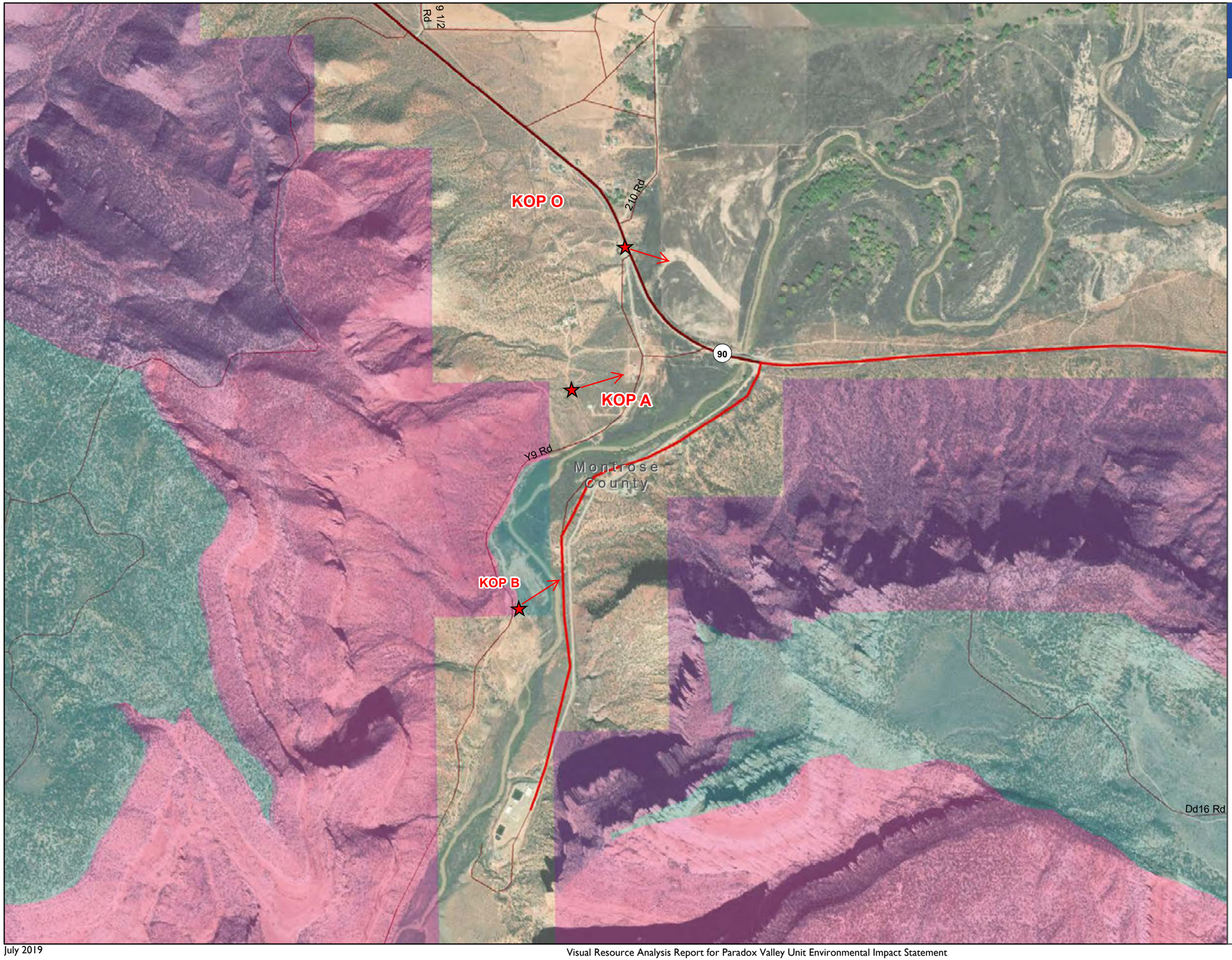
4 Proposed Project Design Drawings

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Appendix C

Alternative C: Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

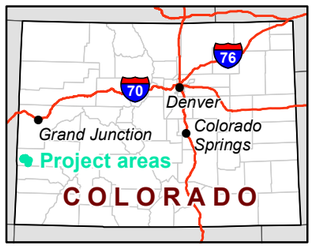
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RECLAMATION
Managing Water in the West

Alternative C
Location Sketch
KOP A, B, O

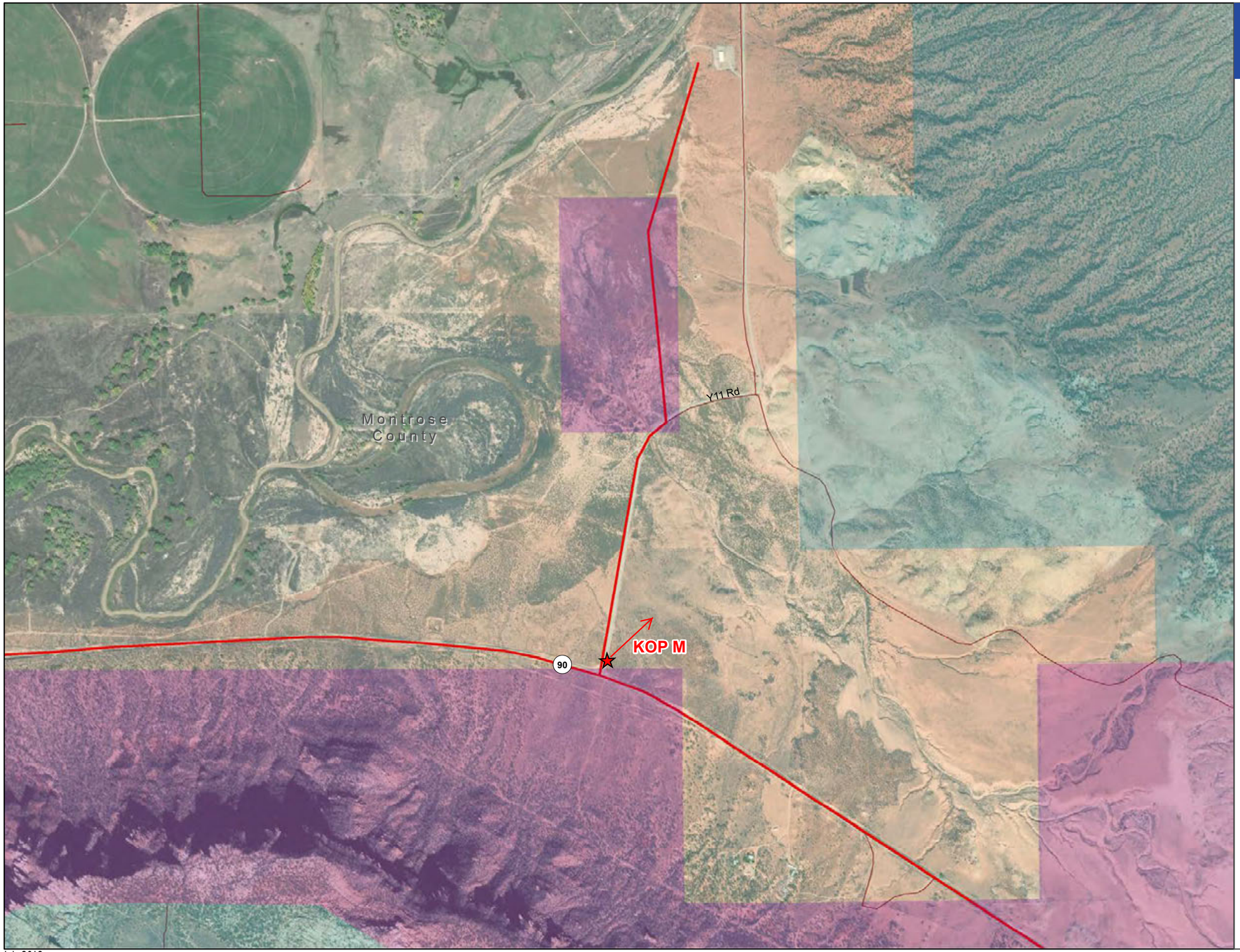
- Paradox Valley Unit project area
- Proposed pipeline
- Roads
- VRM Class I
- VRM Class II
- VRM Class III



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_C_1.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

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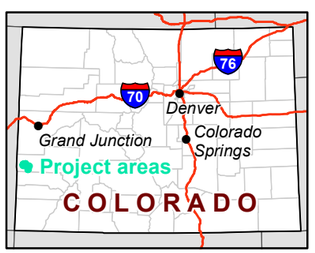
0 0.1 0.2
Miles



RECLAMATION
Managing Water in the West

Alternative C
Location Sketch KOP M

- Paradox Valley Unit project area
- Proposed pipeline
- Roads
- VRM Class I
- VRM Class II
- VRM Class III



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_C_2.mxd
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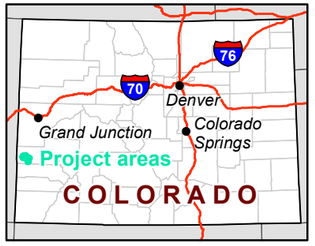
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0 0.1 0.2
Miles

RECLAMATION
Managing Water in the West

Alternative C
Location Sketch
KOP I, J, K, P, N, L

- Paradox Valley Unit project area
- Bittern Pond
- Bittern Storage Pond
- Concentrator Pond
- Crystallizer Pond 1
- Crystallizer Pond 2
- Crystallizer Pond 3
- Crystallizer Pond 4
- Fresh Water Pond
- Hydrogen Sulfide Treatment Building
- Landfill Cells
- Surge Pond
- Wildlife fencing
- Proposed pipeline
- Evaporation pond to landfill road
- Relocated road alignment
- Roads
- VRM Class I
- VRM Class II
- VRM Class III



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_C_3.mxd
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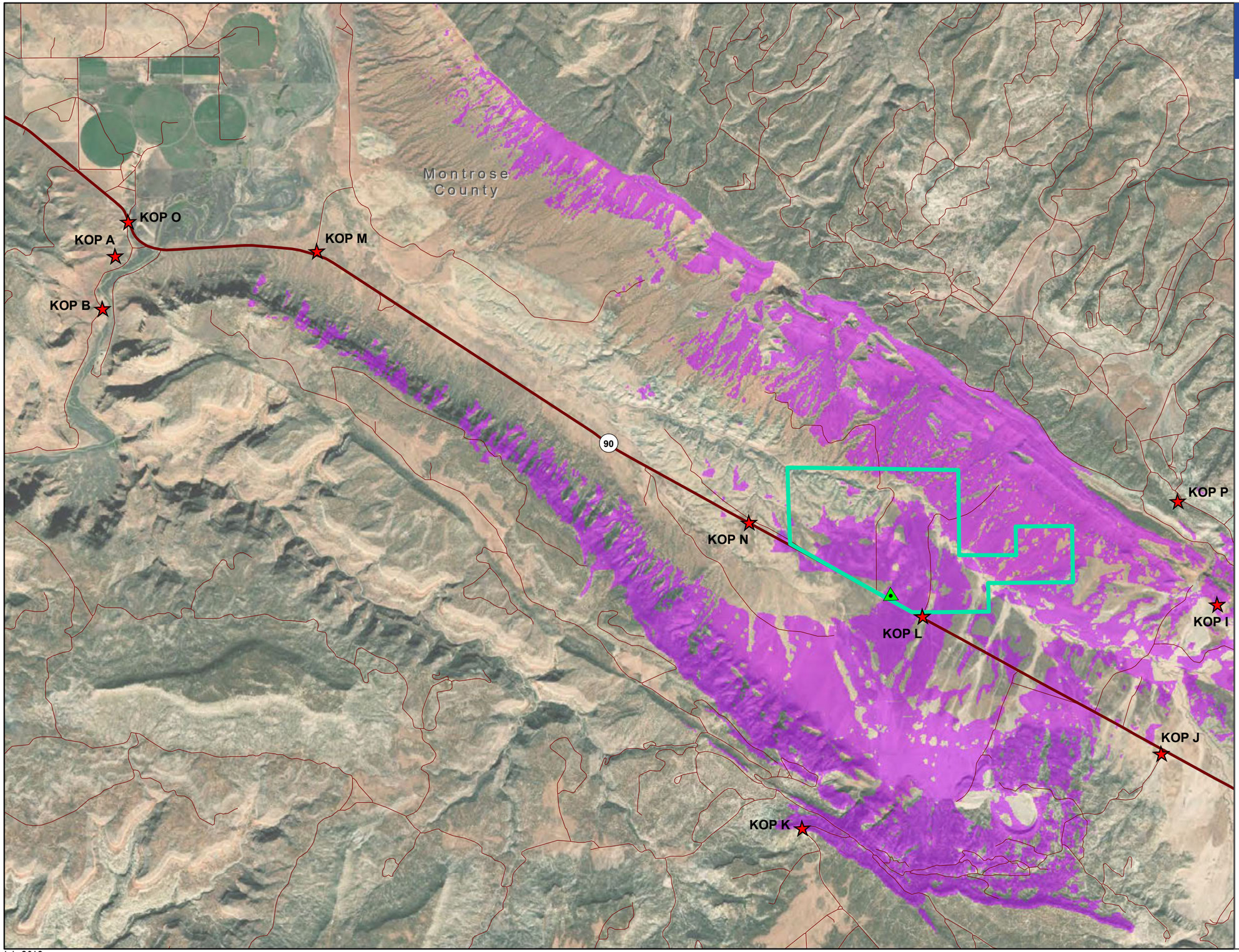
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Appendix C

Alternative C: Viewshed Analyses for Representative Proposed Project Features

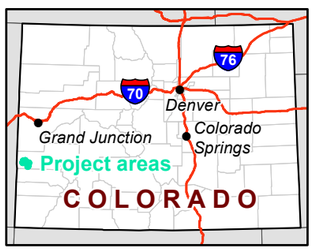
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RECLAMATION
Managing Water in the West

Viewshed for Alternative C H2S Treatment Building

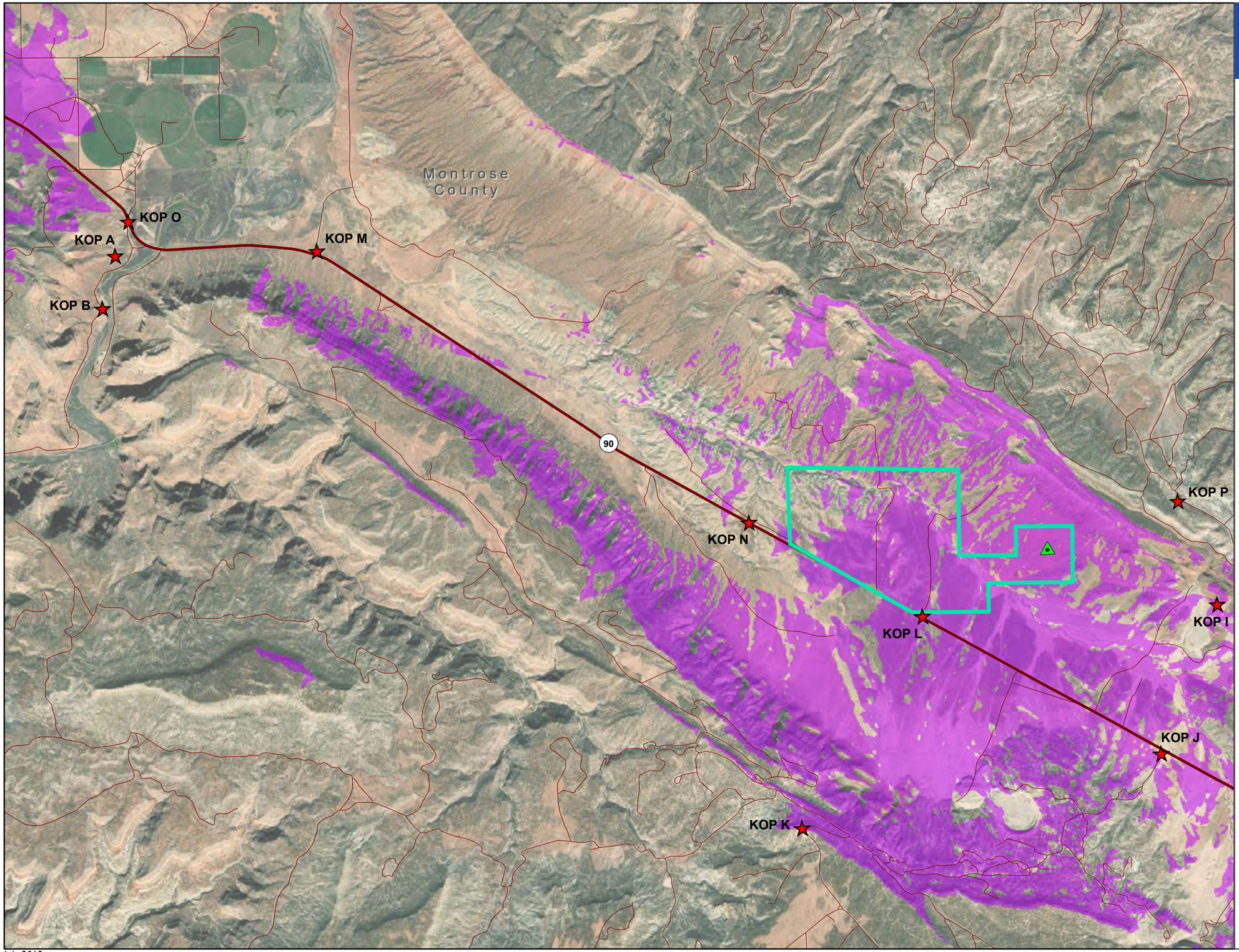
- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative C- H2S treatment building (16 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID16.mxd
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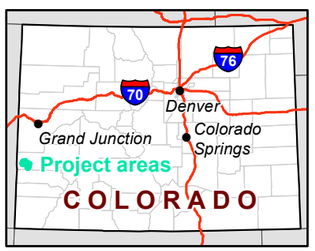
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Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative C Landfill Cells

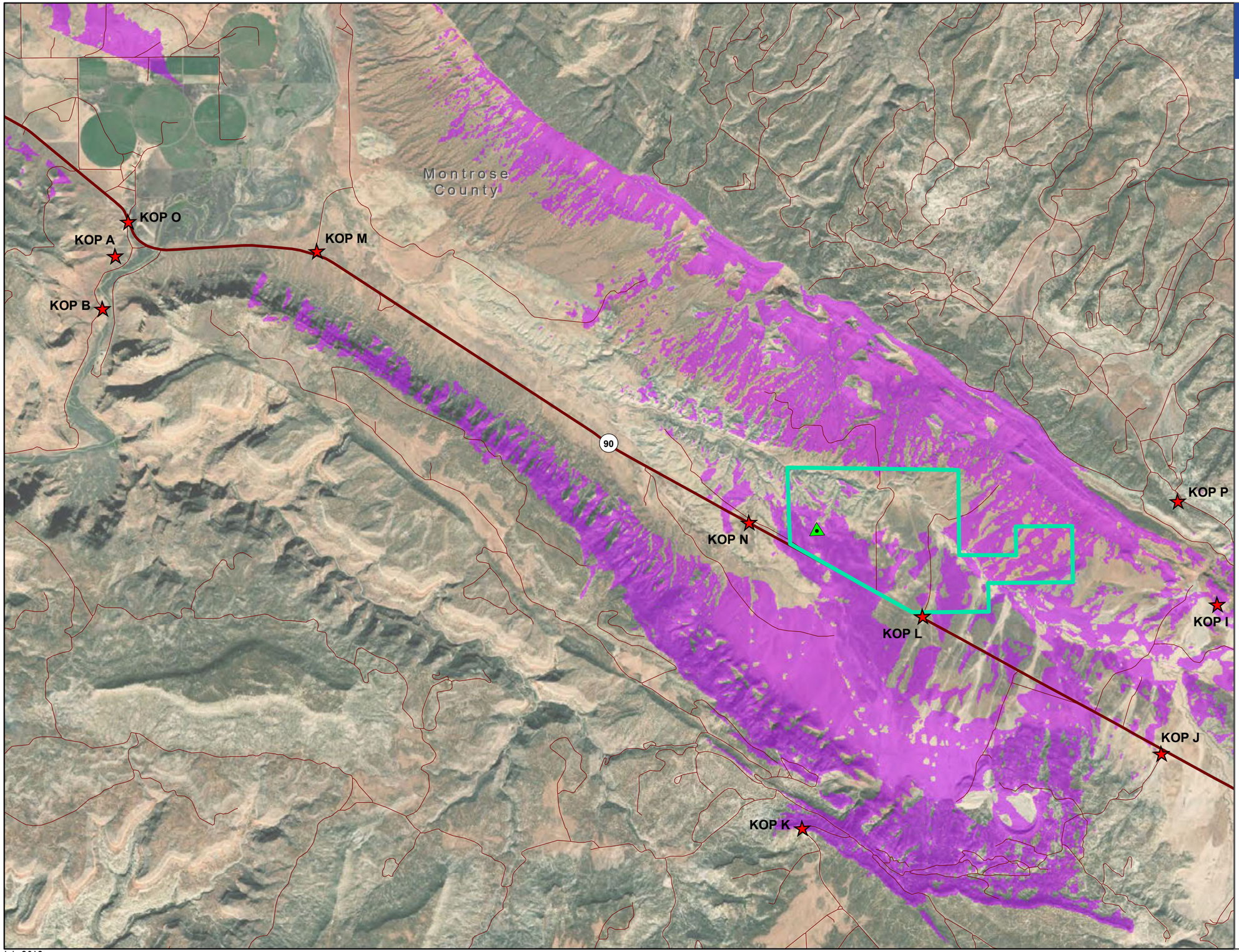
- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative C- landfill cells (100 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID17.mxd
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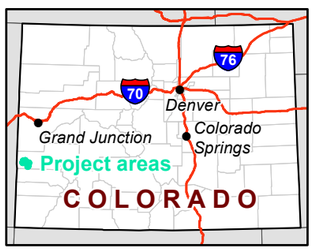
0 0.4 0.8
Miles



RECLAMATION
Managing Water in the West

Viewshed for Alternative C Electric Line

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative C- electric line (37 ft)
- Visible



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID18.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

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Miles

RECLAMATION
Managing Water in the West

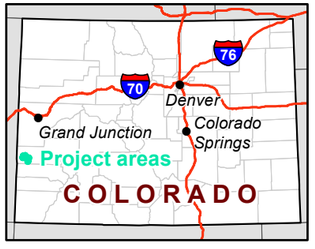
Viewshed for Alternative C Electric Line

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative C- electric line (37 ft)
- Visible

Montrose County

KOP O
KOP A
KOP B
KOP M
KOP N
KOP L
KOP K
KOP J
KOP I
KOP P

90



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID19.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

0 0.4 0.8
Miles

Appendix C

Alternative C: Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP A (Alternative C)

3. VRM Class None (not BLM-administered land)

4. Location
Township 47 N
Range 18 W
Section 19

5. Location Sketch
Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind gentle sloping hills and uneven terrain	Short, rounded and ovate, asymmetrical	Rectangular houses and facility buildings, strands of utility lines, regularly spaced utility poles
LINE	Horizontal and diagonal, complex, converging	Horizontal and diagonal	Horizontal/vertical buildings, diagonal utility lines, vertical utility poles
COLOR	Rust, dark umber, light umber, light brown, tan	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer)	Pale green house in foreground, white and tan house, light grey facility buildings, light brown utility pole, light grey utility lines
TEX-TURE	Uneven and striated plateaus behind smooth and uniform hills	Coarse, stippled bushes and shrubs, medium grain	Stippled buildings and utility pole, smooth utility lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMEN	Form				X				X				X
	Line				X				X				X

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann

	Color				X				X				X	Lindsay Chipman
	Texture				X				X				X	

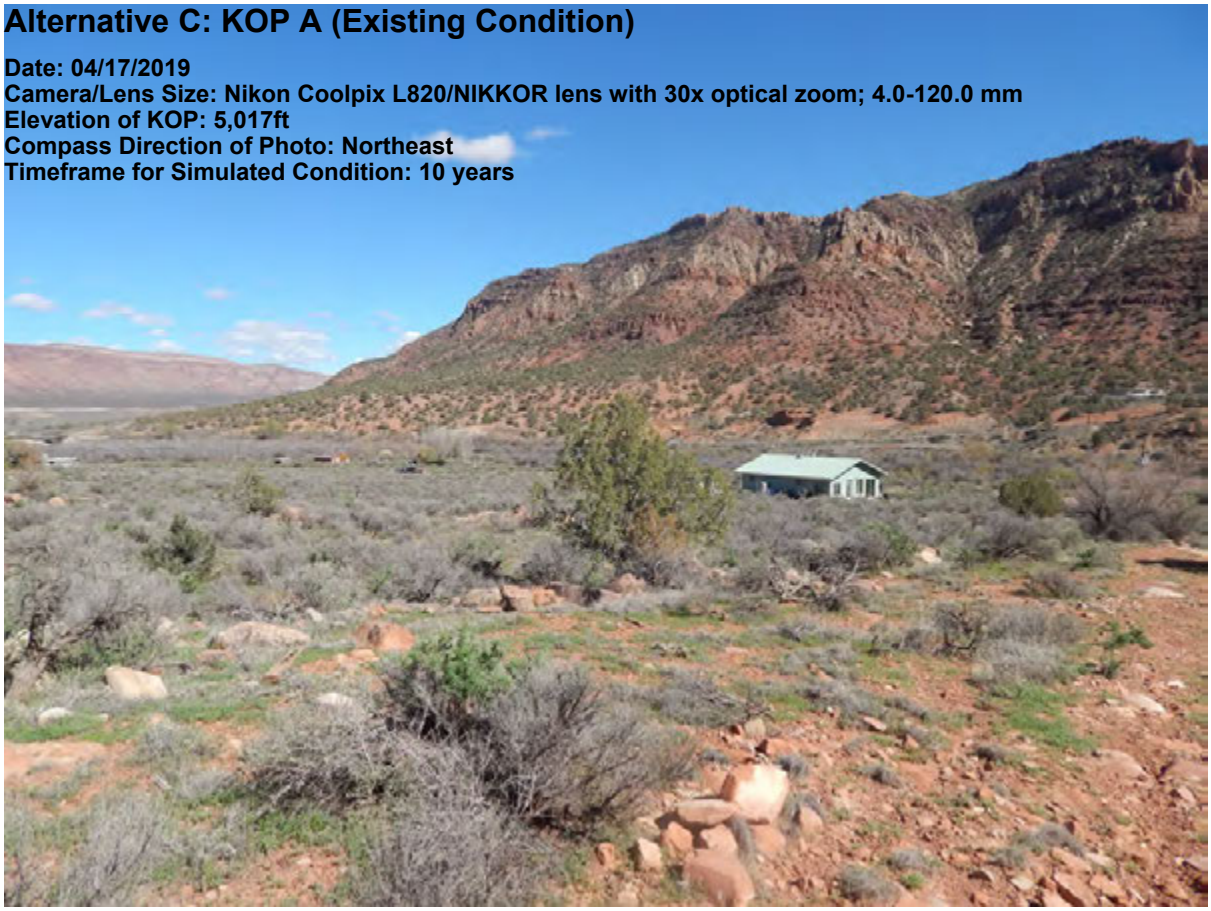
SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP. Although the KOP is approximately 0.2 miles from the proposed pipeline under Alternative C, this project feature is not visible from the KOP, due to vegetation and plateau slopes that block views. There is no degree of contrast. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

No mitigation measures required.



Project Area Not Visible: No Simulation

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP B (Alternative C)

3. VRM Class None (not BLM-administered land)

4. Location

Township 47 N

Range 18 W

Section 30

5. Location Sketch

Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind gentle sloping hills	Short, rounded and ovate	Strands of utility lines, regularly spaced utility poles
LINE	Horizontal and diagonal, complex, converging	Horizontal and diagonal, abrupt edge	Diagonal utility lines, vertical utility poles
COLOR	Rust, dark umber, light umber, light brown, tan	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt umber bushes (in spring and winter)/olive green bushes (in summer)	Light grey utility lines, light brown utility poles
TEX-TURE	Uneven and striated plateaus behind smooth and uniform hills	Coarse, stippled bushes and shrubs, medium grain, moderately smooth	Smooth utility lines, stippled utility pole

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rugged prominent plateaus behind gentle sloping hills, interruption from linear pipeline scar	Short, rounded and ovate, interrupted	Existing: Strands of utility lines, regularly spaced utility poles New: No new project structures visible
LINE	Horizontal and diagonal, complex, converging, contrasting, horizontal pipeline scar	Horizontal and diagonal, disrupted	Existing: Diagonal utility lines, vertical utility poles New: No new project structures visible
COLOR	Rust, dark umber, light umber, light brown, tan, tan pipeline scar	Light green grass (in summer)/light brown grass (in winter), dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), burnt orange bushes (in spring and winter)/olive green bushes (in summer)	Existing: Light grey utility lines, light brown utility poles New: No new project structures visible
TEX-TURE	Uneven and striated plateaus behind smooth and uniform hills, smooth pipeline scar	Coarse, stippled bushes and shrubs, medium grain, moderately smooth	Existing: Smooth utility lines, stippled utility pole New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

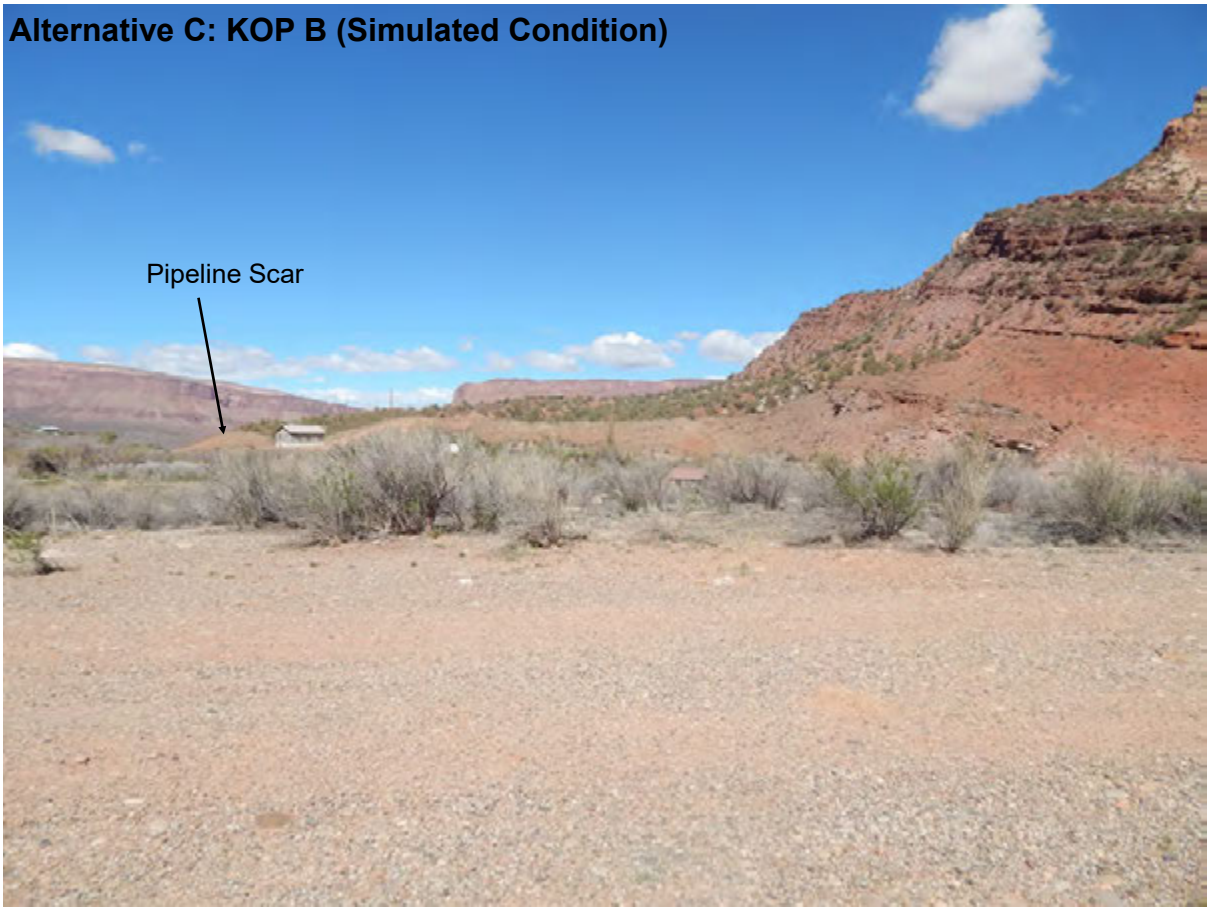
Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar from the proposed pipeline. The KOP is approximately 0.1 miles from the proposed project feature. The pipeline scar would be parallel to the road. The topography would not change, and the pipeline scar would be obstructed by vegetation. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would initially be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as this vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.


Alternative C: KOP B (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 4,974ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 10 years


Alternative C: KOP B (Simulated Condition)
Pipeline Scar

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP I (Alternative C)

3. VRM Class III

4. Location

Township 46 N

Range 17 W

Section 2

5. Location Sketch

Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat horizontal plateaus in background, uneven/horizontal and smooth in foreground	Some low rounded bushes, short grass, low bushes and trees	Strands of utility lines, regularly spaced utility poles
LINE	Horizontal, some diagonal slopes, smooth, horizontal plateaus in background	Horizontal and smooth in foreground, some diagonal in background. Abrupt edge	Diagonal utility lines, vertical utility poles
COLOR	Light tan/white, light brown, tan, light grey, light umber	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), bright green grass and purple wildflowers (in spring/summer)/brown grass (in winter)	Light grey utility lines, light brown utility poles
TEX-TURE	Smooth, even, uniform	Sparse, some patches of trees/bushes, uniform and continuous grass, fine grain	Smooth utility lines, stippled utility poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat horizontal plateaus in background, flat/horizontal and smooth in foreground, uneven evaporation ponds, smaller convex domed landfill	Some low rounded bushes in foreground, short grass, low bushes and trees, interrupted, flattened	Existing: Strands of utility lines, regularly spaced utility poles New: Rectangular building
LINE	Horizontal, some diagonal slopes, smooth, horizontal plateaus in background, contrasting, horizontal evaporation ponds, smaller curved landfill	Horizontal and smooth in foreground, some diagonal in background, disrupted, flattened	Existing: Diagonal utility lines, vertical utility poles New: Vertical building
COLOR	Light tan/white, light brown, tan, light grey, light umber, white/teal or light blue, grey, white/teal or light blue evaporation ponds white/light tan smaller landfill, grey gravel roads	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), bright green grass and purple wildflowers (in spring/summer)/brown grass (in winter)	Existing: Light grey utility lines, light brown utility poles New: Earth-toned building
TEX-TURE	Smooth, even, uniform, smooth evaporation ponds, smooth smaller landfill, smooth gravel roads	Sparse, some patches of trees/bushes, uniform and continuous grass, fine grain, flattened	Existing: Smooth utility lines, stippled utility poles New: Smooth building

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form				X				X		X			Evaluator's Names Date 04/17/2019
	Line				X				X		X			Amanda Biedermann
	Color			X				X			X			Lindsay Chipman
	Texture			X				X			X			

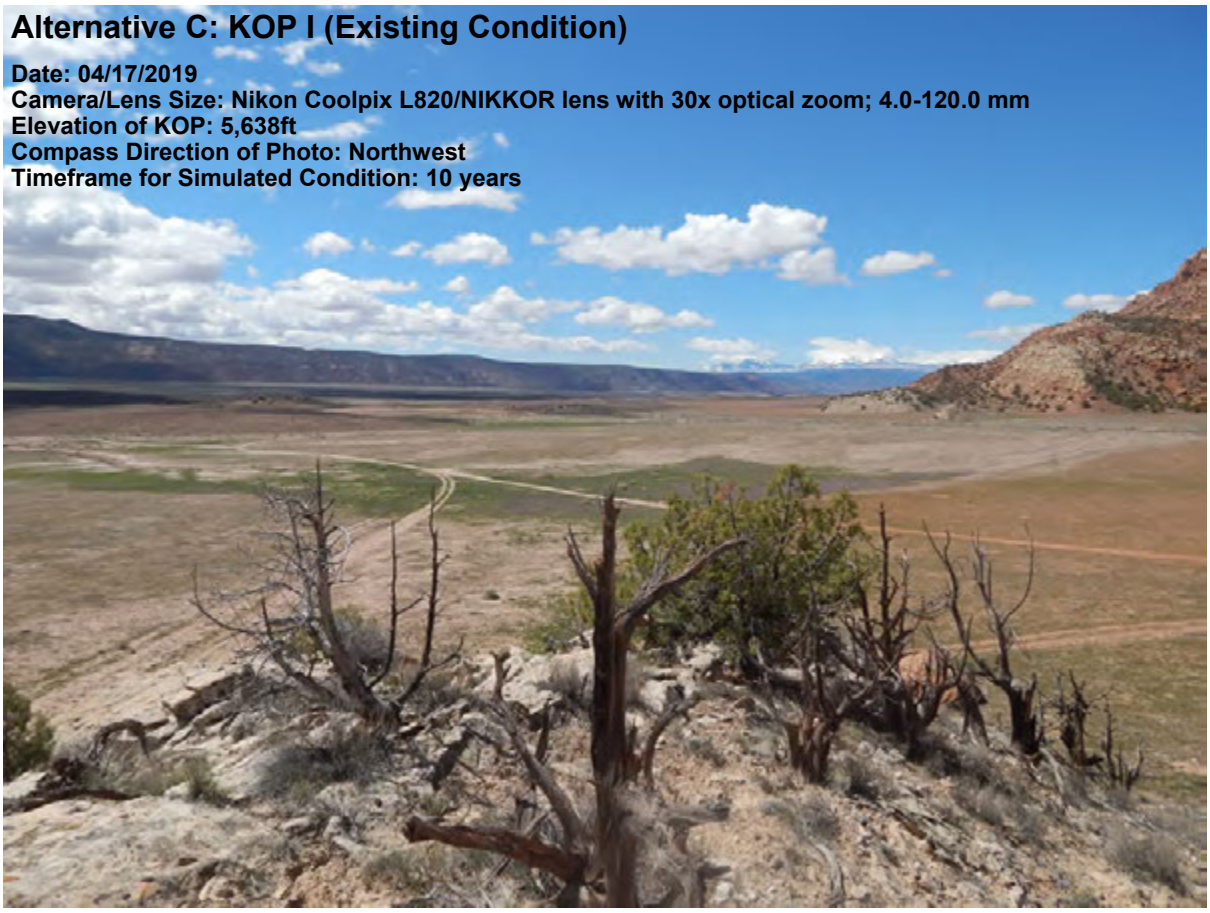
SECTION D. (Continued)

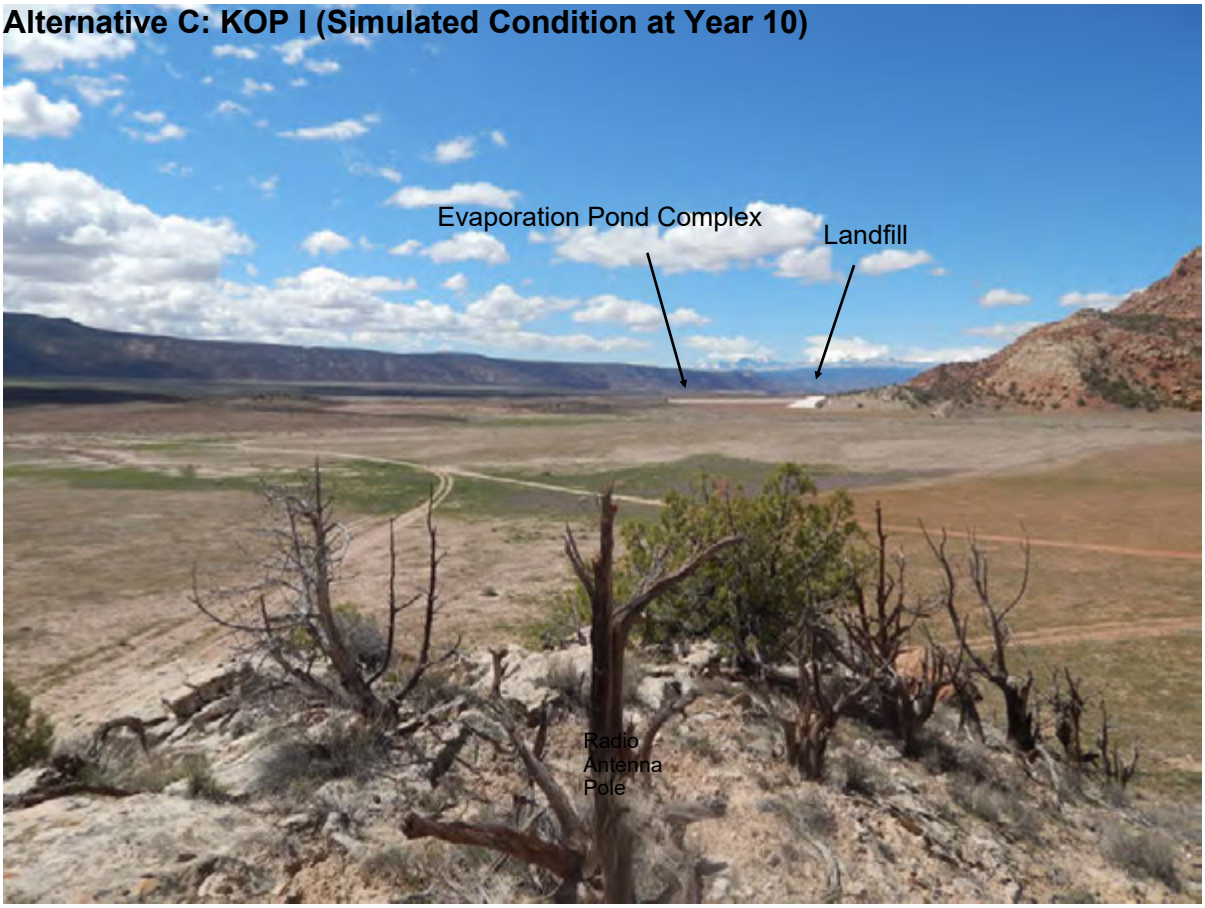
Comments from item 2.

The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres), the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), and landfill. The KOP is approximately 1.3 miles from proposed project features. The color of some of the project features would attract attention. Additionally, the size of many of the project features, such as the evaporation pond complex, the H_2S treatment system building, the landfill, and the utility fencing, would not allow them to blend with the background; this would attract viewer attention. The proposed project features would attract attention but would not dominate the view; consequently, the level of change to the characteristic landscape would be moderate. At this distance, and given that the KOP is on an elevated ridgetop, the degree of contrast created by the project features would be moderate. The proposed project features conform with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

- Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of the access roads and evaporation ponds


Alternative C: KOP I (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,638ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years


Alternative C: KOP I (Simulated Condition at Year 10)
Evaporation Pond Complex
Landfill
Radio Antenna Pole

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP I (Alternative C)

3. VRM Class III

4. Location

Township 46 N

Range 17 W

Section 2

5. Location Sketch

Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat horizontal plateaus in background, uneven/horizontal and smooth in foreground	Some low rounded bushes, short grass, low bushes and trees	Strands of utility lines, regularly spaced utility poles
LINE	Horizontal, some diagonal slopes, smooth, horizontal plateaus in background	Horizontal and smooth in foreground, some diagonal in background. Abrupt edge	Diagonal utility lines, vertical utility poles
COLOR	Light tan/white, light brown, tan, light grey, light umber	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), bright green grass and purple wildflowers (in spring/summer)/brown grass (in winter)	Light grey utility lines, light brown utility poles
TEX-TURE	Smooth, even, uniform	Sparse, some patches of trees/bushes, uniform and continuous grass, fine grain	Smooth utility lines, stippled utility poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat horizontal plateaus in background, flat/horizontal and smooth in foreground, uneven evaporation ponds, large convex domed landfill	Some low rounded bushes, short grass, low bushes and trees, interrupted, flattened	Existing: Strands of utility lines, regularly spaced utility poles New: Rectangular building
LINE	Some diagonal slopes, smooth, horizontal plateaus in background, contrasting, horizontal evaporation ponds, large curved landfill	Horizontal and smooth in foreground, some diagonal in background, disrupted, flattened	Existing: Diagonal utility lines, vertical utility poles New: Vertical building
COLOR	Light tan/white, light brown, tan, light grey, light umber, white/teal or light blue, grey, white/teal or light blue evaporation ponds, white/light tan large landfill	Olive and dark green trees (year-round), grey bushes (in spring and winter)/light green bushes (in summer), bright green grass and purple wildflowers (in spring/summer)/brown grass (in winter)	Existing: Light grey utility lines, light brown utility poles New: Earth-toned building
TEX-TURE	Smooth, even, uniform, smooth evaporation ponds, smooth large landfill	Sparse, some patches of trees/bushes, uniform and continuous grass, fine grain, flattened	Existing: Smooth utility lines, stippled utility poles New: Smooth building

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form				X				X		X			Evaluator's Names Date 04/17/2019
	Line				X				X		X			Amanda Biedermann
	Color			X				X			X			Lindsay Chipman
	Texture			X				X			X			

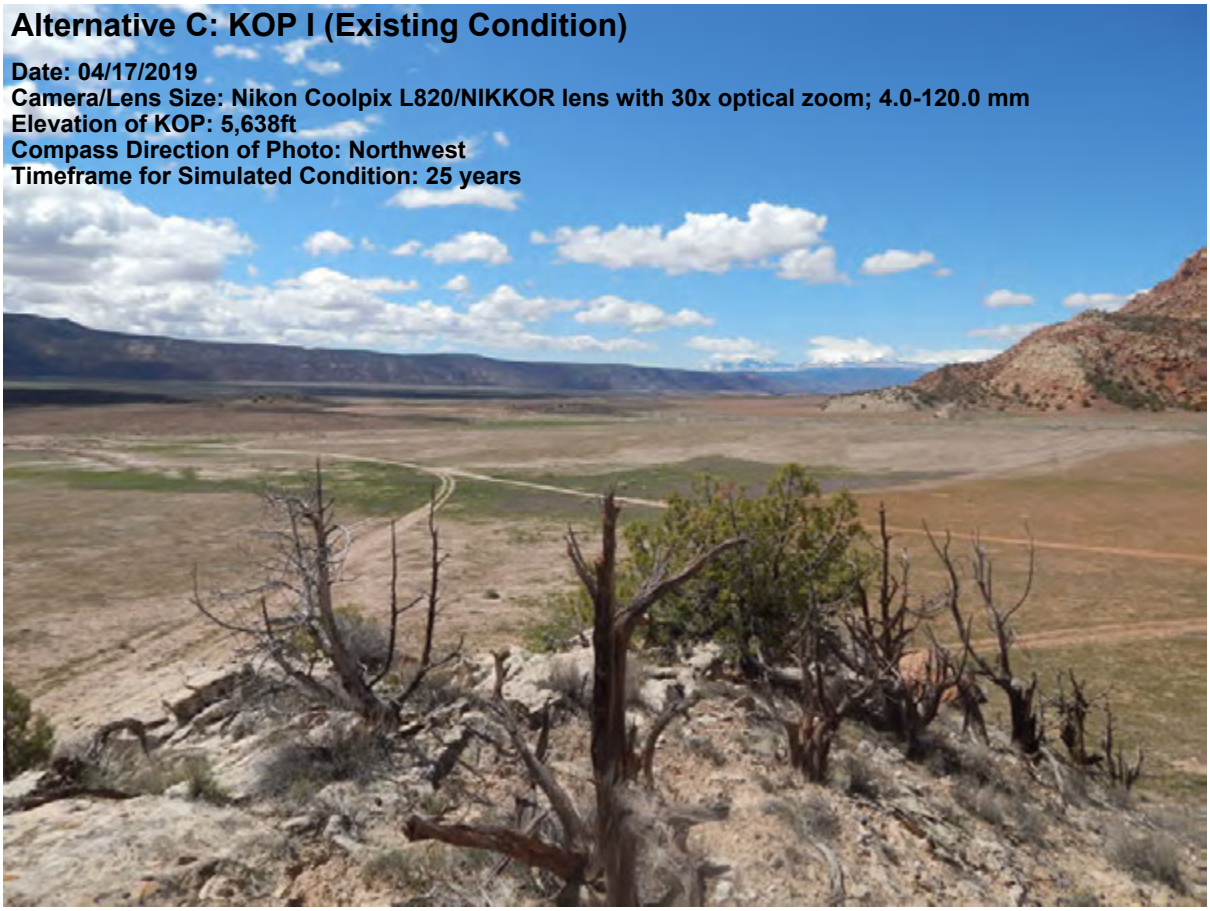
SECTION D. (Continued)

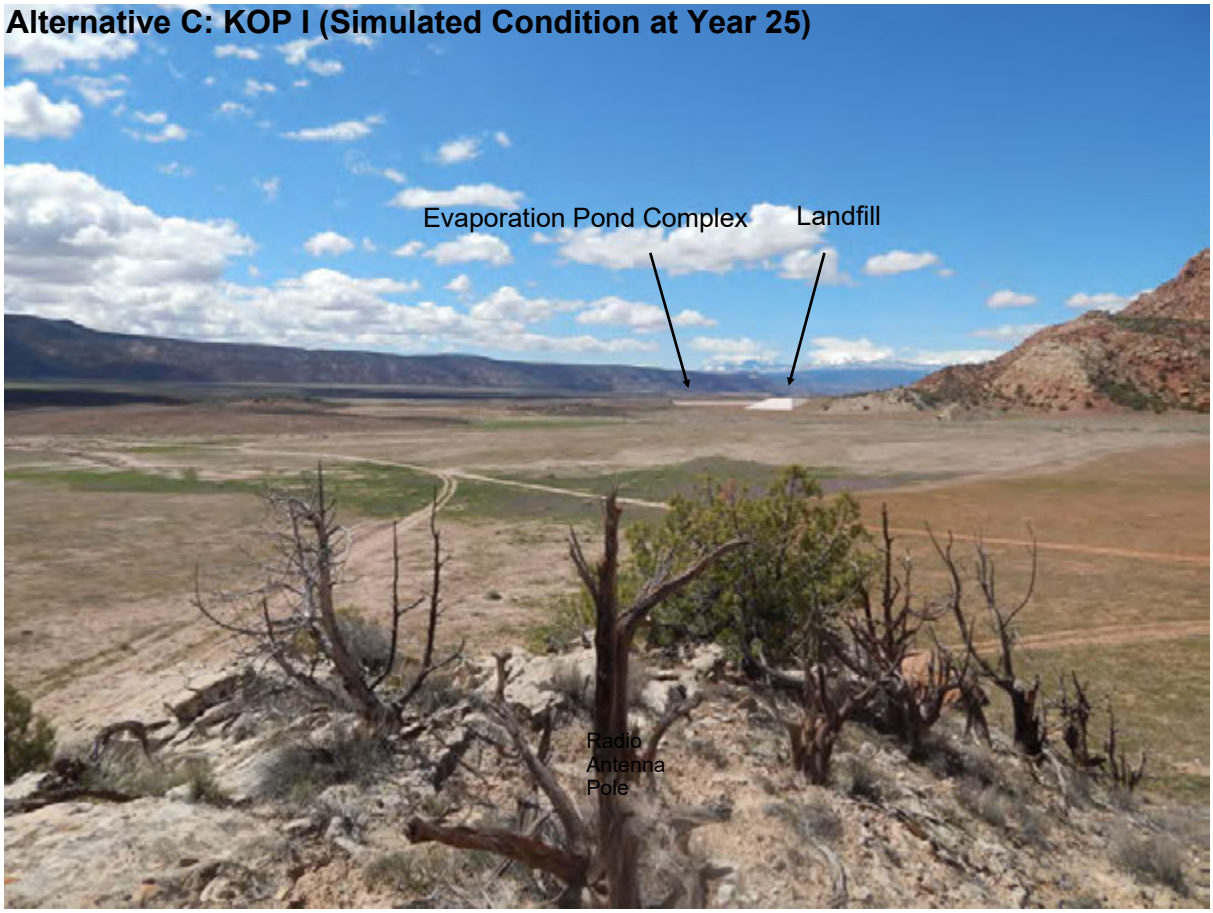
Comments from item 2.

The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres), the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), and landfill. The KOP is approximately 1.3 miles from proposed project features. The color of some of the project features would attract attention. Additionally, the size of many of the project features, such as the evaporation pond complex, the H_2S treatment system building, the landfill, and the utility fencing, do not allow them to blend with the background; this would attract viewer attention. The proposed project features attract attention but do not dominate the view; consequently, the level of change to the characteristic landscape would be moderate. At this distance and given that the KOP is on an elevated ridgetop, the degree of contrast created by the project features would be moderate. The proposed project features conform with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

- Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of the access roads and evaporation ponds


Alternative C: KOP I (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,638ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 25 years


Alternative C: KOP I (Simulated Condition at Year 25)
Evaporation Pond Complex
Landfill
Radio Antenna Pole

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP J (Alternative C)

3. VRM Class II and III

4. Location
Township 46 N
Range 17 W
Section 14

5. Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain with some rounded mounds backed by steeply rising plateaus	Strips of short, rounded, somewhat indistinct shrubs; flat, low grass	Strands of utility lines, isolated utility poles
LINE	Horizontal, vertical, and diagonal	Horizontal and diagonal, abrupt edge	Diagonal utility lines, horizontal and vertical utility poles
COLOR	Light brown, tan, rust	Dark green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	Light to dark grey utility lines; dark brown utility poles
TEX-TURE	Smooth, bumpy, striated	Smooth grass to moderately rough and patchy shrubs	Smooth utility lines and stippled poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X				X
	Line				X				X				X
	Color				X				X				X
	Texture				X				X				X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann
Lindsay Chipman

SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP, which is approximately 1.7 miles from proposed project area and features. At this distance, project features would not be visible from the KOP, due to gently sloping hills, rocks, and vegetation that block views of the project area. There would be no degree of contrast. The proposed project features meet VRM Class II and III objectives.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative C: KOP J (Existing Condition)
Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,590ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Project Area Not Visible: No Simulation

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP K (Alternative C)

3. VRM Class II and III

4. Location
Township 46 N
Range 17 W
Section 18

5. Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven expanse backed by steeply rising plateaus and jagged peaks	Jagged trees; flat grass/shrubs	Flat, linear roads; discrete, narrow, linear power lines
LINE	Horizontal, diagonal, vertical	Horizontal, diagonal, vertical	Horizontal and diagonal roads; diagonal power lines
COLOR	Light to medium brown, rust, light to medium grey, white	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks	Light brown roads, dark grey power lines
TEX-TURE	Coarse to smooth, striated, jagged	Coarse and clumped, smooth and gridded, smooth sparse or bare patches	Smooth, gridded roads, smooth power lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven expanse backed by steeply rising plateaus and jagged peaks, interrupted, flat evaporation ponds, small, convex domed landfill	Jagged trees, flat grass/shrubs, interrupted, flattened	Existing: Flat, linear roads; discrete, narrow, linear power lines New: Rectangular building, flat gravel roads
LINE	Horizontal, diagonal, vertical, gridded/broken, horizontal evaporation ponds, small convex domed landfill	Horizontal, diagonal, vertical, discontinuous, flattened	Existing: Horizontal and diagonal roads; diagonal power lines New: Vertical building, horizontal gravel roads
COLOR	Light to medium brown, rust, light to medium grey, white, white/teal or light blue evaporation ponds, small white/light tan landfill	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks, bare patch	Existing: Light brown roads, dark grey and power lines New: Earth-toned building, grey gravel roads
TEX-TURE	Coarse to smooth, striated, jagged, gridded/broken/ discontinuous, contrasting, smooth evaporation ponds, small smooth landfill	Coarse and clumped, smooth and gridded, smooth sparse or bare patches, flattened	Existing: Smooth, gridded roads, smooth power lines New: Smooth building, smooth gravel roads

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☐ Yes ☒ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form				X		X			X				Evaluator's Names Date 04/17/2019
	Line				X		X			X				Amanda Biedermann
	Color		X						X	X				Lindsay Chipman
	Texture			X			X			X				

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres), one freshwater pond, totaling ~6 acres, the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), landfill, and access roads. The KOP is approximately 2.2 miles from proposed project features. There are no other natural or artificial landscape elements of similar height, so the height of these project features would attract attention. Additionally, the color and size of the project features would not allow them to blend into the background and so would attract viewer attention. The proposed project features would dominate the view and would be a major focus of viewer attention; consequently, the level of change to the characteristic landscape would be high. At this distance and given that the KOP is on an elevated plateau/mesa, the degree of contrast created by the project features would be strong, even with implementation of mitigation measures. The proposed project features do not conform with VRM Class II and III objectives.

Additional Mitigating Measures (See item 3)

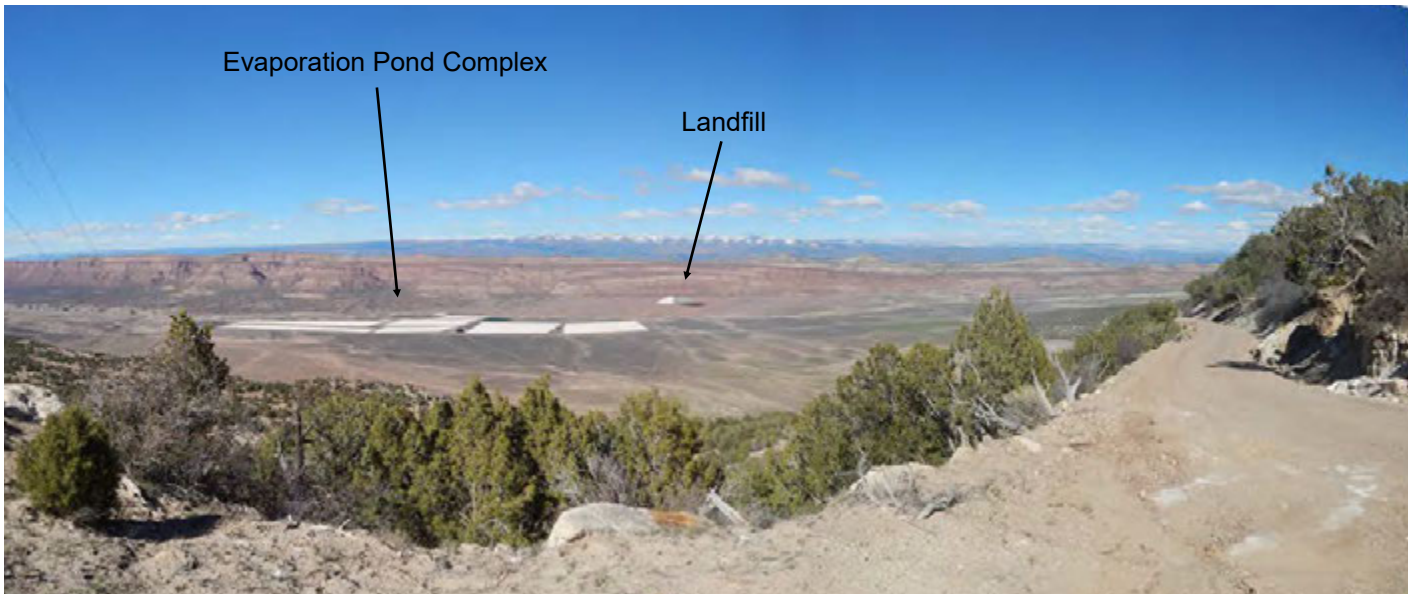
- Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of the access roads and evaporation ponds
- So that the proposed project footprint would be on less BLM-administered land, relocate and reconfigure the proposed project footprint farther to the southeast, on the north side of the highway, or to the south, on the south side of the highway; alternatively, reconfigure the proposed project footprint so that it is on BLM-administered land only managed as VRM Class III

Alternative C: KOP K (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,946ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 10 years



Alternative C: KOP K (Simulated Condition at Year 10)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement	4. Location Township 46 N Range 17 W Section 18	5. Refer to Appendix C Alternative C project description map/location sketch
2. Key Observation Point KOP K (Alternative C)		
3. VRM Class II and III		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven expanse backed by steeply rising plateaus and jagged peaks	Jagged trees; flat grass/shrubs	Flat, linear roads; discrete, narrow, linear power lines
LINE	Horizontal, diagonal, vertical	Horizontal, diagonal, vertical	Horizontal and diagonal roads; diagonal power lines
COLOR	Light to medium brown, rust, light to medium grey, white	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks	Light brown roads, dark grey power lines
TEX-TURE	Coarse to smooth, striated, jagged	Coarse and clumped, smooth and gridded, smooth sparse or bare patches	Smooth, gridded roads, smooth power lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven expanse backed by steeply rising plateaus and jagged peaks, interrupted, flat evaporation ponds, large convex domed landfill	Jagged trees; flat grass/shrubs, interrupted, flattened	Existing: Flat, linear roads and discrete, narrow, linear power lines New: Rectangular building, flat gravel roads
LINE	Horizontal, diagonal, gridded/broken, vertical, horizontal evaporation ponds, large convex domed landfill	Horizontal, diagonal, vertical, discontinuous, flattened	Existing: Horizontal and diagonal roads; diagonal power lines New: Vertical building, horizontal gravel roads
COLOR	Light to medium brown, rust, light to medium grey, white, white/teal or light blue evaporation ponds, large white/light tan landfill	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks, bare patch	Existing: Light brown roads, dark grey and power lines New: Earth-toned building, grey gravel roads
TEX-TURE	Coarse to smooth, gridded/broken/ discontinuous, striated, jagged, contrasting, smooth evaporation ponds, large smooth landfill	Coarse and clumped, smooth and gridded, smooth sparse or bare patches, flattened	Existing: Smooth, gridded roads, smooth power lines New: Smooth building, smooth gravel roads

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☐ Yes ☒ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form				X		X			X				Evaluator's Names Date 04/17/2019
	Line				X		X			X				Amanda Biedermann
	Color		X						X	X				Lindsay Chipman
	Texture			X			X			X				

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres, one freshwater pond, totaling ~6 acres, the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), landfill, and access roads. The KOP is approximately 2.2 miles from the proposed project features. There are no other natural or artificial landscape elements of similar height, so the height of these project features would attract attention. Additionally, the color and size of the project features would not allow them to blend with the background and would attract viewer attention. The degree of contrast from the landfill would be greater than during the construction phase of the project, due to the increased size of the landfill. The proposed project features would dominate the view and would be a major focus of viewer attention; consequently, the level of change to the characteristic landscape would high. At this distance and given that the KOP is on an elevated plateau/mesa, the degree of contrast created by the project features would strong, even with implementation of mitigation measures. The proposed project features do not conform with VRM Class II and III objectives.

Additional Mitigating Measures (See item 3)

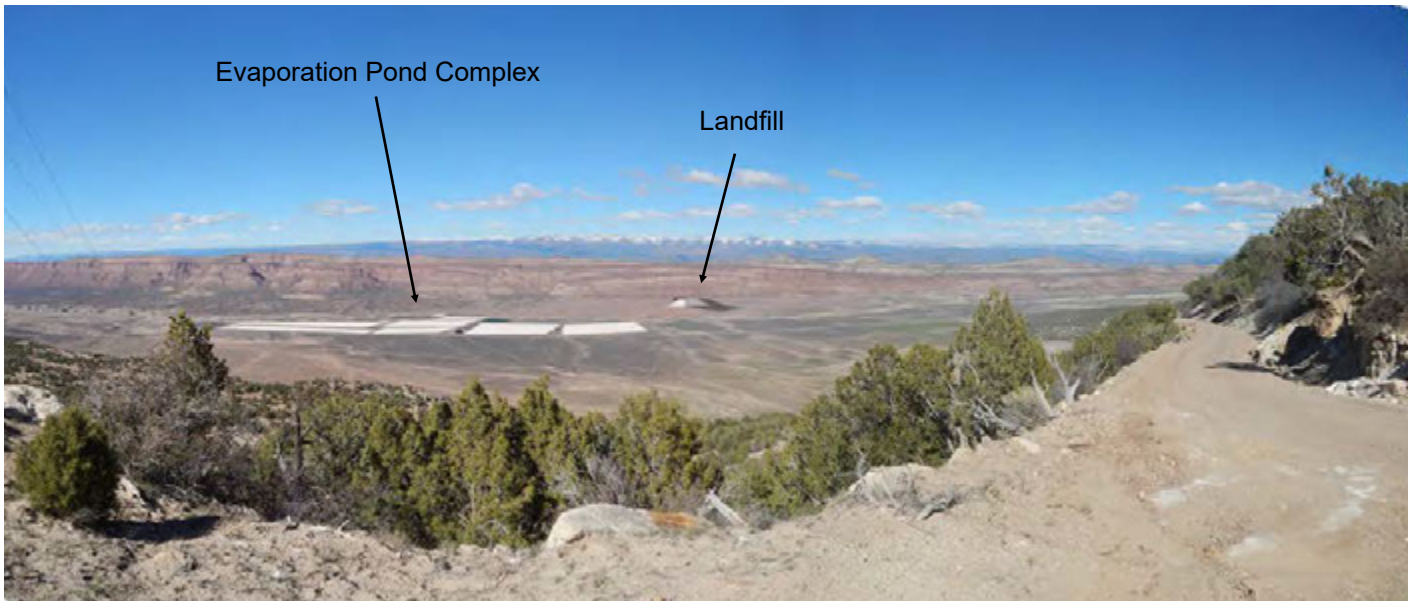
- Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of the access roads and evaporation ponds

Alternative C: KOP K (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,946ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 25 years



Alternative C: KOP K (Simulated Condition at Year 25)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP L (Alternative C)

3. VRM Class III

4. Location
Township 46 N
Range 17 W
Section 8

5. Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain backed by steeply rising plateau	Short, flat, patchy	None
LINE	Horizontal, vertical, and diagonal	Horizontal and diagonal, diffuse edge	None
COLOR	Light brown, tan, rust	Light green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	None
TEX-TURE	Smooth to striated, discontinuous and patchy in foreground	Patchy grass to low/moderately coarse shrubs	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain backed by steeply rising plateau, interrupted; flat evaporation ponds	Short, flat, patchy, interrupted, flattened	Rectangular building, straight vertical wildlife fence, strands of utility lines, vertical utility poles, flat gravel roads
LINE	Horizontal, vertical, diagonal, broken, horizontal evaporation ponds	Horizontal, diagonal, broken, flattened	Vertical building, vertical wildlife fence, linear utility lines, vertical utility poles, horizontal gravel roads
COLOR	Light brown, tan, rust; white/teal or light blue evaporation ponds	Light green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	Earth-toned building, grey wildlife fence, grey utility lines, light tan utility poles, grey gravel roads
TEX-TURE	Smooth to striated, discontinuous and patchy in foreground, contrasting, smooth evaporation ponds	Patchy grass to low/moderately coarse shrubs, discontinuous, contrasting	Smooth building, stippled wildlife fence, smooth utility lines, stippled utility poles, smooth gravel roads

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form		X				X			X			
	Line		X				X			X			
	Color		X						X	X			

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann
Lindsay Chipman

	Texture		X				X			X			

SECTION D. (Continued)

Comments from item 2.

The proposed project features visible from this KOP are the evaporation pond complex: eight ponds, totaling ~383 acres, one freshwater pond, totaling ~6 acres, the H_2S treatment system building (a ~72-foot by 117-foot metal building, with ~16-foot-high eaves), access roads, utility fencing, and an electric line extension (~32–37 feet maximum height for poles; power line maximum height of ~25–33 feet). The KOP is approximately 0.1 miles from proposed project features. Although the color of some of the project features, such as the utility poles, allows them to blend with the color of the background, there are no other natural or artificial landscape elements of similar height, so the height of these project features would attract attention. Additionally, the color and size of many of the project features, such as the evaporation pond complex, the H_2S treatment system building, the access roads, and the utility fencing, would not allow the project features to blend into the background and would attract viewer attention. The proposed project features would dominate the view and be a major focus of viewer attention; consequently, the level of change to the characteristic landscape is high. At this distance, the degree of contrast created by the project features is strong. The proposed project features do not conform with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

- Ensure the use of earth-tone paints for the H_2S treatment facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the H_2S treatment facility building; minimize clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of the access roads and evaporation ponds
- So that the proposed project footprint would be on less BLM-administered land, relocate and reconfigure the proposed project footprint farther to the southeast, on the north side of the highway, or to the south, on the south side of the highway; alternatively, reconfigure the proposed project footprint so that it is on BLM-administered land only managed as VRM Class III

Alternative C: KOP L (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,441ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Alternative C: KOP L (Simulated Condition)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement	4. Location Township 47 N Range 18 W Section 21	5. Refer to Appendix C Alternative C project description map/location sketch
2. Key Observation Point KOP M (Alternative C)		
3. VRM Class II		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain backed by steeply rising plateau	Short, rounded, patchy shrubs; linear bands and a few solitary mounds	Discrete, narrow lines of fencing
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal; shrubs rugged in foreground	Horizontal fence lines, vertical fence poles
COLOR	Light to medium-reddish brown, rust, tan	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Dark grey fence lines, ash brown poles
TEX-TURE	Smooth, striated, slightly rough	Patchy, moderately coarse, becoming smother and more uniform	Stippled fence lines and poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven terrain backed by steeply rising plateau; interruption from linear pipeline scar	Short, rounded, patchy shrubs, linear bands and a few solitary mounds, interrupted	Existing: discrete, narrow lines of fencing New: No new project structures visible
LINE	Horizontal, vertical, and diagonal; broken/discontinuous; horizontal pipeline scar	Horizontal, vertical, and diagonal; shrubs rugged in foreground; discontinuous	Existing: Horizontal fence lines, vertical fence poles New: No new project structures visible
COLOR	Light to medium-reddish brown, rust, tan; tan pipeline scar	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Existing: Dark grey fence lines, ash brown poles New: No new project structures visible
TEX-TURE	Smooth, striated, slightly rough, discontinuous, smooth pipeline scar	Patchy, moderately coarse, becoming smoother and more uniform	Existing: Stippled fence lines and poles New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar. The KOP is approximately 0 miles from the proposed project feature, and the pipeline scar would run directly across the KOP. It would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

Alternative C: KOP M (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,025ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 10 years



Pipeline Scar Not Simulated—See Alternative C KOPs B and N for examples of pipeline scars.

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VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP N (Alternative C)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 6

5. Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven to gently sloping terrain, lined by steeply rising plateaus	Short, flat, patchy; a few predominant shrubs in foreground	Narrow lines of fencing
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal	Horizontal fence lines, vertical fence poles
COLOR	Light to medium-reddish brown	Light green grass in spring/summer, light brown grass in fall/winter, dark green, pale yellow shrubs	Dark grey fence lines and poles
TEX-TURE	Smooth to striated	Patchy grass to moderately coarse shrubs	Smooth fence lines and poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven to gently sloping terrain, lined by steeply rising plateaus; interruption from linear pipeline scar	Short, flat, patchy, a few predominant shrubs, interrupted	Existing: Narrow lines of fencing New: No new project structures visible
LINE	Horizontal, vertical, diagonal, horizontal pipeline scar	Horizontal, vertical, diagonal, discontinuous	Existing: Horizontal fence lines, vertical fence poles New: No new project structures visible
COLOR	Light to medium-reddish brown, tan pipeline scar in landscape	Light green grass in spring/summer, light brown grass in fall/winter, dark green, pale yellow shrubs	Existing: Dark grey fence lines and poles New: No new project structures visible
TEX-TURE	Smooth to striated, discontinuous; smooth pipeline scar	Patchy grass to moderately coarse shrubs	Existing: Smooth fence lines and poles New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0 miles from the proposed project feature, and the pipeline scar would run directly across the KOP. It would be parallel to I-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

Alternative C: KOP N (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,404ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Alternative C: KOP N (Simulated Condition)



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(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP O (Alternative C)

3. VRM Class None (not BLM-administered land)

4. Location
Township 47 N
Range 18 W
Section 19

5. Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Uneven plain, steeply rising plateau	Short and rounded, clustered near highway	Flat curving road, strands of utility lines, regularly spaced utility poles
LINE	Horizontal, vertical, and diagonal	Horizontal, diagonal, abrupt edges	Horizontal curving road, diagonal utility lines, vertical utility poles
COLOR	Light to medium-reddish brown, light green	Light to vivid green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Grey road, light grey utility lines, light brown utility poles
TEX-TURE	Smooth plain; striated and jagged plateau	Patchy, moderately coarse to coarse	Smooth road, smooth utility lines, stippled utility poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X				X
	Line				X				X				X
	Color				X				X				X

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) Not applicable

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann
Lindsay Chipman

	Texture				X				X				X

SECTION D. (Continued)

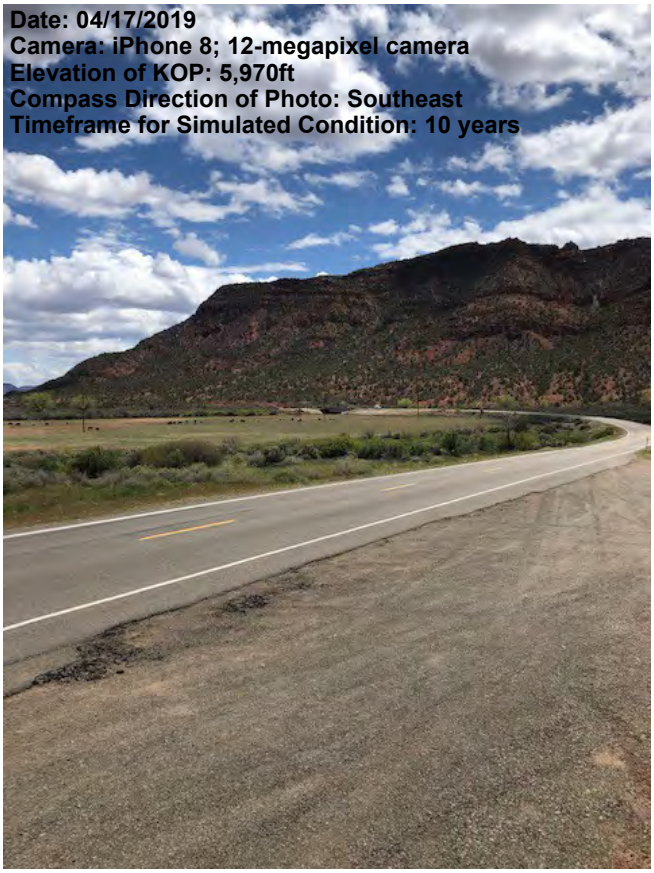
Comments from item 2.

The proposed project area and features are not visible from this KOP, which is approximately 0.8 miles from proposed pipeline under Alternative C; however, this project feature is not visible from the KOP, due to vegetation and plateau slopes that block views. There is no degree of contrast. The proposed project features are not subject to BLM VRM class objectives, because the proposed project is not on BLM-administered land in this location.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative C: KOP O (Existing Condition)



Project Area Not Visible: No Simulation

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP P (Alternative C)

3. VRM Class II and III

4. Location
Township 46 N
Range 17 W
Section 2

5. Refer to Appendix C Alternative C project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling ridge	Short, rounded	Strands of utility lines, isolated utility pole.
LINE	Flowing, horizontal and diagonal	Horizontal and diagonal	Diagonal utility lines, vertical utility pole
COLOR	Light brown, tan	Olive and dark green trees (year-round), dark red bushes (in spring and winter)/green bushes (in summer), grey bushes (in spring and winter)/light green bushes (in summer)	Light grey utility lines, light brown utility pole
TEX-TURE	Smooth, uneven	Dense, medium grain, moderately smooth	Smooth utility lines, stippled utility pole

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELE MEN	Form				X				X				X
	Line				X				X				X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann

	Color				X				X				X	Lindsay Chipman
	Texture				X				X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP, which is approximately 1.0 miles from the proposed project area and features under Alternative C. At this distance, project features would not be visible from the KOP, due to a large rolling ridge that blocks views of the project area. There would be no degree of contrast. The proposed project features conform with VRM Class II and III objectives

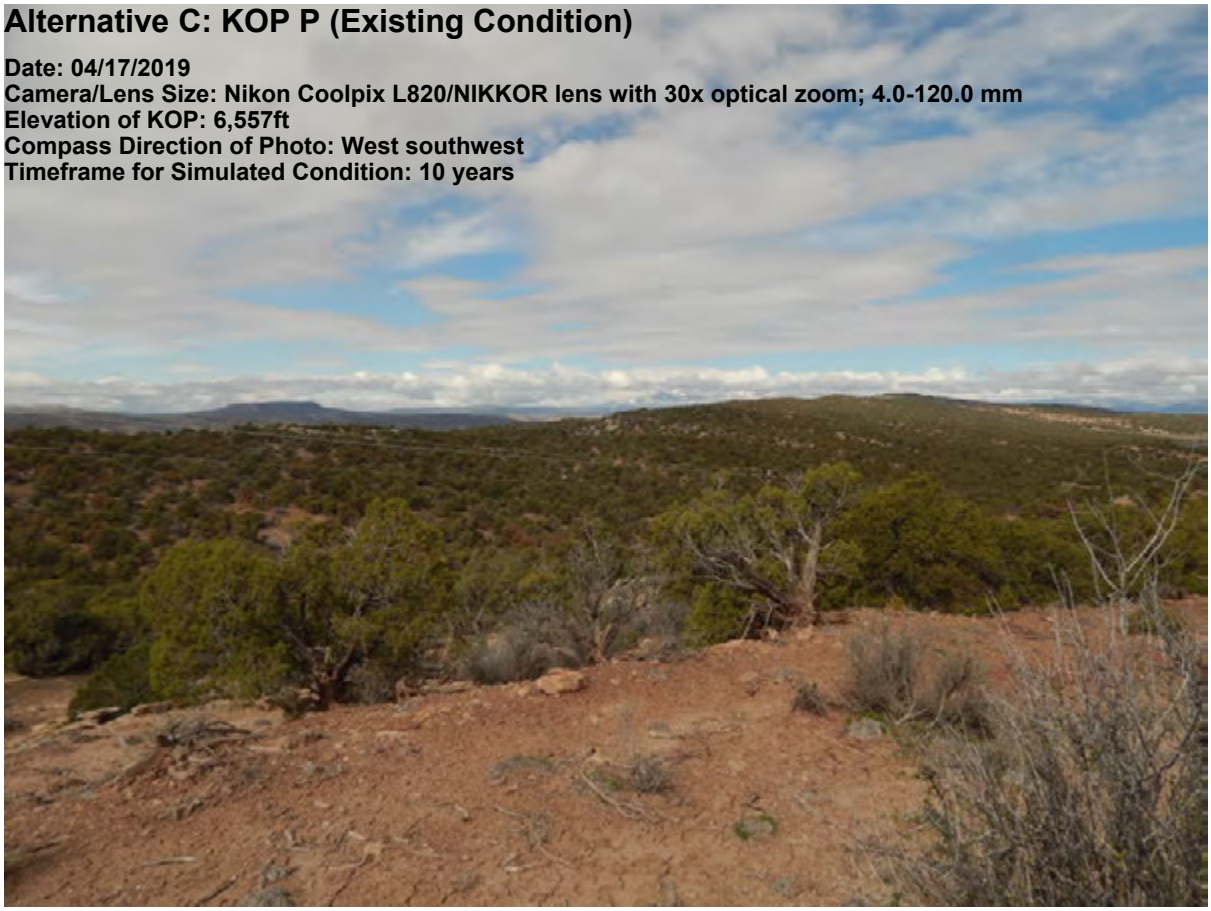
While the proposed project area is not visible from this KOP, the proposed project area could be visible to travelers on roads to the KOP. The proposed project area would likely only be visible to travelers for the limited amount of time it is within the viewshed of the road. During that time, travelers would also be further from the proposed project area during their approach to the KOP.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

Alternative C: KOP P (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,557ft
Compass Direction of Photo: West southwest
Timeframe for Simulated Condition: 10 years



Project Area Not Visible: No Simulation

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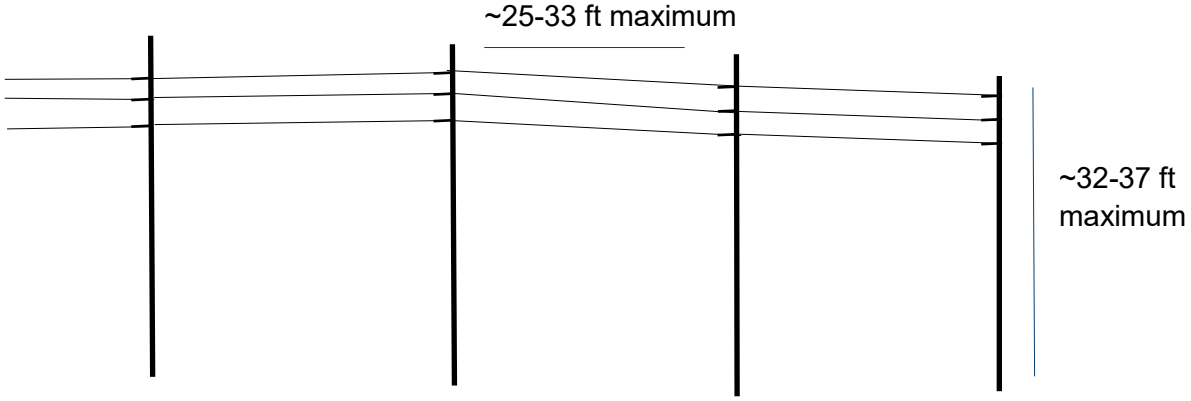
Appendix C

Alternative C: Proposed Project Design Drawings

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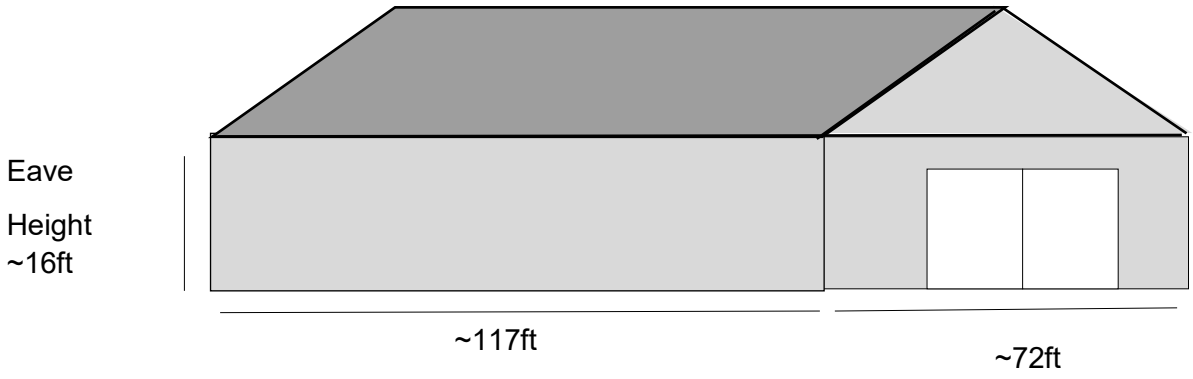
Alternative C: Powerlines

Above ground power lines (32-37 feet maximum height for poles; power line height 25-33 feet)

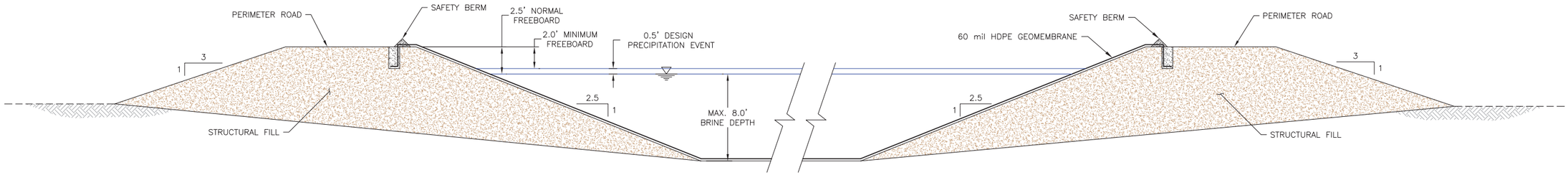


Alternative C: H_2S Treatment System Building

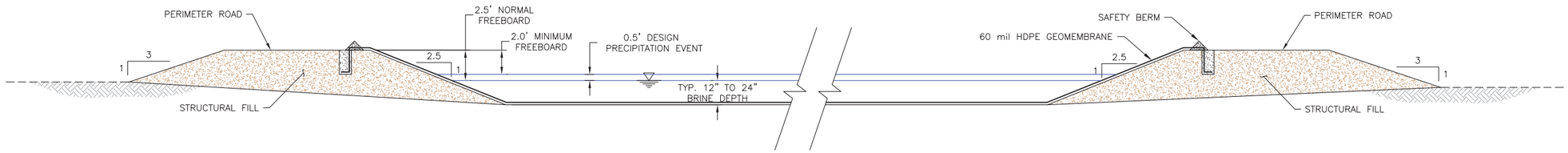
H_2S Treatment System (metal building)



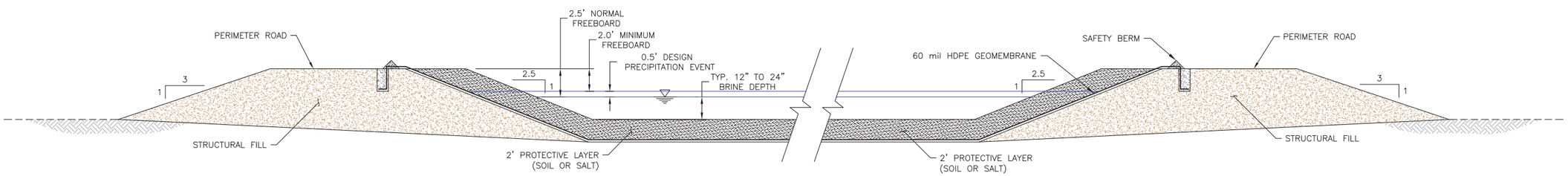
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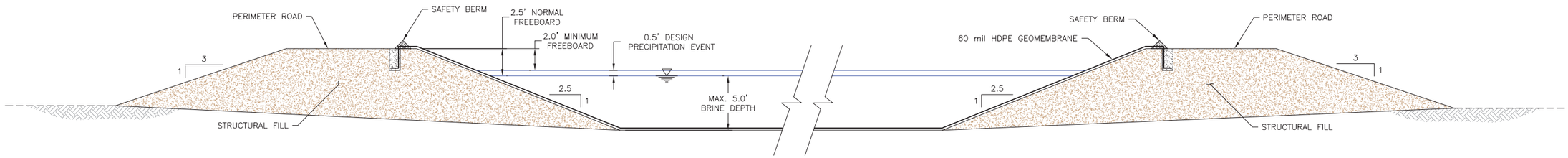
TYPICAL CROSS SECTION SURGE POND
N.T.S.



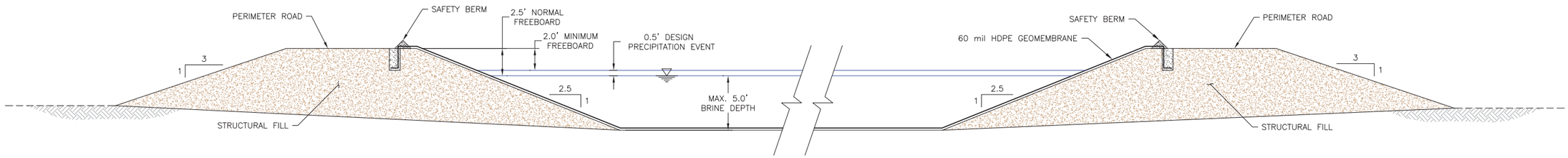
TYPICAL CROSS SECTION CONCENTRATOR POND
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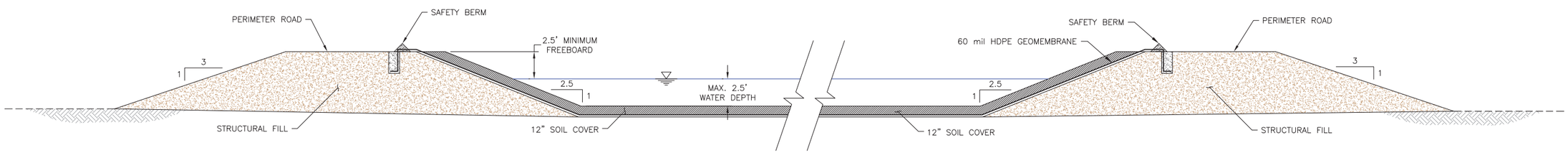
TYPICAL CROSS SECTION CRYSTALLIZER PONDS
N.T.S.



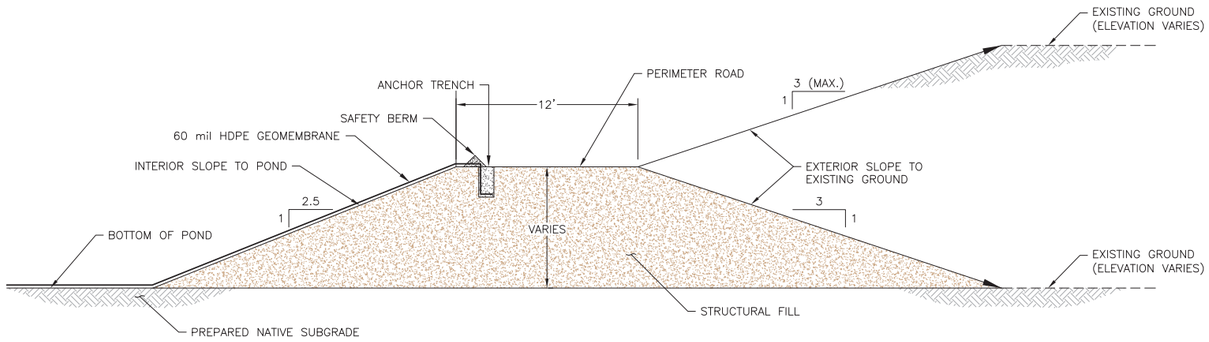
TYPICAL CROSS SECTION BITTERN POND
N.T.S.



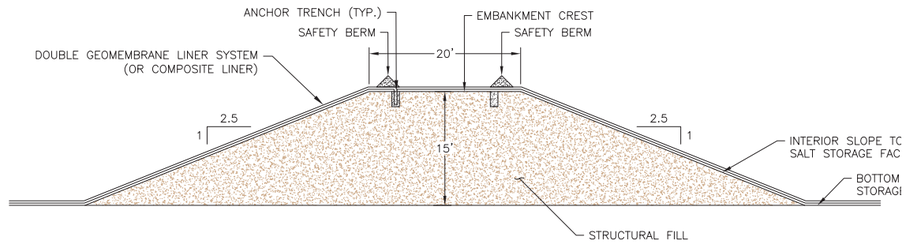
TYPICAL CROSS SECTION BITTERN PRODUCT POND
N.T.S.



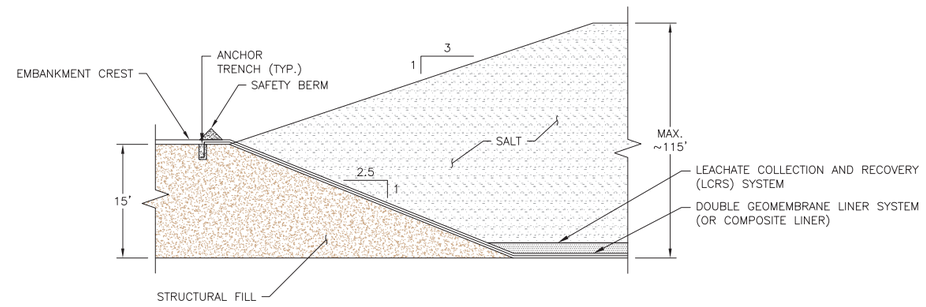
TYPICAL CROSS SECTION FRESHWATER POND
N.T.S.



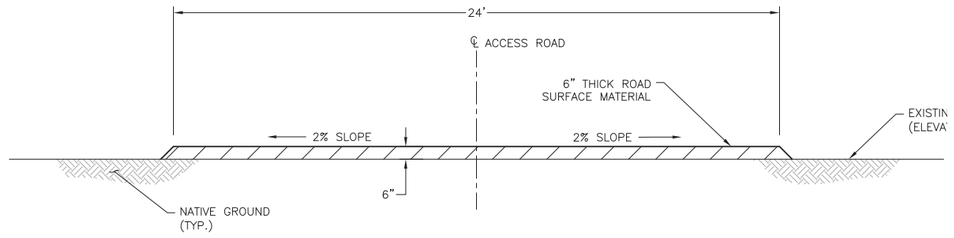
A TYPICAL EVAPORATION POND EMBANKMENT
N.T.S.



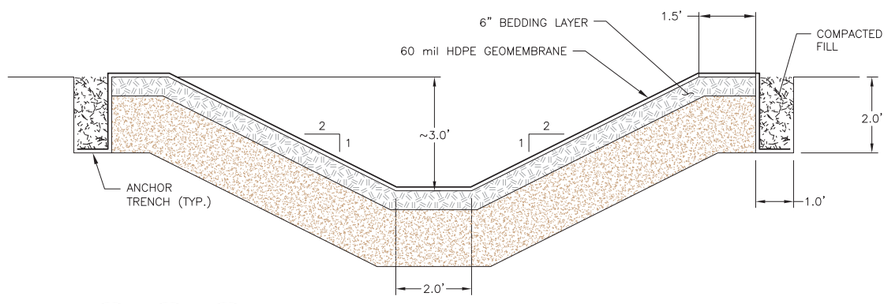
B TYPICAL SECTION FOR SALT STORAGE CELL INTERIOR EMBANKMENT
N.T.S.



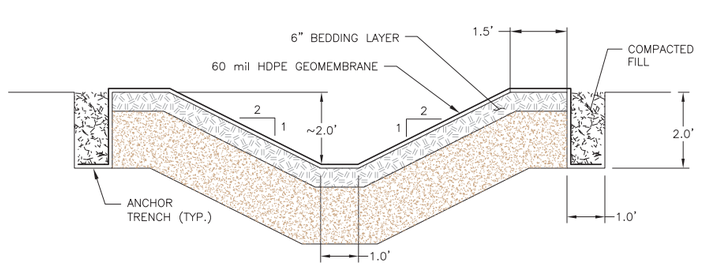
C TYPICAL SECTION FOR SALT STORAGE FACILITY PERIMETER EMBANKMENT
N.T.S.



D TYPICAL ACCESS ROAD SECTION
N.T.S.

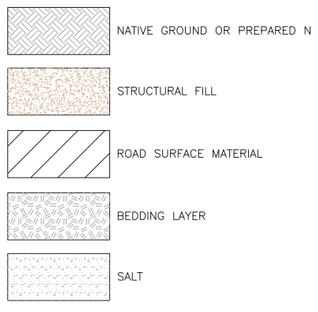


E 180 E 180 E 180 TYPICAL BITTERN FEED CHANNEL
N.T.S.



F 180 F 180 F 180 TYPICAL CRYSTALLIZER FEED CHANNEL
N.T.S.

LEGEND:



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Appendix D

Alternative D

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APPENDIX D

1 Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

2 Viewshed Analyses for Representative Proposed Project Features
Note: Viewshed analyses were prepared for representative proposed project features to identify their ability to be seen from the key observation points.

3 Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos
Note: Key observation point O does not have photo simulation because project features are not visible from the key observation point. Only a pipeline scar would be visible from key observation points J, K, and L. To streamline the presentation of photo simulations, only pipeline scars in photo simulations for KOP B for Alternative D, KOP N for Alternatives B, Area B2, C, and D, and KOP Q for Alternative B, Area B2 were prepared. Those photos simulations containing pipeline scars were used as representative pipeline scar photo simulations when analyzing impacts on visual resources at other key observation points containing pipeline scars when completing contrast rating worksheets.

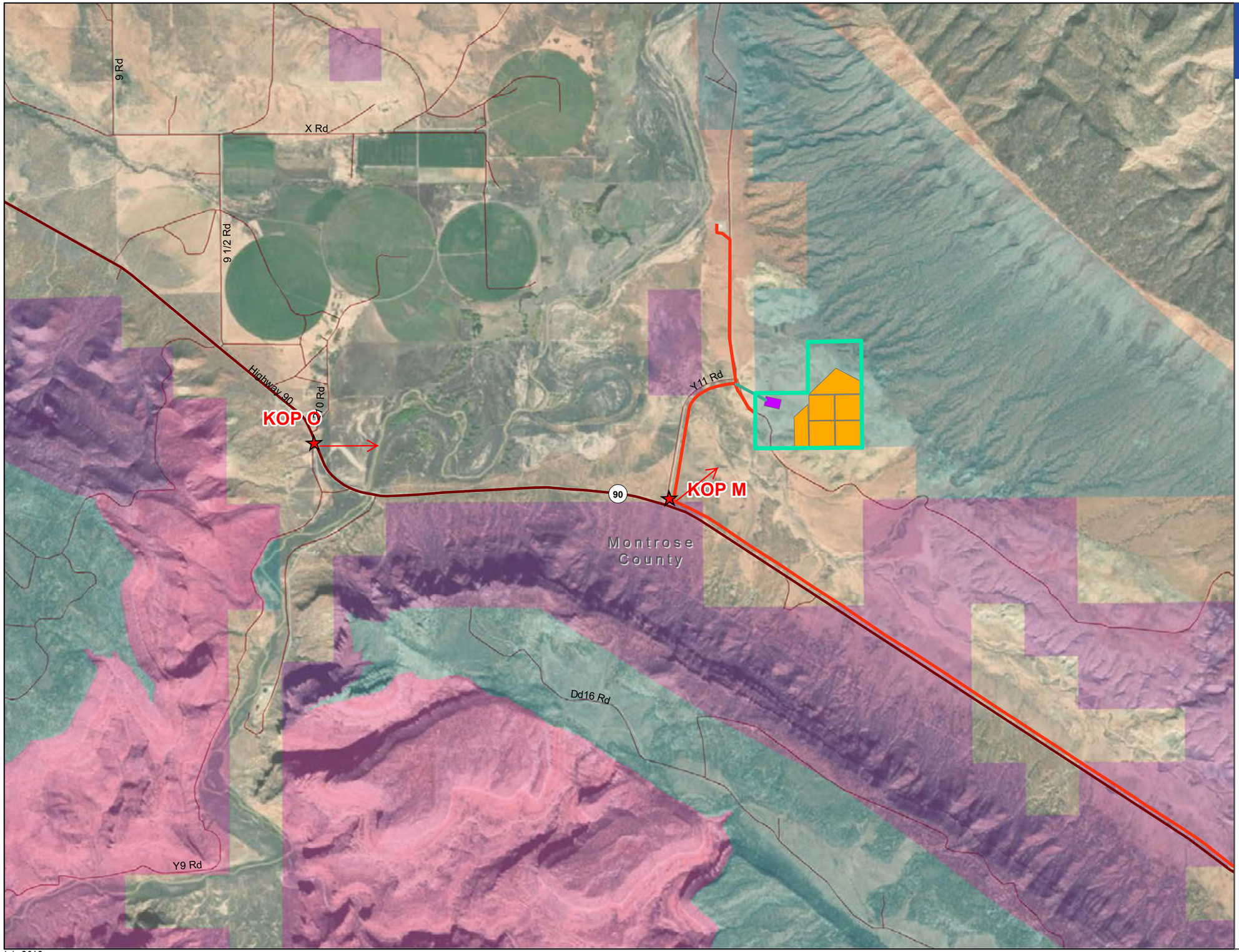
4 Proposed Project Design Drawings

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Appendix D

Alternative D: Project Description Maps/Location Sketches for Visual Contrast Rating Worksheets

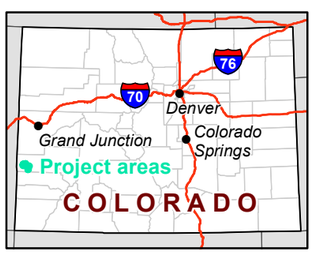
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RECLAMATION
Managing Water in the West

Alternative D
Location Sketch
KOP O and M

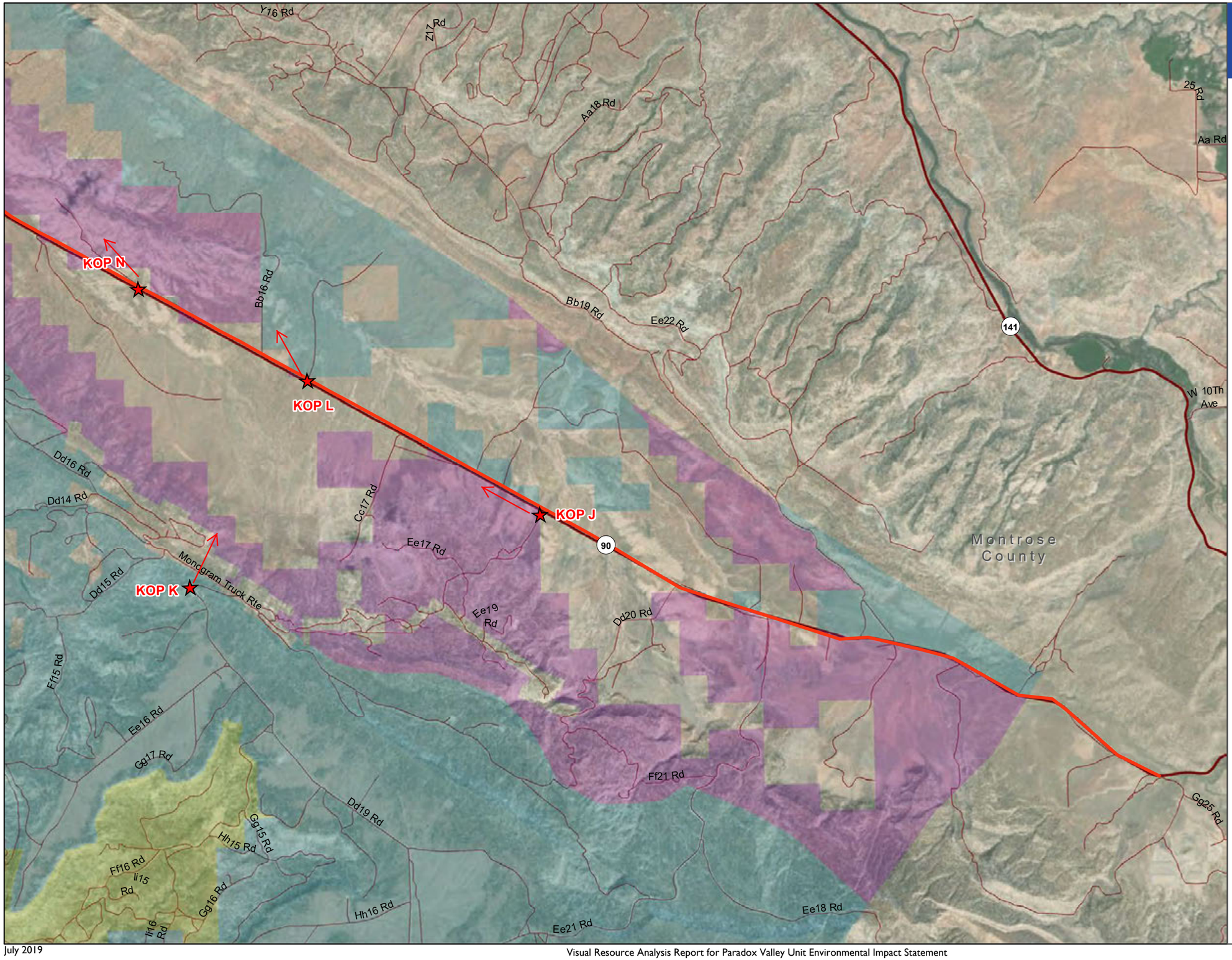
- Paradox Valley Unit project area
- Zero Liquid Discharge Technologies building
- Landfill cells
- Proposed pipeline
- Electric line extension
- Roads
- VRM Class I
- VRM Class II
- VRM Class III



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_D_1.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

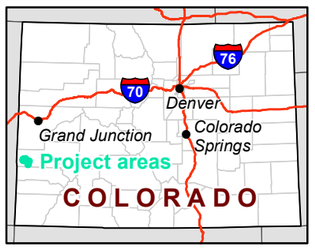
0 0.2 0.4
Miles



RECLAMATION
Managing Water in the West

Alternative D
Location Sketch
KOP N, L, K, J

- Paradox Valley Unit project area
- Proposed pipeline
- Roads
- VRM Class II
- VRM Class III
- VRM Class IV



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
July 15, 2019
PVUvisual_Sketch_D_3.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N

0 0.45 0.9
Miles

Appendix D

Alternative D: Viewshed Analyses for Representative Proposed Project Features

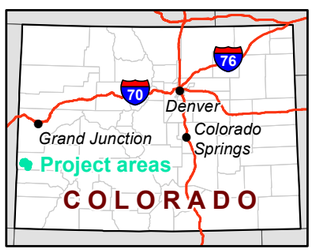
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RECLAMATION
Managing Water in the West

Viewshed for Alternative D Zero Liquid Discharge Building

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative D- zero liquid discharge building (40 ft)
- Visible

KOP O
KOP M
KOP N
KOP L
KOP J
KOP K
141
90
Montrose County



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID14.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

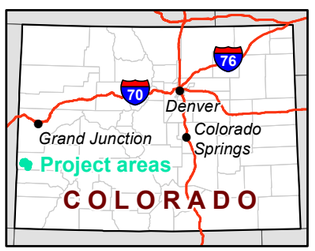
N
0 0.4 0.8
Miles

RECLAMATION
Managing Water in the West

Viewshed for Alternative D Zero Liquid Discharge Landfill

- Paradox Valley Unit project area
- Roads
- Key observation points (KOPs)
- Alternative D- zero liquid discharge landfill (100 ft)
- Visible

KOP O
KOP M
KOP N
KOP L
KOP J
KOP K
Montrose County
141
90



Source: Reclamation GIS 2019, BLM GIS 2019
U.S. Department of the Interior
Bureau of Reclamation
Western Colorado Area Office
June 27, 2019
PVUvisual_viewshed_ID15.mxd
No warranty is made by Reclamation as to the accuracy, reliability or completeness of the data herein. This product was compiled from the best available data and is presented as visual aide only and does not represent actual survey data.

N
0 0.4 0.8
Miles

Appendix D

Alternative D: Visual Contrast Rating Worksheets with Existing and Simulated Landscape Photos

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Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP J (Alternative D)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 14

5. Refer to Appendix D Alternative D project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain with some rounded mounds backed by steeply rising plateaus	Strips of short, rounded, somewhat indistinct shrubs; flat, low grass	Strands of utility lines, isolated utility poles
LINE	Horizontal, vertical, and diagonal	Horizontal and diagonal. Abrupt edge	Diagonal utility lines, vertical utility poles
COLOR	Light brown, tan, rust	Dark green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	Light to dark grey utility lines; dark brown utility poles
TEX-TURE	Smooth, bumpy, striated	Smooth grass to moderately rough and patchy shrubs	Smooth utility lines and stippled poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain with some rounded mounds backed by steeply rising plateaus; interruption from linear pipeline scar	Strips of short, rounded, somewhat indistinct shrubs; flat, low grass; interrupted	Existing: Strands of utility lines, isolated utility poles New: No new project structures visible
LINE	Horizontal, vertical, and diagonal; broken, horizonal pipeline scar	Horizontal and diagonal; discontinuous	Existing: Diagonal utility lines, vertical utility poles New: No new project structures visible
COLOR	Light brown, tan, rust, tan pipeline scar	Dark green grass in spring/summer, light brown grass in fall/winter, cool green/vivid grey shrubs	Existing: Light to dark grey utility lines; dark brown utility poles New: No new project structures visible
TEX-TURE	Smooth, stippled, striated, contrasting, smooth pipeline scar	Smooth grass to moderately rough and patchy shrubs	Existing: Smooth utility lines and stippled poles New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☒ Yes ☐ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.03 miles from the proposed project feature. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The pipeline scar would be obstructed by vegetation. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low, as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

U.S. Government Printing Office: 1985-461-988/33094



Pipeline Scar Not Simulated—See Alternative D KOP N for example of pipeline scar.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement	4. Location Township 46 N Range 17 W Section 18	5. Refer to Appendix D Alternative D project description map/location sketch
2. Key Observation Point KOP K (Alternative D)		
3. VRM Class II		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat expanse backed by steeply rising plateaus and jagged peaks	Jagged trees, flat grass/shrubs	Flat, linear roads; discrete, narrow, linear power lines
LINE	Horizontal, diagonal, vertical	Horizontal, diagonal, vertical	Horizontal and diagonal roads, diagonal power lines
COLOR	Light to medium brown, rust, light to medium grey, white	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunks	Light brown roads, dark grey power lines
TEX-TURE	Coarse to smooth, striated, jagged	Coarse and clumped, smooth and gridded	Smooth, gridded roads, smooth power lines

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat expanse interrupted; backed by steeply rising plateaus and jagged peaks; interruption from linear pipeline scar	Jagged trees, flat grass/shrubs, interrupted	Existing: Flat, linear roads; discrete, narrow, linear power lines New: No new project structures visible
LINE	Horizontal, diagonal, vertical, gridded/broken, horizonal pipeline scar	Horizontal, diagonal, vertical, discontinuous	Existing: Horizontal and diagonal roads. diagonal power lines New: No new project structures visible
COLOR	Light to medium brown, rust, light to medium grey, white; tan pipeline scar	Light to dark green grass in spring/summer, light brown grass in fall/winter; medium to dark green and grey shrubs, light grey tree trunk	Existing: Light brown roads, dark grey power lines New: No new project structures visible
TEX-TURE	Coarse to smooth, striated, jagged, contrasting; smooth pipeline scar	Coarse and clumped, smooth and gridded	Existing: Smooth, gridded roads, smooth power lines New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE	FEATURES			2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
	LAND/WATER BODY (1)	VEGETATION (2)	STRUCTURES (3)	

OF CONTRAST		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide pipeline scar from a proposed pipeline. The KOP is approximately 2.2 miles from the proposed project feature. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

U.S. Government Printing Office: 1985-461-988/33094

Alternative D: KOP K (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 6,946ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 10 years



Pipeline Scar Not Simulated—See Alternative D KOP N for example of pipeline scar.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP L (Alternative D)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 8

5. Refer to Appendix D Alternative D project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau	Short, flat, patchy	None
LINE	Horizontal, vertical, and diagonal	Horizontal and diagonal, diffuse edge	None
COLOR	Light brown, tan, rust	Light green grass in spring/summer, light brown grass in fall/winter, cool green, vivid grey, and dark green shrubs, pale yellow	None
TEX-TURE	Smooth to striated	Patchy grass to low/moderately coarse shrubs	None

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau, interrupted; interruption from linear pipeline scar	Short, flat, patchy, interrupted	New: No new project structures visible
LINE	Horizontal, vertical, and diagonal, horizonal pipeline scar	Horizontal and diagonal; discontinuous	New: No new project structures visible
COLOR	Light brown, tan, rust, tan pipeline scar	Light green grass in spring/summer, light brown grass in fall/winter, cool green, vivid grey, and dark green shrubs, pale yellow	New: No new project structures visible
TEX-TURE	Smooth to striated, smooth pipeline scar	Patchy grass to low/moderately coarse shrubs	New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman

	Texture			X					X				X

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0 miles from the proposed project feature, and the pipeline scar would run directly across it. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low as the vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

U.S. Government Printing Office: 1985-461-988/33094

Alternative D: KOP L (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,441ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Pipeline Scar Not Simulated—See Alternative D KOP N for example of pipeline scar.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP M (Alternative D)

3. VRM Class III

4. Location

Township 47 N

Range 18 W

Section 21

5. Refer to Appendix D Alternative D project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau	Short, rounded, patchy shrubs; linear bands and a few solitary mounds	Discrete, narrow lines of fencing
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal; shrubs rugged in foreground	Horizontal fence lines, vertical fence poles
COLOR	Light to medium-reddish brown, rust, tan	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Dark grey fence lines, light brown poles
TEX-TURE	Smooth, striated, slightly rough	Patchy, moderately coarse, becoming smother and more uniform	Stippled fence lines and poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain, backed by steeply rising plateau; interrupted; flat, linear pipeline scar; small convex, domed landfill	Short, rounded, patchy shrubs, linear bands and a few solitary mounds; interrupted, flattened	Existing: Discrete, narrow lines of fencing New: Prominent, rectangular building; narrow, linear fencing, strands of utility lines; regularly spaced utility poles, complex and boxy construction equipment and infrastructure, flat gravel road
LINE	Horizontal, vertical, and diagonal; broken/discontinuous, horizontal pipeline scar; small, curving landfill	Horizontal, vertical, and diagonal; shrubs rugged in foreground; discontinuous, flattened	Existing: Horizontal fence lines, vertical fence poles New: Vertical, horizontal building; vertical and horizontal wildlife fence, diagonal utility lines, vertical utility poles, complex construction equipment and infrastructure, horizontal gravel road

COLOR	Light to medium-reddish brown, rust, tan, tan pipeline scar; small, white/light brown landfill	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Existing: Dark grey fence lines, light brown poles New: Earth-toned building, dark grey or brown fencing, light grey utility lines, light brown utility poles, grey/white and primary colored construction equipment and infrastructure, grey gravel roads
TEX-TURE	Smooth, striated, slightly rough, discontinuous, smooth pipeline scar, small smooth landfill	Patchy, moderately coarse, becoming smoother and more uniform, flattened	Existing: Stippled fence lines and poles New: Smooth building with sharp edges, stippled wildlife fence, smooth utility lines, stippled utility poles, smooth construction equipment and infrastructure, smooth gravel road

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form		X				X				X			Evaluator's Names Date 04/17/2019 Amanda Biedermann Lindsay Chipman
	Line		X				X				X			
	Color			X					X			X		
	Texture			X				X				X		

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is the landfill, a ~150,000-square-foot building, a new gravel access road, and a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.5 miles from the proposed project features at the ZLD facility. The greatest contrast created by the building would be its height and angular form. Similarly, the greatest contrast created by the landfill would be its height; however, it could resemble nearby hills, once reclamation is complete. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. The degree of contrast with the other project features would only be minimized. Although the color of the new vegetation would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would attract attention but would not dominate the view. The degree of contrast created by the proposed project feature would be moderate. The proposed project features conform with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

- Ensure use of earth-tone paints for the ZLD facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the ZLD facility building after construction; minimize the clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of access roads, the pipeline scar, and utility poles
- Revegetate landfill and contour landfill to resemble nearby topography

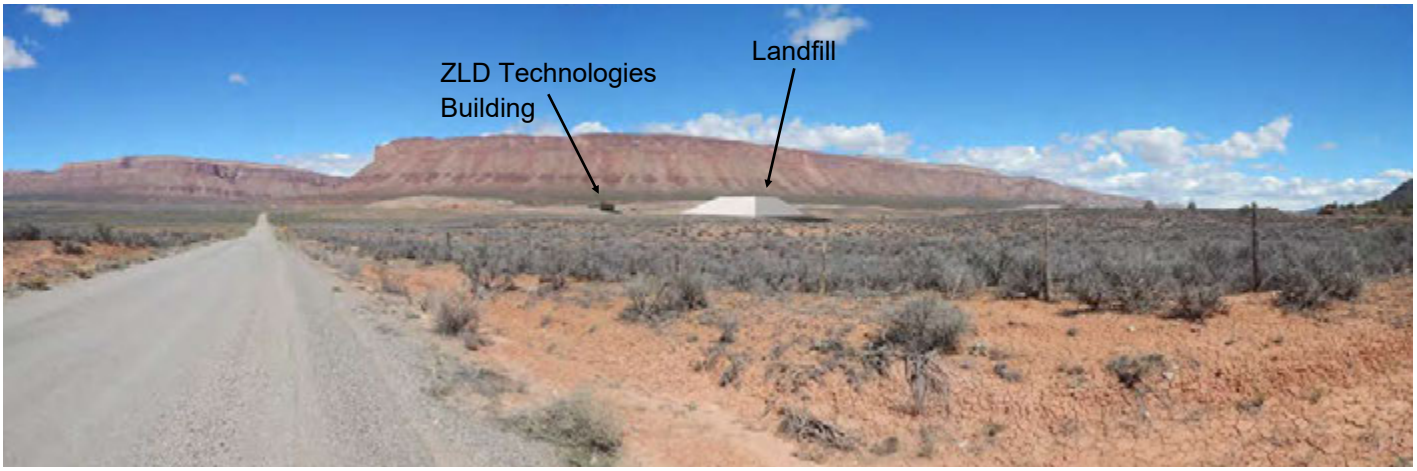
U.S. Government Printing Office: 1985-461-988/33094

Alternative D: KOP M (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,025ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 5 years



Alternative D: KOP M (Simulated Condition at Year 5)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP M (Alternative D)

3. VRM Class III

4. Location
Township 47 N
Range 18 W
Section 21

5. Refer to Appendix D Alternative D project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau	Short, rounded, patchy shrubs; linear bands and a few solitary mounds	Discrete, narrow lines of fencing
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal; shrubs rugged in foreground	Horizontal fence lines, vertical fence poles
COLOR	Light to medium-reddish brown, rust, tan	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Dark grey fence lines, light brown poles
TEX-TURE	Smooth, striated, slightly rough	Patchy, moderately coarse	Stippled fence lines and poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat terrain backed by steeply rising plateau; interruption from linear pipeline scar; large, convex, domed landfill	Short, rounded, patchy shrubs, linear bands and a few solitary mounds, interrupted, flattened	Existing: Discrete, narrow lines of fencing New: Prominent, rectangular building; narrow, linear fencing, strands of utility lines; regularly spaced utility poles, flat gravel road
LINE	Horizontal, vertical, and diagonal; broken/discontinuous; horizontal pipeline scar; large, curving landfill	Horizontal, vertical, and diagonal; shrubs rugged in foreground, discontinuous, flattened	Existing: Horizontal fence lines, vertical fence poles New: Vertical, horizontal building; vertical and horizontal wildlife fence, diagonal utility lines, vertical utility poles, horizontal gravel road
COLOR	Light to medium-reddish brown, rust, tan, large white/light brown landfill; tan pipeline scar	Light to dark green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Existing: Dark grey fence lines, light brown poles New: Earth-toned building, grey fencing, light grey utility lines, light brown utility poles, grey gravel road

TEX-TURE	Smooth, striated, slightly rough, discontinuous; smooth pipeline scar; large smooth landfill	Patchy, moderately coarse, flattened	Existing: Stippled fence lines and poles New: Smooth building with sharp edges, stippled wildlife fence, smooth utility lines, stippled utility poles, smooth gravel road

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES												2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form		X				X				X			Evaluator's Names Date 04/17/2019 Amanda Biedermann Lindsay Chipman
	Line		X				X				X			
	Color			X					X			X		
	Texture			X				X				X		

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is the landfill, a ~150,000-square-foot building, a new access road, and a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0.5 miles from the proposed project features at the ZLD facility. The greatest contrast created by the building would be associated with its height and angular form. Similarly, the greatest contrast created by the landfill would be its height; however, it could resemble nearby hills, once reclamation is complete. The pipeline scar would be parallel to the road, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar after installation, the degree of contrast could be minimized or eliminated for the pipeline scar. The degree of contrast with the other project features would only be minimized. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would attract attention but would not dominate the view. The degree of contrast created by the proposed project feature would be moderate. The proposed project features conform with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

- Ensure use of earth-tone paints for the ZLD facility building; select paint finishes with low levels of reflectivity, such as flat or semigloss
- Revegetate around the base of the ZLD facility building after construction; minimize the clearing size by, for example, stripping vegetation only where necessary
- Revegetate around the edge of access roads, the pipeline scar, and utility poles
- Revegetate landfill and contour landfill to resemble nearby topography

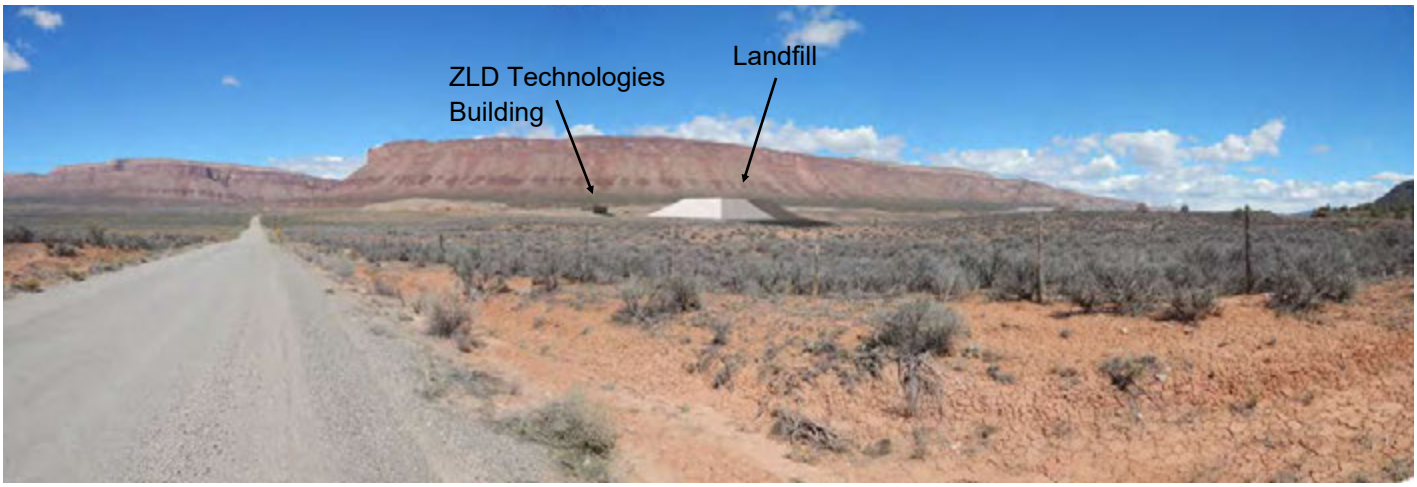
U.S. Government Printing Office: 1985-461-988/33094

Alternative D: KOP M (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,025ft
Compass Direction of Photo: Northeast
Timeframe for Simulated Condition: 25 years



Alternative D: KOP M (Simulated Condition at Year 25)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP N (Alternative D)

3. VRM Class II

4. Location
Township 46 N
Range 17 W
Section 6

5. Refer to Appendix D Alternative D project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to gently sloping terrain, lined by steeply rising plateaus, jagged peaks in background	Short, flat, patchy grass; clumped, rounded shrubs	Discrete, narrow lines of fencing; flat, slightly curving road
LINE	Horizontal, vertical, and diagonal	Horizontal, vertical, and diagonal, abrupt edge	Horizontal fence/utility lines and road, vertical fence/utility poles
COLOR	Light to medium-reddish brown	Light green grass in spring/summer, light brown grass in fall/winter, dark green, pale yellow shrubs	Dark grey to dark brown fence lines and poles, light grey road, dark grey utility poles
TEX-TURE	Smooth to striated	Patchy grass to moderately coarse shrubs	Smooth road, stippled fence/utility poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to gently sloping terrain, lined by steeply rising plateaus, jagged peaks in background; interruption from linear pipeline scar	Short, flat, patchy grass; clumped, rounded shrubs, interrupted	Existing: Discrete, narrow lines of fencing; flat, slightly curving road New: No new project structures visible
LINE	Horizontal, vertical, diagonal, horizontal pipeline scar	Horizontal, vertical, diagonal, discontinuous	Existing: Horizontal fence/utility lines and road, vertical fence/utility poles New: No new project structures visible
COLOR	Light to medium-reddish brown, tan pipeline scar	Light green grass in spring/summer, light brown grass in fall/winter, dark green, pale yellow shrubs	Existing: Dark grey to dark brown fence lines and poles, light grey road, dark grey utility poles New: No new project structures visible
TEX-TURE	Smooth to striated, discontinuous, smooth pipeline scar	Patchy grass to moderately coarse shrubs	Existing: Smooth road, stippled fence/utility poles New: No new project structures visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1.	FEATURES	2. Does project design meet visual resource

DEGREE OF CONTRAST		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)				management objectives? ☒ Yes ☐ No (Explain on reverse side)
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
ELEMENTS	Form			X				X					X	Evaluator's Names Date 04/17/2019
	Line			X				X					X	Amanda Biedermann
	Color			X					X				X	Lindsay Chipman
	Texture			X					X				X	

SECTION D. (Continued)

Comments from item 2.

The proposed project feature visible from this KOP is a ~20-foot-wide scar from a proposed pipeline. The KOP is approximately 0 miles from the proposed project feature, as the pipeline would run directly across the KOP. The pipeline scar would be parallel to Hwy-90, and the topography would not change. The degree of contrast would be most noticeable immediately after pipeline installation. With the implementation of mitigation measures, such as revegetating the pipeline scar, the degree of contrast could be minimized or eliminated. Although the color of the revegetated area would be lighter than the surrounding vegetation in the first 5 years, the short, sparse new vegetation would eventually resemble the surrounding vegetation. The level of change to the characteristic landscape would become low, as the new vegetation matures. Eventually, the degree of contrast created by the proposed project feature would be weak. The proposed project feature conforms with VRM Class II objectives.

Additional Mitigating Measures (See item 3)

Revegetate the pipeline scar.

U.S. Government Printing Office: 1985-461-988/33094

Alternative D: KOP N (Existing Condition)

Date: 04/17/2019
Camera/Lens Size: Nikon Coolpix L820/NIKKOR lens with 30x optical zoom; 4.0-120.0 mm
Elevation of KOP: 5,404ft
Compass Direction of Photo: Northwest
Timeframe for Simulated Condition: 10 years



Alternative D: KOP N (Simulated Condition)



Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 04/17/2019

District UFO

Resource Area Paradox Valley

Activity (program) Salinity Control

SECTION A. PROJECT INFORMATION

1. Project Name Paradox Valley Unit Environmental Impact Statement

2. Key Observation Point KOP O (Alternative D)

3. VRM Class III

4. Location
Township 47 N
Range 18 W
Section 19

5. Refer to Appendix D Alternative D project description map/location sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat plain, steeply rising plateau	Short and rounded, clustered near highway	Flat curving road, strands of utility lines, regularly spaced utility poles
LINE	Horizontal, vertical, and diagonal	Horizontal, diagonal, abrupt edges	Horizontal curving road, diagonal utility lines, vertical utility poles
COLOR	Light to medium-reddish brown, light green	Light to vivid green grass in spring/summer, light brown grass in fall/winter; cool/light to dark green shrubs	Grey road, light grey utility lines, light brown utility poles
TEX-TURE	Smooth plain; striated and jagged plateau	Patchy, moderately coarse to coarse	Smooth road, smooth utility lines, stippled utility poles

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Project area not visible	Project area not visible	Project area not visible
LINE	Project area not visible	Project area not visible	Project area not visible
COLOR	Project area not visible	Project area not visible	Project area not visible
TEX-TURE	Project area not visible	Project area not visible	Project area not visible

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST		FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form				X				X				X
	Line				X				X				X
	Color				X				X				X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names Date 04/17/2019
Amanda Biedermann
Lindsay Chipman

	Texture				X				X				X

SECTION D. (Continued)

Comments from item 2.

The proposed project area and features are not visible from this KOP, which is approximately 2.1 miles from the proposed project area and features under Alternative D. At this distance, project features would not be visible from the KOP, due to the distance and plateau slopes that blocks views of the project area. There is no degree of contrast. The proposed project features conform with VRM Class III objectives.

Additional Mitigating Measures (See item 3)

No mitigation measures required.

U.S. Government Printing Office: 1985-461-988/33094

Alternative D: KOP O (Existing Condition)



Project Area Not Visible: No Simulation

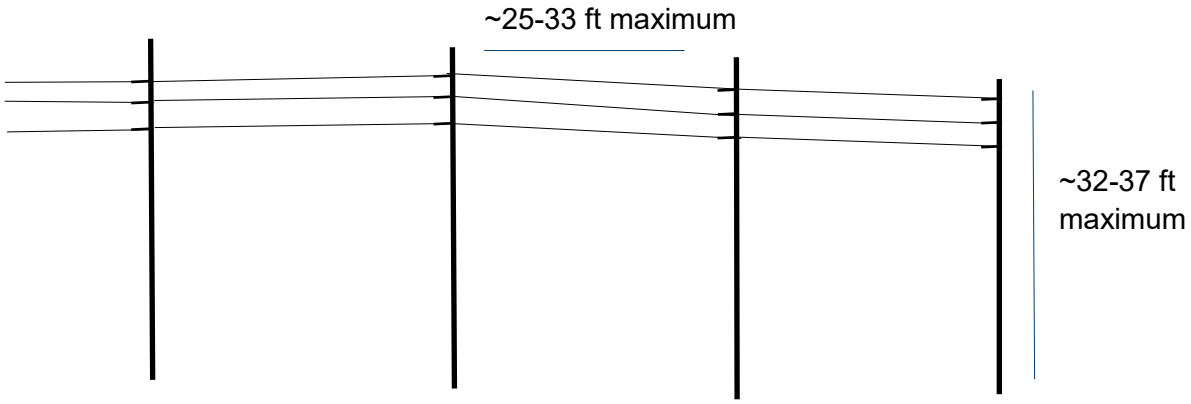
Appendix D

Alternative D: Proposed Project Design Drawings

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Alternative D: Powerlines

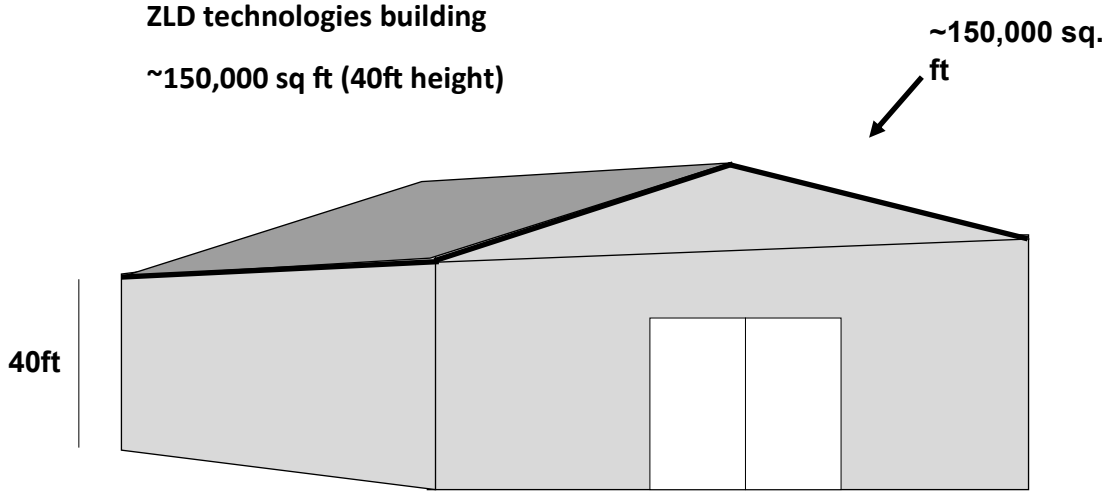
Above ground power lines (32-37 feet maximum height for poles; power line height



Alternative D: ZLD Technologies Building

ZLD technologies building

~150,000 sq ft (40ft height)



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Appendix L

Socioeconomic Analysis Report

Paradox Valley Unit Environmental Impact Statement

Socioeconomic Analysis

U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Denver, Colorado

September 2019

Paradox Valley Unit Environmental Impact Statement – Socioeconomic Analysis
September 2019

Socioeconomics Affected Environment

The following description of the affected environment for the socioeconomic analysis focuses on basic socioeconomic information and estimates of various measures of current economic activity within the impacted region. The geographic area or region for estimating socioeconomic impacts of the Paradox Valley Unit (PVU) salinity control alternatives was defined as Montrose and Mesa counties in Colorado and Grand County in Utah. The PVU is located in western Montrose County, Colorado, about 50 miles southwest of Grand Junction, Colorado, and 10 miles east of the Colorado-Utah border. Generally, the three-county socioeconomic region is rural with a low population growth rate, except primarily for Grand Junction, Colorado. The three-county region has higher poverty and unemployment rates, and lower per capita income when compared to the states of Utah and Colorado overall. The top five most influential economic sectors in the three-county area were the NAICS Industry sectors of Health Care and Social Assistance, Public Administration, Construction, Retail Trade, and Manufacturing.

Project and Regional Area

The PVU extracts naturally occurring brine groundwater in Paradox Valley, thereby preventing it from entering the Dolores River, and injects the brine deep underground to improve water quality in the Dolores River and, ultimately, in the Colorado River. The PVU consists of facilities to intercept shallow brine and inject it into the Mississippi Leadville Limestone (Leadville) Formation via a Class V deep injection well. The PVU has been injecting brine since 1996. The existing PVU injection well is nearing the end of its useful life; therefore, Reclamation is investigating alternative ways to enhance and protect the quality of water available in the Colorado River.

Regional Economy and Population Overview

Mesa County, Colorado is adjacent to Montrose County and includes the largest city in the region, Grand Junction (U.S. Census Bureau 2017 population estimate of 62,475 reflects nearly 31 percent of the regional population). The logic behind including Mesa County was that a significant portion of the construction material as well as workforce is expected to stem from the Grand Junction area. Finally, Grand County, Utah was included in the region because that is likely to be the temporary residence of much of the workforce during construction. Despite the assumption that a significant portion of the construction workforce would come from the Grand Junction area, one way driving time from Grand Junction to Paradox, Colorado is over two and a half hours. The City of Moab in Grand County, Utah has ample lodging and rental opportunities and is just over an hour from Paradox. Therefore, the assumption was made that most of the construction workforce would reside in Moab requiring the inclusion of Grand County within the region.

Measures of Regional Economic Activity

As will be discussed in more detail under the socioeconomics environmental consequences section, the IMPLAN input-output model was used to evaluate the regional economic impacts of the proposed alternatives within the three-county region. The IMPLAN model generates several measures of regional economic activity; three of the most commonly used are presented in this socioeconomics discussion - employment, total output, and total labor income. Each measure provides a somewhat different aspect of the regional economy and, as a result, all three are presented in this analysis.

Within IMPLAN, employment effects are measured in terms of number of jobs as opposed to full-time equivalent positions (FTEs). For example, two half-time jobs (20 hours per week) would constitute two jobs in IMPLAN even though they would represent only one FTE. IMPLAN's employment estimates also account for seasonal employees by measuring annual jobs. For example, two employees working six months during a year would count as one annual job.

Total output represents the value of goods and services produced by businesses within a given industry or sector[1] of the economy and is measured in terms of sales dollars. Note that production in excess of sales would increase inventory during the period and therefore would not be included in the output measure. The value of total output is analogous to the concept of gross regional product.

Total labor income is comprised of employee compensation (wages paid to workers) and proprietor income (wages to owners of sole proprietorships). Employment and total labor income are often of particular interest to local government officials whereas total output is the most comprehensive measure of regional economic activity.[2]

Current Socioeconomic Conditions within the Impacted Region

The following measures also provide information about the region; however, these measures are separated from the three measures of regional economic activity described above because they are not addressed within the IMPLAN model for the impacts section. Basic socioeconomic measures, including existing population, unemployment, per capita income, and some housing characteristics, are shown in this section, and are not discussed in the socioeconomics environmental consequences section since they are not expected to be affected by the project. Nevertheless, these measures do provide additional background and perspective for describing the overall region and regional economy.

Population Related Measures

Table 1 presents estimates of annual population, number of households, and average household size by county, for the three-county region, separately for the states of Colorado and Utah, and for the entire U.S. In addition, for population and number of households, growth rates from the previous year are presented. Growth in household size was not

[1] The terms "industry" and "sector" are used interchangeably within the socioeconomic discussion.
[2] Total output includes labor income plus a series of other factors (i.e., indirect business taxes, other property income, and the value of intermediate inputs).

calculated since it was found to be insignificant. Data was gathered for years 2012 to 2017; however, the data are estimates (not decennial census data), and some 2017 data may be subject to revisions by the Census Bureau.

The population and number of households data generally indicate that the study area is growing more slowly than all of Colorado, all of Utah, and the entire U.S. For most years, the annual growth rates for population and number of households in the region have been well under one percent (except 2016 and 2014 for number of households). In addition, the regional growth rates for both population and number of households fell well below those of Colorado and Utah, and below the national growth rate over the same period, with the exception of the last two years (2016 and 2017). Average household size within the region was below that of Colorado, Utah, and the nation.

Table 1. Socioeconomics: Population, Number of Households, & Household Size by County

Date	Mesa County, CO	Montrose County, CO	Grand County, UT	Regional Total	Regional Growth Rate from Prior Year (%)	Colorado (1,000s)	Colorado Growth Rate from Prior Year (%)	Utah (1,000s)	Utah Growth Rate from Prior Year (%)	U. S. (1,000s)	U. S. Growth Rate from Prior Year (%)
1. Population Estimates											
2017	151,616	41,784	9,674	203,074	0.96	5,607.1	1.19	3,101.8	1.63	325,719.1	0.80
2016	150,083	41,471	9,579	201,133	1.23	5,540.5	1.68	3,051.2	2.03	323,127.5	0.70
2015	148,401	40,800	9,493	198,694	0.52	5,448.8	1.85	2,990.6	1.66	320,896.6	0.73
2014	147,502	40,747	9,420	197,669	0.17	5,349.6	1.56	2,941.8	1.35	318,563.5	0.75
2013	147,372	40,634	9,332	197,338	-0.06	5,267.6	1.50	2,902.7	1.64	316,204.9	0.70
2012	147,471	40,678	9,314	197,463	0.07	5,189.9	1.40	2,855.8	1.41	313,998.4	0.75
2. Number of Households (occupied)											
2017[1]	60,562	16,951	3,873	81,386	0.97	2,082.5	-1.27	938.3	2.17	118,825.9	-0.03
2016	60,188	16,587	3,820	80,595	1.02	2,108.9	4.17	918.3	1.33	118,860.0	1.65
2015	59,215	16,768	3,789	79,772	0.21	2,024.5	1.31	906.3	1.13	116,926.3	0.62
2014	58,966	16,815	3,822	79,603	1.00	1,998.3	1.05	896.2	1.06	116,211.1	0.52
2013	58,598	16,586	3,633	78,817	-0.30	1,977.6	0.76	886.8	0.67	115,610.2	0.33
2012	58,635	16,732	3,690	79,057	0.67	1,962.8	1.11	880.9	1.09	115,226.8	0.41
3. Average Household Size											
2017[1]	2.40	2.38	2.44	2.40	-	2.55	-	3.14	-	2.63	-
2016	2.46	2.49	2.34	2.46	-	2.56	-	3.16	-	2.72	-
2015	2.51	2.43	2.51	2.49	-	2.69	-	3.30	-	2.74	-
2014	2.50	2.42	2.46	2.48	-	2.68	-	3.28	-	2.74	-
2013	2.51	2.45	2.57	2.50	-	2.64	-	3.27	-	2.74	-
2012	2.52	2.43	2.52	2.50	-	2.64	-	3.24	-	2.73	-

Notes: (1) Numbers are preliminary for 2017 and subject to revisions.

Source:
1) Population: U. S. Census Bureau, American Factfinder, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2017
2) Number of Households: U. S. Census Bureau, American Factfinder, American Community Survey 5-Year Estimates 2013-2017 (2017), 2012-2016 (2016) 2011-2015 (2015), 2010-2014 (2014), 2009-2013 (2013), 2008-2012 (2012).

Unemployment Rate

Table 2 presents unemployment rate data by county, region (reflects the three-county socioeconomic project area weighted average where weights are based on the percentage of each county's population to the total population of the region)[3], state, and for the nation from 2012 to 2018. The unemployment rates for each of the individual counties are higher than the rates of their respective states in all years and as a result, the weighted regional average also exceeds the Colorado and Utah state rates in all years. The weighted average regional rate also exceeds the national average in all years, although by only a small amount for some years. The unemployment rate for all study region counties, states, and the nation decreased substantially from 2012 to 2018. However, it should be noted that unemployment rates in Mesa County and Montrose actually increased from 2017 to 2018, which resulted in an increase in the unemployment rate for the study region. The difference in unemployment rates between the study region and the states and nation have decreased over the seven year period.

Table 2. Socioeconomics: Unemployment Rates by County (%)

Year	Mesa County, CO	Montrose County, CO	Grand County, UT	Regional Average (Weighted by Annual Population Percentages by County)	Colorado Statewide	Utah Statewide	National
2018	4.1	3.7	4.8	4.1	3.3	3.1	3.9
2017	3.8	3.2	5.3	3.7	2.7	3.3	4.4
2016	5.2	4.1	5.9	5.0	3.2	3.4	4.9
2015	5.6	5.1	6.1	5.5	3.9	3.6	5.3
2014	6.2	6.8	6.4	6.3	5.0	3.8	6.2
2013	8.7	9.4	7.8	8.8	6.8	4.6	7.4
2012	9.7	10.3	8.4	9.8	7.9	5.4	8.1
Source: U. S. Bureau of Labor Statistics, Local Area Unemployment Statistics.							

Per Capita Personal Income

Table 3 presents per capita personal income estimates by county, weighted average for the region (weights again based on county population percentages), by state, and for the nation from 2012 to 2017. The weighted average per capita personal income for the region falls below the averages for both states (although only barely below Utah's estimate) and the nation as a whole.

The U. S. Bureau of Economic Analysis (BEA), which publishes the data, defines personal income as the income received by, or on behalf of, all persons from all sources from:

- participation as laborers in production,
- owning a home or business,
- the ownership of financial assets, and
- government and business in the form of transfers (e.g., social security payments, unemployment payments, retirement pensions, etc.).

[3] Weights applied to 2018 data to compute the regional average were based on 2017 population percentages for the three counties.

It includes income from domestic sources as well as the rest of world. It does not include realized or unrealized capital gains or losses.

The rate of growth of personal income has been lower over the 2012 to 2017 time period for the study area compared to the rate of growth for all of Colorado, Utah, and the nation. This indicates the gap in per capita personal income between the study region and other larger regions has increased over the 2012 to 2017 time period.

Table 3. Socioeconomics: Per Capita Personal Income ($)

Area	2012	2013	2014	2015	2016	2017
Mesa County, CO	36,418	36,470	38,424	38,863	39,920	41,503
Montrose County, CO	32,577	31,838	33,317	34,559	36,339	37,658
Grand County, UT	37,645	38,247	39,015	39,990	46,053	49,593
Weighted Regional Average	35,685	35,600	37,399	38,033	39,474	41,097
Colorado	46,402	46,792	49,768	50,899	52,372	54,646
Utah	35,995	36,045	37,644	39,308	42,179	43,459
Nationwide	44,266	44,462	46,414	48,112	49,831	51,640
Notes: The personal income measure used by BEA incorporates more elements than the labor income estimate provided by IMPLAN, hence the per capita value (for 2013) from BEA exceeds that from IMPLAN.						
Source: U. S. Bureau of Economic Analysis, Local Area Personal Income.						

Poverty Rate

Table 4 presents estimates of the percentage of people living in poverty by county, weighted average for the region (weights again based on county population percentages), by state, and for the nation from 2012 to 2017. The weighted average percentage for the region exceeds that of the states of Colorado and Utah in all years and exceeded the national average from 2014 to 2017, and has been at about the same rate as the nation as a whole. The poverty level data presented in Table 4 indicate the poverty rate in the study region has actually increased by 5.9 percent from 2012 to 2017. The poverty rate over the same period has decreased by 20.2 percent for all of Colorado, 19.8 percent for Utah, and 17.4 percent for the Nation.

Table 4. Socioeconomics: Percentage of People Below Poverty Level

Area	2012	2013	2014	2015	2016	2017
Mesa County, CO	13.4	14.7	15.8	15.6	16.3	14.9
Montrose County, CO	13.8	16.0	17.2	19.0	18.0	12.9
Grand County, UT	13.6	13.7	16.3	18.7	17.0	10.8
Weighted Regional Average	13.5	14.9	16.1	16.4	16.7	14.3
Colorado	12.9	13.2	13.1	12.7	12.2	10.3
Utah	12.1	12.7	12.8	12.3	11.7	9.7
Nationwide	14.9	15.4	15.6	15.5	15.1	12.3
Source: U. S. Census Bureau, American Factfinder, American Community Survey 5-Year Estimates 2013 – 2017 (2017), 2012 – 2016 (2016), 2011-2015 (2015), 2010-2014 (2014), 2009-2013 (2013), 2008-2012 (2012)						

Summary of Regional Economic Conditions

The population, unemployment, income, and poverty rate data indicate the study region is growing at a slower rate, has a higher rate of unemployment and poverty, and has a lower level of per capita income than for all of Colorado, Utah, and the nation. As a result, the region could be considered relatively more sensitive to changes in activities that would affect demand for goods and services in the region compared to other areas in Colorado and Utah.

Economic Base – Employment, Total Output, and Total Labor

Table 5 provides 2013 estimates of employment, total output, and total labor income by major NAICS (North American Industry Classification System) sector for the three-county region based on IMPLAN model data. It is common practice to use the twenty major 2-digit NAICS aggregated industries to describe overall conditions within a regional economy. The IMPLAN model data was summed across IMPLAN industries to reflect the major NAICS industries (i.e., data from IMPLAN sectors 1-19 were summed to represent the NAICS Industry sector11 - Agriculture, Forestry, Fishing, and Hunting).

To determine the major NAICS sectors within the three-county region, percentages of total employment, total output, and total labor income were first estimated for each industry. Each industry was then ranked for each of the three measures based on the percentages, with the highest percentage getting the highest rank. The rankings were summed across the three measures with the lowest overall sum representing the highest ranked, most influential sector.

For the three-county region, the top eight most influential sectors were as follows:

1. NAICS Industry 62 – Health Care and Social Assistance
2. NAICS Industry 92 – Public Administration
3. NAISC Industry 23 – Construction
4. NAICS Industry 44-45 Retail Trade
5. NAICS Industry 31-33 – Manufacturing
6. NAICS Industry 53 – Real Estate, Rental, Leasing
7. NAICS Industry 21 – Mining, Quarrying, and Oil & Gas Extraction
8. NAICS Industry 54 – Professional, Scientific, and Technical Services

Table 5. Socioeconomics: Current Economy – Employment, Output, Income

			Employment			Output			Labor Income			
NAICS Sector(s) Numbers	**NAICS Industry Name**	**IMPLAN Industry Numbers**	**# Annual Jobs**	**%**	**Rank**	**M$**	**%**	**Rank**	**(M$)**	**%**	**Rank**	**Overall Rank**
11	Agriculture, Forestry, Fishing and Hunting	1-19	3,871	3.45	13	341.3	2.39	17	86.0	1.9	12	13
21	Mining, Quarrying, and Oil & Gas Extraction	20-40	3,942	3.51	12	1,111.3	7.80	5	351.3	7.8	5	7
22	Utilities	41-51	443	0.39	20	416.4	2.92	14	41.8	0.9	15	15
23	Construction	52-64	7,437	6.63	5	1,280.5	8.98	3	384.4	8.6	3	3
31-33	Manufacturing	65-394	4,604	4.10	11	1,441.7	10.12	2	223.4	5.0	7	5
42	Wholesale Trade	395	3,192	2.84	15	618.6	4.34	9	179.3	4.0	10	11
44-45	Retail Trade	396-407	12,985	11.57	2	961.6	6.75	7	355.3	7.9	4	4
48-49	Transportation and Warehousing	408-416	3,823	3.41	14	578.0	4.06	11	185.1	4.1	9	11
51	Information	417-432	1,301	1.16	17	415.2	2.91	15	59.6	1.3	14	14
52	Finance and Insurance	433-439	5,226	4.66	10	721.7	5.06	8	181.8	4.1	9	10
53	Real Estate, Rental, and Leasing	440-446	6,611	5.89	7	1,765.8	12.39	1	67.5	1.5	13	6
54	Professional, Scientific, and Technical Services	447-460	5,894	5.25	8	615.5	4.32	10	258.0	5.8	6	8
55	Management of Companies and Enterprises	461	1,062	0.95	18	148.0	1.04	19	27.4	0.6	17	17
56	Administrative and Support and Waste Management and Remediation Services	462-471	5,479	4.88	9	351.7	2.47	16	151.4	3.4	11	12
61	Educational Services	472-474	910	0.81	19	28.7	0.20	20	14.0	0.3	18	18
62	Health Care and Social Assistance	475-487	13,104	11.67	1	1,166.3	8.18	4	664.9	14.8	2	1
71	Arts, Entertainment, and Recreation	488-498	2,578	2.30	16	158.1	1.11	18	35.1	0.8	16	16
72	Accommodation and Food Services	499-503	9,971	8.88	4	568.8	3.99	12	210.4	4.7	8	8
81	Other Services (except Public Administration)	504-517	7,186	6.40	6	467.5	3.28	13	258.5	5.8	6	9
92	Public Administration	518-536	12,626	11.25	3	1,096.3	7.69	6	744.8	16.6	1	2
	Total:	1-536	112,246			14,253.0			4,480.1			

M$ = Millions of Dollars

Environmental Consequences

This section identifies the regional economic impacts resulting from project-related expenditures expected to occur within the local economy under each alternative, defined as the three-county area consisting of Grand County in Utah, and Mesa and Montrose Counties in Colorado. Regional economic effects were modeled using the Impact Analysis for Planning (IMPLAN) model. The inputs used to estimate the regional economic impacts were based on conceptual design-level cost estimates for each alternative. Following the summary of the IMPLAN model, the alternatives are described with numerical results, or output, from the model runs. For additional detail on project components and costs, see the project design reports for each alternative (also listed in this report's references section):

- Alternative A No Action (closure and removal of existing wells and related facilities and equipment): Paradox Valley Unit 2nd Well Design.
- Alternative B: Paradox Valley Unit 2nd Well Design.
- Alternative C: Final Pond Design Strategy Report – Pond Optimization Study 2; Final Pond Operation Strategy Report – Pond Optimization Study 2; and Paradox Valley Unit Salinity Control Investigations, Study 1 - Hydrogen Sulfide Management, 50% Design Report – Final.
- Alternative D: SaltMaker Evaporator Crystallizer Pilot Report; and USBR Paradox Valley Unit Saline Water Treatment Plant Concept Design & Cost Overview.

Regional economic effects of the initial construction activities, as well as equipment replacements and operation and maintenance (O&M) activities expected to occur over time, were estimated for each action alternative. Cost estimates were prepared for each type of activity required to construct or operate each major component of the project. These costs were determined to be in- or out-of-region expenditures. Only the in-region expenditures were then sorted into the appropriate economic sectors to be used as inputs into the IMPLAN model, which then produced an estimate of the overall change to the regional economy resulting from implementing the various alternatives. The regional impacts from No Action are related to activities necessary to remove existing project facilities.

The project-related changes to employment, labor income and total economic output within the local three-county region, in 2017 dollars, is shown for each alternative in table 6. It is important to note that the costs shown in table 6 are local, in-region costs only, and do not represent the total estimated costs of the alternatives. The second column of table 6 shows the amounts of project costs, or expenditures, which would be spent within the three-county region—this is the model input. The second through fifth columns include several model outputs that are common measures of economic activity. The third column displays the total economic effect (the sum of direct, indirect, and induced economic effects) of in-region spending (the amount in the second column) on employment—the total number of jobs generated as a result of the dollars spent in column two. The fourth column shows the total economic effect (the sum of direct, indirect, and induced economic effects) of in-region spending (the amount in the second column) on labor income—the dollars of labor income generated as a result of the expenditures shown in column two. The last column in table 6 displays the total economic effect (the sum of direct, indirect, and induced economic effects) of the in-region spending (the amount in the second column) on economic output--the total economic activity generated as a result of total expenditures shown in column

one. Additional explanation of the IMPLAN model and definition of terms is in the following section. It is important to note that the impacts associated with construction are short term impacts that would occur over the construction period while the annual O&M costs are long term impacts that occur over the life of the project alternative. The impacts associated with annual O&M are not directly comparable between existing conditions and the alternatives since existing conditions include the current O&M costs until the point in time when the existing facilities will be deconstructed.

Table 6.—Summary of In-region Economic Impacts for Existing Conditions and by Alternative – IMPLAN Output

Estimated In-region Construction, Replacement, and O&M Costs	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment (Jobs)	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Annual Existing Conditions PVU O&M Costs				
Annual O&M Costs	2,370,000	30.0	1,239,643	4,050,756
Alternative A				
Construction (deconstruction)	2,153,302	33.9	1,191,815	3,053,211
Alternative B, Area B1				
Construction	16,051,539	253	11,546,642	28,550,680
Annual O&M Costs	1,681,533	21	879,536	2,874,042
Alternative B, Area B2				
Construction	25,715,476	351	15,816,872	44,083,593
Annual O&M Costs	1,861,849	24	973,852	3,182,234
Alternative C				
Construction	79,497,486	766	31,761,102	124,372,739
Annual O&M Costs	1,611,947	20	843,138	2,755,107
Replacement Costs	14,725,363	140	6,215,081	23,517,289
Alternative D				
Construction	39,006,313	442	20,868,791	62,401,210
Annual O&M Costs	11,442,250	145	5,984,940	19,556,861
Replacement Costs	3,206,565	27	1,140,809	4,947,722

Among other comparisons, table 6 shows the effect of each alternative compared to what is estimated under Alternative A when the Paradox Valley Unit is taken out of service. The effect associated with an alternative is the difference between Alternative A and the other alternatives. Alternative A represents no salinity control in the Paradox Valley.

Throughout the report, a set of three tables is included for each alternative (in the case of alternative B, there are two sets—one for each potential site location); the first tables provide the highest summary level information (as in table 6, above), the second tables provide an

intermediate summary. The third tables also include a value added column in addition to direct, indirect, and induced effects. The following section provides additional information about the IMPLAN model and interpreting the output.

IMPLAN Modeling

The IMPLAN model is a static regional input-output economic model that estimates changes in economic output, income, and employment within a specific region resulting from changes in spending within the specified regional economy (IMPLAN 2018). The IMPLAN model is a widely accepted and used static model that calculates economic impacts resulting from a change in economic activity in a defined regional economy. For the Paradox Valley Unit, specific construction- and operation-related expenditures were injected (run through IMPLAN) into the local economy in the three-county region consisting of Grand County in Utah, and Mesa and Montrose Counties in Colorado. The economic impact was based on conceptual design-level cost estimates.

IMPLAN Model Methodology

In terms of inputs for IMPLAN, each major expenditure expected for the project was matched with corresponding IMPLAN sector codes and totaled, by sector, for entry into the model. The IMPLAN multipliers estimate the amount of total economic activity that results from an industry (or household) spending an additional dollar in the local economy. The IMPLAN model generates a series of tables to show the direct, indirect, and induced (and the combination, or total of the three) economic impacts to gross receipts, i.e., economic output, resulting from an injection of dollars into a specific industry, or industries, within a defined economic region.

Direct impacts are the injection of dollars into the regional economy, either as local expenditures or purchases of goods and services that are made by the project.[4] Alternatively stated, direct economic effects are the expenditures made by the Project for purchasing local construction supplies and labor**.** Indirect impacts constitute inter-industry transactions that occur when supplying industries respond to increased demands from the directly affected industries, or sectors. Induced effects are the impacts of additional household spending generated by employees of all industries affected both directly and indirectly by the change in expenditures, i.e., household spending of employees of the construction industry, as well as employees of the business establishments providing the inputs to the construction businesses involved directly in the project. Induced effects include changes in local spending that result from income changes in the directly and indirectly affected industry sectors, for example, impacts from wage expenditures. The total effects (sum of direct, indirect, and induced economic effects) in this report show the regional economic impacts from local project expenditure amounts by alternative and sector.[5]

IMPLAN Inputs

For IMPLAN modeling, the total estimated project costs by alternative were considered for each construction or maintenance component to identify which ones would be considered in- or out-of-region expenditures and, in the case of No Action, deconstruction costs. Only expenditures made

[4] Direct impacts exclude household savings and tax payments since it is assumed they do not circulate through the economy.

[5] Regional and local are used interchangeably, and are defined as the three-county area.

within the local region for project components were included and categorized according to IMPLAN sectors for inputs to the model.[6]

IMPLAN Output and Results

The IMPLAN output tables show four major types of impacts (direct, indirect, induced, and total effects) for employment, labor income, value added, and economic output. Employment is the number of jobs generated by the economic activity of the project.[7] Total labor income is comprised of employee compensation and proprietor income. Value added was included in the most detailed set of tables only. Value added shows the net income generated after deducting the cost of intermediate inputs of goods and services purchased from other industries or sectors (including those inputs that are imported from other regions) from the total gross revenues of an industry. Total output represents the value of goods and services produced by businesses within a given industry of the regional economy and is measured in terms of sales dollars. Employment and total labor income are often of particular interest to local government officials, whereas total output is the most comprehensive measure of regional economic activity.

Existing Conditions - PVU Annual O&M

The existing PVU annual O&M costs represent the baseline economic conditions and identify the economic impacts which would be lost due to well closure. Detailed results can be seen below in table 7. It is assumed the existing O&M economic impacts would cease when the selected alternative is implemented. The IMPLAN model was used to show economic impacts of existing O&M expenditures.

Table 7.—Detailed Results of Existing PVU O&M Estimated Costs – IMPLAN Output

Existing Conditions – PVU O&M Costs	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Annual Existing Conditions PVU O&M Costs					
Direct Effect	62	14.4	753,864	836,929	2,370,000
Indirect Effect	62	9.1	264,715	510,549	940,994
Induced Effect	62	6.5	221,065	425,481	739,761
Total Effect	62	30.0	1,239,643	1,772,958	4,050,756

[6] IMPLAN sectors are primarily based on the NAICS sector categories; however, construction sectors are based on Bureau of the Census structure type definitions.

[7] A job in IMPLAN equals the annual average of monthly jobs in that industry (this is the same definition used by QCEW, BLS, and BEA nationally). Thus, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. A job can be either full-time or part-time.

Alternative A – No Action

Under Alternative A, the existing deep injection well would not be replaced. No action represents closure of the existing PVU facilities and no salinity control in Paradox Valley. The O&M cost impacts identified in table 7 would no longer occur.

Once the injection well is no longer operational, it would be plugged and abandoned in accordance with the EPA Underground Injection Control Permit. The pipelines and brine production wells would be capped and abandoned; other ancillary infrastructure would be removed. The buildings would be assessed for possible future use. The IMPLAN model was used to show economic impacts of the existing well's annual O&M costs as well as deconstruction costs.

Table 8.—Summary of In-region Alternative A Well Deconstruction Estimated Costs – IMPLAN Output

Alternative A Estimated Deconstruction Costs	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment (Jobs)	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Deconstruction	2,153,302	33.9	1,191,815	3,053,211

Table 9.—In-region Alternative A Well Deconstruction – IMPLAN Output

Alternative A Deconstruction and Costs by IMPLAN Sector	IMPLAN Sector Codes	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Deconstruction - BIF		**1,134,188**	**17.9**	**564,304**	**1,695,094**
Architectural, engineering, and related services	449	178,250	3.1	145,285	330,358
Water, sewage, and other systems	51	730,250	5.9	249,911	1,118,650
Construction of new highways and streets	58	135,125	4.6	89,629	141,226
Landscape and horticultural services	469	43,125	1.0	27,082	67,715
Construction of new power and communication structures	54	47,438	3.3	52,397	37,145
Deconstruction - STF		**347,876**	**6.8**	**214,311**	**205,119**
Water, sewage, and other systems	51	50,313	0.4	17,218	77,073
Construction of new power and communication structures	54	107,813	3.5	70,616	109,025
Construction of new highways and streets	56	189,750	2.9	126,477	19,021
Deconstruction – Well Closure Costs		**283,188**	**2.3**	**96,914**	**433,808**
Water, sewage, and other systems	51	283,188	2.3	96,914	433,808
Non-contract Costs		**388,050**	**6.9**	**316,286**	**719,190**
Architectural, engineering, and related services	449	388,050	6.9	316,286	719,190

Table 10.—Detailed Results of Alternative A Well Deconstruction Estimated Costs – IMPLAN Output

Alternative A Deconstruction Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Deconstruction – Brine Injection Facilities (BIF) and Surface Treatment Facilities (STF)					
Architectural, engineering, and related services - BIF					
Direct Effect	449	1.7	96,297	82,656	178,250
Indirect Effect	449	0.7	23,076	36,508	65,397
Induced Effect	449	0.8	25,913	49,871	86,711
Total Effect	449	3.1	145,285	169,035	330,358
Water, sewage, and other systems – BIF					
Direct Effect	51	2.8	129,100	475,578	730,250
Indirect Effect	51	1.8	76,285	111,745	239,390
Induced Effect	51	1.3	44,525	85,727	149,010
Total Effect	51	5.9	249,911	673,050	1,118,650
Construction of new highways and streets – BIF					
Direct Effect	58	4.0	67,563	39,187	67,563
Indirect Effect	58	0.2	6,074	11,157	20,152
Induced Effect	58	0.5	15,992	30,773	53,511
Total Effect	58	4.6	89,629	81,117	141,226
Landscape and horticultural services – BIF					
Direct Effect	469	0.8	19,925	27,191	43,125
Indirect Effect	469	0.1	2,329	4,589	8,432
Induced Effect	469	0.1	4,828	9,294	16,158
Total Effect	469	1.0	27,082	41,074	67,715
Construction of new power and communication structures – BIF					
Direct Effect	54	3.0	42,694	3,131	4,744
Indirect Effect	54	0.0	362	640	1,140
Induced Effect	54	0.3	9,347	17,981	31,260
Total Effect	54	3.3	52,397	21,752	37,145
Water, sewage, and other systems - STF					
Direct Effect	51	0.2	8,895	32,767	50,313
Indirect Effect	51	0.1	5,256	7,699	16,494
Induced Effect	51	0.1	3,068	5,906	10,266
Total Effect	51	0.4	17,218	46,372	77,073
Construction of new power and communication - STF					
Direct Effect	54	3.0	53,906	35,578	53,906

Indirect Effect	54	0.1	4,110	7,270	12,959
Induced Effect	54	0.4	12,599	24,245	42,160
Total Effect	54	3.5	70,616	67,094	109,025
Construction of new highways and streets – STF					
Direct Effect	56	2.0	94,876	46,489	94,875
Indirect Effect	56	0.2	9,035	15,987	28,635
Induced Effect	56	0.7	22,566	43,424	75,511
Total Effect	56	2.9	126,477	105,901	199,021
Deconstruction - Well Closure Costs					
Water, sewage, and other systems					
Direct Effect	51	1.1	50,064	184,427	283,188
Indirect Effect	51	0.7	29,583	43,334	92,834
Induced Effect	51	0.5	17,267	33,245	57,785
Total Effect	51	2.3	96,914	261,006	433,808
Deconstruction-related Non-contract Costs					
Architectural, engineering, and related services					
Direct Effect	449	3.7	209,639	179,942	388,050
Indirect Effect	449	1.5	50,236	79,477	142,369
Induced Effect	449	1.7	56,411	108,569	188,771
Total Effect	449	6.9	316,286	367,988	719,190

Alternative B – New Deep Injection Wells

Alternative B involves drilling a new injection well for brine disposal. Disposal of the brine from the existing production well field would be accomplished by injecting it into a currently unpressurized block of the Leadville Formation. Two areas (B1 and B2) are analyzed as potential locations for a new injection well: one primarily on Reclamation land near the existing injection well (Area B1) and one entirely on BLM-administered land on Monogram Mesa (Area B2). The final location of the well would be based on the geologic suitability of the site, which would be determined after additional geologic investigations. The Leadville Formation in these areas is expected to have sufficient permeability and porosity to accept the injected brine at a continuous rate of up to 200 gallons per minute (gpm), while keeping wellhead pressures below 5,000 pounds per square inch over a 50-year period. Assuming the brine would be continually diverted, 200 gpm equates to about 114,000 tons of salt that would be prevented from entering the Colorado River system annually.

Area B1 would require construction of a new Brine Injection Facility (BIF); a new deep injection well; an access road, including two new bridges over the Dolores River; a high-pressure brine pipeline; and powerline extension. Area B2 would require construction of a new BIF, a new deep injection well, surface facilities, an access road, a low-pressure pipeline, and pumping stations.

Economic Impacts

The IMPLAN model, which was described at the beginning of this section, was used to estimate expected regional economic effects resulting from each type of project-related expenditure. Local estimated construction costs range from some of the well and facility expenses to design and construction. The O&M-related expenditures shown are those expected to occur within the local region each year of the 50-year project lifespan. Project-related spending within the three-county region was totaled and entered into the IMPLAN model; therefore, expenditure output data in the table below was limited to in-region activity. The overall estimated in-region costs and economic impacts are shown in tables 11 and 14 below, with more detail shown in the tables that follow each summary table.

Additional IMPLAN data for direct, indirect, and induced effects, as well as the sum of the three, total effects, are displayed in tables 13 and 16 for the four primary IMPLAN measures of employment, labor income, value added, and output.

Table 11.—Summary of In-region Area B1 Injection Well Construction and O&M Estimated Costs – IMPLAN Output

Alternative B (Area B1) Estimated Construction, Replacement, and O&M Costs	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment (Jobs)	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Construction	16,051,539	252.7	11,546,642	28,550,680
Annual O&M Costs	1,681,533	21.3	879,536	2,874,042

Table 12.—In-region Area B1 Injection Well Construction, Replacement, and O&M Costs – IMPLAN Output

Alternative B (Area B1) Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Injection Well Ancillary Construction		**2,159,844**	**22.6**	**1,033,078**	**3,425,871**
Construction of new highways and streets	56	1,132,031	10.9	491,069	1,819,258
Landscape and horticultural services	469	57,500	1.3	36,110	90,287
Construction of new power and communication structures	54	970,313	10.4	505,899	1,516,326
Construction - Injection Facility		**2,822,195**	**34.7**	**1,491,195**	**4,609,225**
Construction of new non-residential structures	58	2,739,036	32.8	1,438,972	4,478,649

Landscape and horticultural services	469	83,159	1.9	52,223	130,576
Non-contract Costs		**11,069,500**	**195.4**	**9,022,369**	**20,515,584**
Architectural, engineering, and related services	449	11,069,500	195.4	9,022,369	20,515,584
Annual O&M Costs		**1,681,533**	**21.3**	**879,536**	**2,874,042**
Maintenance and repair construction of nonresidential structures	62	1,681,533	21.3	879,536	2,874,042

Table 13.—Detailed Results of In-region Area B1 Injection Well Construction and O&M Estimated Costs – IMPLAN Output

In-region Alternative B (Area B1) Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Injection Well Ancillary Construction					
Construction of new highways and streets					
Direct Effect	56	5.4	284,050	322,719	1,132,031
Indirect Effect	56	2.9	119,522	208,907	394,410
Induced Effect	56	2.6	87,497	168,458	292,817
Total Effect	56	10.9	491,069	700,084	1,819,258
Landscape and horticultural services					
Direct Effect	469	1.0	26,566	36,255	57,500
Indirect Effect	469	0.1	3,106	6,118	11,243
Induced Effect	469	0.2	6,438	12,392	21,544
Total Effect	469	1.3	36,110	54,765	90,287
Construction of new power and communication structures					
Direct Effect	54	5.7	339,328	496,952	970,313
Indirect Effect	54	2.0	76,413	134,482	244,299
Induced Effect	54	2.7	90,157	173,567	301,714
Total Effect	54	10.4	505,899	805,001	1,516,326
Construction - Injection Facility					
Construction of new non-residential structures					
Direct Effect	58	17.7	921,950	1,037,494	2,739,036

Indirect Effect	58	7.5	260,521	473,811	881,238
Induced Effect	58	7.6	256,501	493,763	858,375
Total Effect	58	32.8	1,438,972	2,005,067	4,478,649
Landscape and horticultural services					
Direct Effect	469	1.5	38,421	52,433	83,159
Indirect Effect	469	0.1	4,491	8,849	16,260
Induced Effect	469	0.3	9,311	17,922	31,157
Total Effect	469	1.9	52,223	79,204	130,576
Non-contract Costs					
Architectural, engineering, and related services					
Direct Effect	449	104.6	5,980,145	5,133,029	11,069,500
Indirect Effect	449	43.2	1,433,030	2,267,166	4,061,215
Induced Effect	449	47.6	1,609,193	3,097,027	5,384,869
Total Effect	449	195.4	9,022,369	10,497,222	20,515,584
Annual O&M Costs		**1,681,533**	**21.3**	**879,536**	**2,874,042**
Maintenance and repair construction of nonresidential structures					
Direct Effect	62	10.2	534,872	593,807	1,681,533
Indirect Effect	62	6.4	187,817	362,238	667,642
Induced Effect	62	4.6	156,847	301,882	524,866
Total Effect	62	21.3	879,536	1,257,927	2,874,042

Table 14.—Summary of In-region Area B2 Monogram Mesa Injection Well Construction and O&M Estimated Costs – IMPLAN Output

Alternative B (Area B2) Estimated Construction, Replacement, and O&M Costs	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment (Jobs)	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Construction	25,715,476	351.0	15,816,872	44,083,593
Annual O&M Costs	1,861,849	23.6	973,852	3,182,234

Table 15.—In-region Area B2 Monogram Mesa Injection Well Construction, Replacement, and O&M Costs – IMPLAN Output

Alternative B (Area B2) Construction, Replacement, and O&M Costs by IMPLAN Sector	**IMPLAN Sector Codes**	**In-region Estimated Costs or Expenditures (2017$)**	**Total Economic Effect Employment**	**Total Economic Effect Labor Income**	**Total Economic Effect Output**
Injection Well Ancillary Construction		**9,210,781**	**74.7**	**3,173,542**	**14,115,998**
Construction of new highways and streets	56	53,906	0.5	23,384	86,631
Landscape and horticultural services	469	57,500	1.3	36,110	90,287
Water, sewage, and other systems	51	9,099,375	72.9	3,114,048	13,939,080
Construction - Injection Facility		**2,822,195**	**34.7**	**1,491,195**	**4,609,225**
Construction of new non-residential structures	58	2,739,036	32.8	1,438,972	4,478,649
Landscape and horticultural services	469	83,159	1.9	52,223	130,576
Non-contract Costs		**13,682,500**	**241.6**	**11,152,135**	**25,358,370**
Architectural, engineering, and related services	449	13,682,500	241.6	11,152,135	25,358,370
Annual O&M Costs		**1,861,849**	**23.6**	**973,852**	**3,182,234**
Maintenance and repair construction of nonresidential structures	62	1,861,849	23.6	973,852	3,182,234

Table 16.—Detailed Results of In-region Area B2 Monogram Mesa Injection Well Construction and O&M Estimated Costs – IMPLAN Output

In-region Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Injection Well Ancillary Construction					
Water, sewage, and other systems					
Direct Effect	56	0.3	13,526	15,368	53,906
Indirect Effect	56	0.1	5,692	9,948	18,781
Induced Effect	56	0.1	4,166	8,022	13,944
Total Effect	56	0.5	23,384	33,337	86,631
Landscape and horticultural services					
Direct Effect	469	1.0	26,566	36,255	57,500
Indirect Effect	469	0.1	3,106	6,118	11,243
Induced Effect	469	0.2	6,438	12,392	21,544
Total Effect	469	1.3	36,110	54,765	90,287
Water, sewage, and other systems					
Direct Effect	51	34.4	1,608,668	5,926,001	9,099,375
Indirect Effect	51	22.1	950,565	1,392,414	2,982,951
Induced Effect	51	16.4	554,814	1,068,212	1,856,754
Total Effect	51	72.9	3,114,048	8,386,627	13,939,080
Construction - Injection Facility					
Construction of new non-residential structures					
Direct Effect	58	17.7	921,950	1,037,494	2,739,036
Indirect Effect	58	7.5	260,521	473,811	881,238
Induced Effect	58	7.6	256,501	493,763	858,375
Total Effect	58	32.8	1,438,972	2,005,067	4,478,649
Landscape and horticultural services					
Direct Effect	469	1.5	38,421	52,433	83,159
Indirect Effect	469	0.1	4,491	8,849	16,260
Induced Effect	469	0.3	9,311	17,922	31,157
Total Effect	469	1.9	52,223	79,204	130,576
Non-contract Costs					
Architectural, engineering, and related services					
Direct Effect	449	12.9	7,391,782	6,344,701	13,682,500
Indirect Effect	449	53.4	1,771,303	2,802,340	5,019,882
Induced Effect	449	58.9	1,989,050	3,828,092	6,655,989
Total Effect	449	241.6	11,152,135	12,975,133	25,358,370

In-region Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Annual O&M Costs					
Maintenance and repair construction of nonresidential structures					
Direct Effect	62	11.3	592,228	657,483	1,861,849
Indirect Effect	62	7.1	207,957	401,082	739,236
Induced Effect	62	5.1	173,666	334,254	581,149
Total Effect	62	23.6	973,852	1,392,819	3,182,234

Alternative C – Evaporation Ponds

Under Alternative C, brine would be collected from the existing brine production well field and piped to a series of evaporation ponds, which would be located about seven miles southeast of the production well field. The BLM manages most of the site, although the study area includes some private land at the perimeter. The 1,530-acre study area analyzed covers the maximum area within which the evaporation pond complex and facilities would be located; however, the permanent disturbance would be about 600 acres. The facility would be operated to evaporate water from the brine, thereby allowing the solid salt to be harvested for disposal in an onsite landfill. Alternative C would prevent up to 171,000 tons of salt from entering the Dolores River annually. Overall estimated in-region costs and economic impacts are shown in table 13 in this section. A more detailed break-down of estimated costs are displayed in table 14, with additional detail in table 15.

Alternative C would require construction of a series of lined ponds. Roads would be constructed within the evaporation pond complex to facilitate operations, and an 8-foot-high wildlife fence would surround it. A hydrogen sulfide (H_2S) treatment facility would be constructed in a roughly 8,400-square-foot building to remove H_2S from the brine. A roughly 60-acre landfill would be constructed within the evaporation pond complex to permanently store the salt. Closure of the evaporation ponds complexes would follow the applicable requirements of the State of Colorado, which could include removing pumping and piping systems, removing the geomembrane liner, site grading to restore the ground to a natural appearance, reseeding disturbed areas, and capping the landfill.

Economic Impacts

The IMPLAN model derived the expected regional economic effects for each type of Alternative C project-related expenditure. Only the estimated project-related spending within the three-county region was totaled and entered into the IMPLAN model; therefore, expenditure output data in the table below reflect only in-region expenditures. The overall estimated in-region costs and economic impacts are shown in table 17, below, with more detail in table 18. Additional IMPLAN data for direct, indirect, and induced effects, as well as the sum of the three, total effects, are displayed in table 19 for the four primary IMPLAN measures of employment, labor income, value added, and output. Construction costs include expenses ranging from real estate purchases to design and construction. Operation and maintenance (O&M) estimated dollar amounts shown are

the expected in-region activity that would occur each year of the 50-year project lifespan. The replacement dollar amounts would occur roughly every eight years over the 50-year project lifespan.

Table 17.—Summary of In-Region Alternative C Evaporation Pond and System Construction, O&M, and Replacement Estimated Costs – IMPLAN Output

Estimated Construction, Replacement, and O&M Costs	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment (Jobs)	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Construction	79,497,486	766.4	31,761,102	124,372,739
Annual O&M Costs	1,611,947	20.4	843,138	2,755,107
Replacement Costs	14,725,363	139.9	6,215,081	23,517,289

Table 18.—In-Region Alternative C Evaporation Pond Construction, Replacement, and O&M Costs IMPLAN Output

Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment	Total Economic Effect Labor Income	Total Economic Effect Output
Construction – Grand Total		**79,497486**	**766.4**	**31,761,102**	**124,372,739**
Construction - Facilities		**56,667,747**	**474.8**	**19,306,007**	**86,415,397**
Evaporation Pond Construction					
Real Estate	440	2,587,500	25.5	306,420	3,390,576
Water, sewage, and other systems	51	51,747,183	414.8	17,709,259	79,270,078
Construction of new highways and streets	56	15,813	0.2	6,860	25,413
Landscape and horticultural services	469	658,375	14.8	413,455	1,033,783
Construction of new power and communication structures	54	227,125	2.4	118,418	354,932
H2S Facility Construction					
Real Estate	440	1,438	0.0	170	1,884
Construction of new nonresidential structures	58	1,430,313	17.1	751,425	2,338,731
Water Delivery Construction		**2,583,188**	**43.9**	**1,294,825**	**4,017,677**
Private households	517	71,875	6.2	87,448	123,995
Water, sewage, and other systems	51	1,293,750	10.4	442,756	1,981,860
Landscape and horticultural services	469	1,217,563	27.3	764,621	1,911,822

Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment	Total Economic Effect Labor Income	Total Economic Effect Output
Construction Closure Costs		**12,011,751**	**102.3**	**4,448,368**	**18,677,753**
Water, sewage, and other systems	51	8,324,563	66.7	2,848,886	12,752,167
Construction of new highways and streets	56	3,687,188	35.6	1,599,482	5,925,586
Construction-related Non-contract Costs		**8,234,800**	**145.4**	**6,711,902**	**15,261,912**
Architectural, engineering, and related services	449	8,234,800	145.4	6,711,902	15,261,912
Annual O&M Costs		**1,611,947**	**20.4**	**843,138**	**2,755,107**
Evaporation Pond O&M					
Maintenance and repair construction of nonresidential structures	62	269,509	3.4	140,968	460,639
H2S Facility O&M					
Maintenance and repair construction of nonresidential structures	62	781,438	9.9	408,736	1,335,618
Salt Storage O&M					
Maintenance and repair construction of nonresidential structures	62	561,000	7.1	293,434	958,850
Replacement Costs*		**14,725,363**	**139.9**	**6,215,081**	**23,517,289**
Evaporation Pond					
Water, sewage, and other systems	51	1,605,163	12.8	508,986	2,427,672
Construction of new highways and streets	56	474,375	4.6	205,781	762,356
Construction of new highways and streets	56	12,486,125	120.5	5,416,414	20,066,133
H2S Facility					
Construction of new nonresidential structures (plumbing)	58	37,700	0.5	19,806	61,644
Construction of new nonresidential structures (other)	58	122,000	1.5	64,094	199,484
Most replacement costs would occur approximately once every eight years.					

Table 19.—Detailed Results of Alternative C Evaporation Pond and H2S Construction, O&M, and Replacement Estimated Costs – IMPLAN Output

Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Construction - Facilities					
Real Estate – Evaporation pond					
Direct Effect	440	18.6	89,544	1,940,822	2,587,500
Indirect Effect	440	5.3	162,263	321,134	620,312
Induced Effect	440	1.6	54,613	105,135	182,764
Total Effect	440	25.5	306,420	2,367,090	3,390,576
Water, sewage, and other systems – Evaporation pond					
Direct Effect	51	195.7	9,148,325	33,700,537	51,747,183
Indirect Effect	51	125.8	5,405,764	7,918,515	16,963,728
Induced Effect	51	93.3	3,155,170	6,074,808	10,559,166
Total Effect	51	414.8	17,709,259	47,693,860	79,270,078
Construction of new highways and streets – Evaporation pond					
Direct Effect	56	0.1	3,968	4,508	15,813
Indirect Effect	56	0.0	1,670	2,918	5,509
Induced Effect	56	0.0	1,222	2,353	4,090
Total Effect	56	0.2	6,860	9,779	25,413
Landscape and horticultural services – Evaporation pond					
Direct Effect	469	11.6	304,184	415,118	658,375
Indirect Effect	469	1.0	35,558	70,055	128,732
Induced Effect	469	2.2	73,713	141,888	246,676
Total Effect	469	14.8	413,455	627,061	1,033,783
Construction of new power and communication structures – Evaporation pond					
Direct Effect	54	1.3	79,428	116,324	227,125
Indirect Effect	54	0.5	17,886	31,479	57,184
Induced Effect	54	0.6	21,103	40,627	70,623
Total Effect	54	2.4	118,418	188,430	354,932
Real Estate - H2S Facility Construction					
Direct Effect	440	0.0	50	1,079	1,438
Indirect Effect	440	0.0	90	178	345
Induced Effect	440	0.0	30	58	101
Total Effect	440	0.0	170	1,315	1,884

Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Construction of new nonresidential structures - H2S Facility Construction					
Direct Effect	58	9.3	481,439	541,775	1,430,313
Indirect Effect	58	3.9	136,043	247,422	460,179
Induced Effect	58	4.0	133,944	257,841	448,240
Total Effect	58	17.1	751,425	1,047,038	2,338,731
Water Delivery Construction					
Private households					
Direct Effect	517	5.8	71,875	71,875	71,875
Indirect Effect	517	0.0	0	0	0
Induced Effect	517	0.5	15,573	29,989	52,120
Total Effect	517	6.2	87,448	101,864	123,995
Water, sewage, and other systems					
Direct Effect	51	4.9	228,721	842,559	1,293,750
Indirect Effect	51	3.1	135,151	197,974	424,116
Induced Effect	51	2.3	78,884	151,878	263,993
Total Effect	51	10.4	442,756	1,192,411	1,981,860
Landscape and horticultural services					
Direct Effect	469	21.5	562,541	767,697	1,217,563
Indirect Effect	469	1.8	65,760	129,556	238,071
Induced Effect	469	4.0	136,321	262,400	456,188
Total Effect	469	27.3	764,621	1,159,652	1,911,822
Construction Closure Costs					
Water, sewage, and other systems					
Direct Effect	51	31.5	1,471,690	5,421,402	8,324,563
Indirect Effect	51	20.2	869,625	1,273,850	2,728,953
Induced Effect	51	15.0	507,572	977,254	1,698,652
Total Effect	51	66.7	2,848,886	7,672,506	12,752,167
Construction of new highways and streets					
Direct Effect	56	17.7	925,192	1,051,143	3,687,188
Indirect Effect	56	9.5	389,301	680,441	1,284,652
Induced Effect	56	8.4	284,989	548,691	953,746
Total Effect	56	35.6	1,599,482	2,280,275	5,925,586

Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Construction-related Non-contract Costs					
Architectural, engineering, and related services					
Direct Effect	449	77.8	4,448,738	3,818,553	8,234,800
Indirect Effect	449	32.1	1,066,057	1,686,586	3,021,211
Induced Effect	449	35.4	1,197,108	2,303,934	4,005,901
Total Effect	449	145.4	6,711,902	7,809,072	15,261,912
Annual O&M Costs					
Maintenance and repair construction of nonresidential structures – Evaporation pond					
Direct Effect	62	1.6	85,727	95,173	269,509
Indirect Effect	62	1.0	30,103	58,058	107,007
Induced Effect	62	0.7	25,139	48,384	84,123
Total Effect	62	3.4	140,968	201,615	460,639
Maintenance and repair construction of nonresidential structures – H2S facility					
Direct Effect	62	4.8	248,564	275,953	781,438
Indirect Effect	62	3.0	87,282	168,338	310,265
Induced Effect	62	2.2	72,890	140,290	243,915
Total Effect	62	9.9	408,736	584,581	1,335,618
Maintenance and repair construction of nonresidential structures – Salt storage facility					
Direct Effect	62	3.4	178,446	198,108	561,000
Indirect Effect	62	2.1	62,660	120,851	222,742
Induced Effect	62	1.5	52,328	100,715	175,108
Total Effect	62	7.1	293,434	419,675	958,850
Replacement Costs					
Water, sewage, and other systems – Evaporation pond					
Direct Effect	51	6.2	253,484	1,029,487	1,605,163
Indirect Effect	51	3.9	165,973	241,645	522,946
Induced Effect	51	2.7	89,528	171,316	299,563
Total Effect	51	12.8	508,986	1,442,448	2,427,672
Construction of new highways and streets* - Evaporation pond					
Direct Effect	56	2.3	119,031	135,235	474,375
Indirect Effect	56	1.2	50,086	87,542	165,277
Induced Effect	56	1.1	36,665	70,592	122,704
Total Effect	56	4.6	205,781	293,369	762,356

Evaporation Pond Construction, Replacement, and O&M Costs by IMPLAN Sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Construction of new highways and streets* - Evaporation pond					
Direct Effect	56	59.8	3,133,028	3,559,542	12,486,125
Indirect Effect	56	32.1	1,318,312	2,304,215	4,350,286
Induced Effect	56	28.5	965,074	1,858,063	3,229,722
Total Effect	56	120.5	5,416,414	7,721,820	20,066,133
Construction of new nonresidential structures – H2S facility (plumbing)					
Direct Effect	58	0.2	12,690	14,280	37,700
Indirect Effect	58	0.1	3,586	6,522	12,129
Induced Effect	58	0.1	3,530	6,796	11,815
Total Effect	58	0.5	19,806	27,598	61,644
Construction of new nonresidential structures – H2S facility (other)					
Direct Effect	58	0.8	41,065	46,211	122,000
Indirect Effect	58	0.3	11,604	21,104	39,251
Induced Effect	58	0.3	11,425	21,993	38,233
Total Effect	58	1.5	64,094	89,308	199,484
*These replacement costs would occur approximately every eight years.					

Alternative D – Zero-Liquid Discharge Technology

Under Alternative D, brine would be collected from the existing brine production well field and piped to a centralized treatment plant consisting of a series of thermally driven crystallizers. The zero-liquid discharge facility would be operated to evaporate (and later condense) water from the brine, resulting in a solid salt and a produced freshwater stream. The solid salt would be transported to an onsite, 60-acre landfill. The 480-acre study area covers the maximum area within which the facilities would be located; however, the permanent disturbance would be about 80 acres.

The facility would be designed to accommodate a continual flow of up to 300 gpm of brine (484 acre-feet per year), and would prevent up to 171,000 tons of salt from entering the Colorado River system annually. The conceptual design includes the use of multiple crystallizers operating in parallel that would reduce the brine to a solid product suitable for landfill disposal. The crystallizers would be constructed as modular units and installed on a flat slab. Approximately 150,000 square feet of building space would be required at a height of about 40 feet to protect the equipment from the weather and prevent freezing. This footprint includes the space required for salt drying prior to disposal. The H_2S treatment would be included to remove H_2S from the brine. A natural gas distribution pipeline, a new electrical substation, and upgraded electrical lines would be constructed along the Highway 90 corridor. The facilities would also include an access road and pipelines for brine, produced water, and fresh water.

Economic Impacts

The IMPLAN model derived estimated regional economic effects resulting from each type of project-related expenditures, most of which were described above for Alternative D. Only project-related spending within the three-county region was totaled and entered into the IMPLAN model; therefore, expenditure output data in the table below reflects only project-related expenditures occurring within the local region. The overall estimated in-region costs and economic impacts are shown in table 20, below, with more detailed break-downs of estimated costs in table 21. Additional IMPLAN data for direct, indirect, and induced effects, as well as the sum of the three, total effects, are displayed in table 22 for the four primary IMPLAN measures of economic impacts of employment, labor income, value added, and output.

Construction costs include expenses ranging from real estate purchases to design and construction. Operation and maintenance (O&M) related expenditures shown are the expected in-region expenditures that would occur each year of the 50-year project lifespan. The replacement dollar amounts would occur roughly every eight years over the 50-year project lifespan.

Table 20.—Summary of In-region Alternative D Zero Liquid Discharge and H2S Construction, O&M, and Replacement Estimated Costs – IMPLAN Output

Estimated Construction, Replacement, and O&M Costs	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment (Jobs)	Total Economic Effect Labor Income (2017$)	Total Economic Effect Output (2017$)
Construction	39,006,313	441.6	20,868,791	62,401,210
Annual O&M Costs	**11,442,250**	**145**	**5,984,940**	**19,556,861**
Replacement Costs	3,206,565	26.5	1,140,809	4,947,722

Table 21.—Alternative D Zero-Liquid Discharge Construction, Replacement, and O&M Costs – IMPLAN Output

Zero-Liquid Discharge Construction, Replacement, and O&M Costs by IMPLAN sector	IMPLAN Sector Codes	In-region Estimated Costs or Expenditures (2017$)	Total Economic Effect Employment	Total Economic Effect Labor Income	Total Economic Effect Output
Construction – Grand Total		**39,006,313**	**441.6**	**20,868,791**	**62,401,210**
Construction - Facilities		**27,696,313**	**241.9**	**11,650,399**	**41,439,897**
Construction ZLD Facility					
Real Estate	440	258,750	2.5	30,642	339,057
Water, sewage, and other systems	51	442,750	3.5	151,521	678,236
Construction of new nonresidential structures	58	15,812,500	189.5	8,307,208	25,855,314
Natural gas distribution	50	10,927,875	43.4	3,027,357	14,151,254
Construction H2S Facility					
Construction of new nonresidential structures	58	254,438	3.0	133,671	416,036
Construction-related Non-contract Costs		**11,310,000**	**199.7**	**9,218,392**	**20,961,313**
Architectural, engineering, and related services	449	11,310,000	199.7	9,218,392	20,961,313
Annual O&M Costs		**11,442,250**	**145**	**5,984,940**	**19,556,861**
ZLD Facility					
Maintenance and repair construction of nonresidential structures	62	10,351,022	131.1	5,414,167	17,691,756
H2S Facility					
Maintenance and repair construction of nonresidential structures	62	530,228	6.7	277,339	906,255
Salt Storage					
Maintenance and repair construction of nonresidential structures	62	561,000	7.1	293,434	958,850
Replacement Costs		**3,206,565**	**26.5**	**1,140,809**	**4,947,722**
ZLD Facility					
Water, sewage, and other systems	51	2,700,565	21.6	924,205	4,136,921
Construction of new highways and streets	56	474,375	4.6	205,781	762,356
H2S Facility					
Water, sewage, and other systems	51	31,625	0.3	10,823	48,445
Replacement costs would generally occur every eight years.					

Table 22.—Detailed Results of In-region Alternative D Zero-Liquid Discharge Construction, Replacement, and O&M Costs – IMPLAN Output by Type of Economic Effect for Employment, Labor Income, Value Added and Output

Zero-Liquid Discharge Construction, Replacement, and O&M Costs by IMPLAN sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Construction - Facility					
Real Estate - ZLD facility					
Direct Effect	440	1.9	8,954	194,082	258,750
Indirect Effect	440	0.5	16,226	32,113	62,031
Induced Effect	440	0.2	5,461	10,513	18,276
Total Effect	440	2.5	30,642	236,709	339,057
Water, sewage, and other systems - ZLD facility					
Direct Effect	51	1.7	78,273	288,343	442,750
Indirect Effect	51	1.1	46,252	67,751	145,142
Induced Effect	51	0.8	26,996	51,976	90,344
Total Effect	51	3.5	151,521	408,070	678,236
Construction of new non-residential structures - ZLD facility					
Direct Effect	58	102.4	5,322,434	5,989,469	15,812,500
Indirect Effect	58	43.2	1,503,992	2,735,316	5,087,402
Induced Effect	58	43.8	1,480,783	2,850,503	4,955,412
Total Effect	58	189.5	8,307,208	11,575,288	25,855,314
Natural gas distribution – ZLD facility					
Direct Effect	50	18.3	2,073,933	7,696,457	10,927,875
Indirect Effect	50	9.1	414,127	846,230	1,418,534
Induced Effect	50	15.9	539,297	1,038,387	1,804,845
Total Effect	50	43.4	3,027,357	9,581,074	14,151,254
Construction of new nonresidential structures – H2S facility					
Direct Effect	58	1.6	85,643	96,376	254,438
Indirect Effect	58	0.7	24,201	44,014	81,861
Induced Effect	58	0.7	23,827	45,867	79,737
Total Effect	58	3.0	133,671	186,257	416,036
Construction-related Non-contract Costs					
Architectural, engineering, and related services					
Direct Effect	449	106.9	6,110,072	5,244,551	11,310,000
Indirect Effect	449	44.1	1,464,164	2,316,423	4,149,450
Induced Effect	449	48.7	1,644,155	3,164,314	5.501,863
Total Effect	449	199.7	9,218,392	10,725,288	20,961,313

Zero-Liquid Discharge Construction, Replacement, and O&M Costs by IMPLAN sector	IMPLAN Sector Codes	Employment	Labor Income (2017$)	Value Added (2017$)	Output (2017$)
Annual O&M Costs					
Maintenance and repair construction of nonresidential structures – ZLD facility					
Direct Effect	62	63.0	3,292,515	3,655,303	10,351,022
Indirect Effect	62	39.6	1,156,147	2,229,831	4,109,810
Induced Effect	62	28.6	965,504	1,858,297	3,230,923
Total Effect	62	131.1	5,414,167	7,743,431	17,691,756
Maintenance and repair construction of nonresidential structures – H2S facility					
Direct Effect	62	3.2	168,658	187,242	530,228
Indirect Effect	62	2.0	59,223	114,222	210,524
Induced Effect	62	1.5	49,458	95,191	165,503
Total Effect	62	6.7	277,339	396,655	906,255
Maintenance and repair construction of nonresidential structures – Salt storage					
Direct Effect	62	3.4	178,446	198,108	561,000
Indirect Effect	62	2.1	62,660	120,851	222,742
Induced Effect	62	1.5	52,328	100,715	175,108
Total Effect	62	7.1	293,434	419,675	958,850
Replacement Costs					
Water, sewage, and other systems – Salt storage cell					
Direct Effect	51	10.2	477,430	1,758,753	2,700,565
Indirect Effect	51	6.6	282,114	413,249	885,297
Induced Effect	51	4.9	164,661	317,030	551,058
Total Effect	51	21.6	924,205	2,489,031	4,136,921
Construction of new highways and streets* Capping salt storage cells					
Direct Effect	56	2.3	119,031	135,235	474,375
Indirect Effect	56	1.2	50,086	87,542	165,277
Induced Effect	56	1.1	36,665	70,592	122,704
Total Effect	56	4.6	205,781	293,369	762,356
H2S Facility Costs					
Direct Effect	51	0.1	5,591	20,596	31,625
Indirect Effect	51	0.1	3,304	4,839	10,367
Induced Effect	51	0.1	1,928	3,712	6,453
Total Effect	51	0.3	10,823	29,148	48,445
*These replacement costs would generally occur approximately every eight years.					

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SaltWorks Technologies Inc. September 30, 2018. USBR Paradox Valley Unit Saline Water Treatment Plant Concept Design & Cost Overview. Billingham, Washington.

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Appendix M

Signed Programmatic Agreement with SHPO

PROGRAMMATIC AGREEMENT
BETWEEN
THE BUREAU OF RECLAMATION, WESTERN COLORADO AREA OFFICE,
THE BUREAU OF LAND MANAGEMENT,
AND
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
REGARDING
THE CONSIDERATION AND MANAGEMENT OF EFFECTS
ON HISTORIC PROPERTIES ARISING FROM THE CONSTRUCTION OF THE PARADOX VALLEY UNIT PROJECT

WHEREAS, the Bureau of Reclamation (Reclamation), Western Colorado Area Office, manages the Paradox Valley Unit to extract naturally-occurring brine groundwater in the Paradox Valley, Montrose County, Colorado, in accordance with Federal laws including, but not necessarily limited to, the Federal Water Pollution Control Act of 1948 (P.L. 80-845) and the Colorado River Basin Salinity Control Act of 1974, as amended (P.L. 93-320) and other authorities; and

WHEREAS, Reclamation proposes to construct additional developments to the Paradox Valley Unit (Project) which consists of one or more of the following facilities: ponds, injection wells, structures, bridges, access roads, utility lines, pipelines, salt landfill, and potentially do a 3D geophysical project to pick the location for a proposed injection well; and

WHEREAS, Reclamation has determined that the construction of the Paradox Valley Unit Project is an undertaking subject to compliance with 54 USC 306108 (formerly Section 106 of the National Historic Preservation Act of 1966, as amended) and has determined that the undertaking has the potential to cause adverse effect to historic properties and has developed this Programmatic Agreement pursuant to the requirements of § 306108 in order to take into account the effects of the undertaking on historic properties; and

WHEREAS, Reclamation has determined that because the Project will be implemented in phases, effects of the Project on historic properties cannot be fully determined prior to the Project's authorization; therefore, it is appropriate to develop and implement a Programmatic Agreement (PA) pursuant to 36 CFR 800.14(b); and

WHEREAS, the Bureau of Land Management (BLM) Southwest District Office is currently responsible for the administration and management of public land and other resources that will be within both the direct and the indirect Area of Potential Effects (APE) of the project; and

WHEREAS, based on project design the project may also occur on privately owned land and/or land where Reclamation is responsible for the administration and management of the land and resources that will be within the direct APE and the indirect APE of the project; and

WHEREAS, Reclamation, for the purposes of the undertaking and this agreement, is the lead federal agency for compliance with § 306108 (formerly Section 106 of NHPA) and related requirements; and

WHEREAS, Reclamation desires to set forth procedures to be followed to satisfy its § 306108 NHPA responsibilities when effects to historic properties cannot be fully determined prior to approval of an undertaking; and

WHEREAS, Native American cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001, may be encountered in the Paradox Project Area and a NAGPRA Plan of Action (POA) shall be prepared in parallel with this Agreement and included as an attachment. Approval of the POA shall not delay approval of the Agreement. The POA shall be developed in consultation with those tribes that claim affiliation with project lands; and

WHEREAS, Reclamation used and coordinated the National Environmental Policy Act (NEPA) public participation requirements to assist in satisfying the public involvement requirements under § 306108 (formerly Section 106 of the NHPA) pursuant to 36 CFR § 800.2(d)(1-3); and

WHEREAS, Reclamation consulted the Colorado State Historic Preservation Officer (COSHPO), and COSHPO is authorized to enter into this Agreement in order to fulfill its role of advising and assisting Federal agencies in carrying out § 306108 (Section 106) responsibilities pursuant to 36 CFR § 800.2(c)(1)(i), and 36 CFR § 800.6(b), and COSHPO is a Signatory to this Agreement; and

WHEREAS, Reclamation, in accordance with 36 C.F.R. § 800.6(a)(l), notified the Advisory Council on Historic Preservation (ACHP) of its determination of potential adverse effects; and

WHEREAS, Reclamation has invited the ACHP to participate in consultation, pursuant to 36 CFR 800.14(b), and the ACHP has declined to participate; and

WHEREAS, Reclamation has invited the Hopi Tribe, the Navajo Nation, the Ute Indian Tribe of the Uintah and Ouray Reservation, the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, and Zuni Pueblo to participate in the development of this Agreement, pursuant to 36 CFR 800.2, and they declined to participate; and

NOW, THEREFORE, Reclamation, the BLM, and the COSHPO, collectively known as "Signatory Parties", mutually agree that the fulfillment of Reclamation's Section 106 responsibilities for undertakings located within the Paradox Valley Unit Construction Project Area shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

Reclamation, as the lead agency for NHPA and NAGPRA compliance, will ensure that the following stipulations are implemented:

Roles and Responsibilities

Reclamation shall be the lead Federal agency for implementing this agreement. Duties include ensuring that all Signatory Parties carry out their responsibilities; consulting with American Indian tribal governments; overseeing all cultural resource work; assembling all submissions and requests for concurrence including determinations of eligibility and effect, treatment or data recovery plans; reports of findings or other relevant documents.

Reclamation shall bear all expenses of identification, documentation, evaluation, and treatment of historic properties directly or indirectly affected by project-related activity within the designated APE. Such costs shall include, but not be limited to, cultural resource implementation planning, fieldwork, post-fieldwork analysis, research and report preparation, interim and summary report preparation, and artifact and records curation.

Reclamation, in cooperation with the Signatory Parties, shall ensure that all its personnel and personnel of its construction contractors are directed not to engage in the illegal collection of archeological objects. Reclamation shall cooperate with the BLM to ensure compliance with ARPA on public lands.

Should damage to cultural resources inside or outside the APE occur during construction or operation due to the unauthorized or negligent actions of Reclamation, its employees, contractors, or any other project personnel, Reclamation shall be responsible for costs of rehabilitation or mitigation and may be subject to civil or criminal penalties for willful violations, as appropriate.

I. Professional Qualifications and Documentation Standards

A. All survey, evaluation, analysis, treatment, excavation, monitoring, and recording work required to meet the stipulations of this Agreement shall be carried out under the supervision of a person who meets the minimum standards as identified in the *Secretary of the Interior's Professional Qualification Standards* (48 FR 44716), as appropriate for the historic properties being addressed. All determinations made pursuant to this Agreement shall be made by Reclamation cultural resource staff under supervision of a person who meets the above standards.

B. Reclamation contractors will obtain permits as required under the Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. 470) for any archaeological investigations carried out under this PA. These permits shall be issued by the BLM for lands under their ownership, by Reclamation for lands under their ownership, and by the State of Colorado for private lands.

C. Reclamation shall ensure that all work, including but not limited to research designs, reports, and historic properties management undertaken to satisfy the terms of this Agreement, shall be conducted in accordance with the principles, standards, and guidelines contained in the Secretary of Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (36 CFR 67); the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (48 FR 44716-44740); the Office of Archaeology and Historic Preservation's *Colorado Cultural Resource Survey Manual Guidelines for Identification: History and Archaeology;* and the *Colorado BLM Handbook of Guidelines and Procedures for Identification, Evaluation, and Mitigation of Cultural Resources.*

D. Reclamation acknowledges that Indian tribes "possess special expertise in assessing the eligibility of historic properties that may possess religious and cultural significance to them" (§ 800.4 (c)(1)). Further, Reclamation recognizes that this expertise is the outcome of extensive traditional learning and training that certain Native individuals go through to receive tribal recognition as an initiated individual, a medicine man/woman, or a priest (holy person). Reclamation acknowledges and respects traditional knowledge and traditional education systems on their own terms and recognizes that inclusion of individuals with this knowledge is a vital component for the identification, evaluation, analysis, recording, treatment, monitoring or disposition of historic properties.

II. Determination of Project Area of Potential Effect

A. Direct Effects APE – APE used shall be a 100-meter buffer on any proposed project developments (included but not limited to: facilities, pipelines, access roads, temporary disturbance work areas, salt landfill areas), to adequately cover any proposed project developments' potential area of impact.

B. Indirect Effects APE - APE used shall be a maximum 2-mile buffer on any proposed project developments, to adequately cover any proposed project developments' potential area of impact. The Indirect Effects APE will be based on potential visual impacts to historic properties and sacred sites from the above ground proposed developments, and the potential seismicity effects to historic properties that are standing structures. It will be developed off of geographic information system (GIS) analysis completed at the time of project design.

III. Identification, Evaluation, and Determination of Effects to Historic Properties

A. Subject to the terms of ARPA and BLM and/or Reclamation permits or permissions for field work, cultural resource inventories will include an intensive Class III inventory of the Direct Effects APE, including construction right-of-way (ROW), all proposed project facilities, and other project related ground disturbance, and a Class II inventory of the Indirect Effects APE. The inventory shall meet Secretary of the Interior Standards, as well as those of the other parties for their respective land jurisdictions.

B. Reclamation shall, in consultation with the COSHPO and all consulting parties, determine the eligibility of sites recorded during the cultural resource inventories and effects of the undertaking to the historic properties identified in the APE. If a Signatory disagrees regarding eligibility of a property, Reclamation shall seek a formal determination of eligibility from the Keeper of the National Register. The Keeper's determination is final.

C. Reclamation shall consult with Tribes to identify properties of traditional religious and cultural importance. Reclamation shall ensure that recordation and evaluation of TCPs and sacred sites will be done utilizing guidance provided by Bulletin Number 38, Executive Order 13007, and Executive Order 13175. Identification, evaluation, and

assessment of effects and subsequent treatment will be done in consultation with the Tribes affiliated with a given TCP or sacred site, as appropriate.

IV. Treatment of Potentially Affected Historic Properties

Reclamation or its contractors will prepare, in consultation with the consulting parties, a treatment plan for all historic properties which may be subject to adverse direct and indirect effects by the Project.

Reclamation shall ensure consultation with all the Signatory Parties to this PA to ensure that the treatment plan prepared is acceptable to all Signatory Parties and is consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties and with the ACHP's guidelines.

A. Treatment Plans will be appropriate for the resources and the nature of effects, and may include, but are not limited to, the following options:

a) No treatment beyond documentation prepared (if any) during a property's identification;
b) Avoidance or minimization of effect through project redesign, monitoring of construction near sites, fencing, and placement of trenches outside site boundaries, or other means;
c) Recordation via photography, mapping, data recovery and similar means; and
d) Treatment not yet identified but agreed upon through consultation between Reclamation and the tribal group ascribing significance to that property.

B. Treatment Plans shall:

a) Be consistent with applicable Reclamation, BLM, and COSHPO standards and guidelines on tribal, federal, and/or private lands as appropriate and with the terms of an ARPA permit obtained from the relevant land managing agency;
b) Be designed to preserve historic properties in place whenever feasible;
c) On federal property, be consistent with the NAGPRA POA, and for unmarked human burials on private land be consistent with the requirements under State Law Colorado Revised Statute (CRS) 24-80-130: Discovery of human remains during an anthropological investigation. CRS 24-80-1302 applies if the human remains are Native American and/or determined to be of archaeological interest.
d) Be designed to the extent possible to protect or, if necessary, recover interred human remains and funerary items for appropriate reburial or other treatment;
e) Where archaeological data recovery is proposed, be designed to address defensible research questions or issues;
f) Be developed in consultation with those affected and/or knowledgeable about the properties affected; and
g) Include, where pertinent, provisions for minimizing the likelihood of discoveries during construction, and for the efficient handling of any discoveries that may occur.

C. Reclamation will ensure that the treatment plans it prepares, or that are prepared on its behalf, are promptly submitted for review to all consulting parties involved.

At a minimum, a data recovery treatment plan shall include the following topics:

a) Research Domains
b) Previous research and applicable research issues
c) Research questions
d) Proposed Research
e) Data required to address objectives
f) Sampling design
g) Sample size
h) Justification for sampling design
i) Number and dimensions of block excavation units, trenches, etc.
j) Special analyses (e.g., C-14, obsidian sourcing, dendrochronology, etc.)
k) Native American Consultation
l) Native American ideas regarding resolution of effects
m) NAGPRA Plan of Action
n) Schedule
o) Relative time line with fieldwork, analyses, write up, draft report, final report
p) Work effort needed to perform tasks (hours, budget)

Other forms of treatment shall be documented with similar efforts in keeping with the nature of those specific treatment plans.

D. Reclamation will ensure that all final, approved treatment plans take into account comments provided by the consulting parties.

V. Curation

Reclamation shall ensure that all material remains, samples, and associated records (as defined in "Curation of Federally- Owned and Administered Archeological Collections" (36 CFR § 79.4) resulting from the surveys, monitoring, or treatments to resolve adverse effects associated with the undertaking shall be curated as follows:

A. Material remains, samples, and associated records resulting from the surveys, monitoring, or treatments to resolve adverse effects associated with the undertaking conducted on federal lands shall be curated in accordance with federal curation policies (36 CFR § 79) in an appropriate curation facility identified by the land managing agency.

B. Material remains, samples, and copies of associated records resulting from the surveys, monitoring, or treatments to resolve adverse effects associated with the undertaking conducted on private lands shall be curated in accordance with federal curation policies (36 CFR § 79) in an appropriate curation facility identified by the land owner if the land owner deeds them to the federal government. If the land owner does not deed the collections to the federal government, they will be turned over to the landowner.

VI. Discoveries

If potential historic properties are discovered or unanticipated effects on historic properties found, Reclamation shall implement the Discovery Plan included as Appendix 2 of this Agreement.

VII. Monitoring and Reporting

Reclamation shall report and distribute the results of Section 106 compliance activities (i.e., planning, identification, evaluation, effect and treatment, monitoring) to all consulting parties as completed, for a 30-calendar day review and comment period. Final reports may be submitted in either hard copy or electronic formats to the consulting parties. Reports must be submitted in both hard copy and electronic formats to the COSHPO and the BLM. Reclamation shall take into account the comments provided by the consulting parties and revise reports as necessary.

No later than December 31of each year following the execution of this Agreement until it expires or is terminated, Reclamation shall provide all parties to this Agreement a summary report detailing work carried out pursuant to its terms, for a 30-calendar day review and comment period. The report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in Reclamation's efforts to carry out the terms of this Agreement.

If any party fails to respond to Reclamation within 30 calendar days of the receipt of a submission, Reclamation shall presume concurrence with Reclamation's findings and recommendations as detailed in the submission and proceed accordingly.

VIII. Confidentiality

Consistent with 54 U.S.C. § 307103 (formerly Section 304 of the NHPA) and 36 CFR § 800.11(c), and in consultation with the tribal participants and the ACHP, Reclamation and the SHPO shall withhold from disclosure to the public information about the location, character, or ownership of a historic property if it is determined that disclosure may (1) cause a significant invasion of privacy, (2) risk harm to a historic property, or (3) impede the use of a traditional religious site by practitioners.

IV. Dispute Resolution

Should any signatory party to this Agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are being implemented, Reclamation shall consult with such party to resolve the objection. If Reclamation determines that such objection cannot be resolved, Reclamation will:

A. Forward all documentation relevant to the dispute, including Reclamation's proposed resolution, to the ACHP. The ACHP shall provide Reclamation with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation.

Prior to reaching a final decision on the dispute, Reclamation shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and signatory, and provide them with a copy of this written response. Reclamation will then proceed according to its final decision.

B. If the ACHP does not provide its advice regarding the dispute within the 30-day time period, Reclamation may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, Reclamation shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories to the Agreement and provide them and the ACHP with a copy of such written response.

C. Reclamation's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute remain unchanged.

X. Anti-Deficiency Act

Reclamation's obligations under this Agreement are subject to the availability of appropriated funds and the stipulations of this Agreement are subject to the provisions of the Anti-Deficiency Act. Reclamation shall make reasonable and good faith efforts to secure the necessary funds to implement this Agreement in its entirety. If compliance with the Anti-Deficiency Act alters or impairs Reclamation's ability to implement the stipulations of this Agreement, Reclamation shall consult with the SHPO and ACHP in accordance with the amendment and termination procedures in Stipulations XIII and XIV of this Agreement.

XI. Addition of Another Federal Agency

In the event that another federal agency not initially a party to or subject to this Agreement receives an application for funding/license/permit for activities associated with the undertaking as described in this Agreement, that agency may fulfill its Section 106 responsibilities by stating in a written letter to Reclamation that it concurs and will comply with the terms of this Agreement and notifying Reclamation and other Signatories to this Agreement that it intends to do so. Such agreement shall be evidenced by filing the letter with the ACHP, and implementation of the terms of this Agreement.

XII. Duration

This Agreement will be null and void if its stipulations are not carried out within ten (10) years from the date of its execution. At such time, and prior to work continuing on the undertaking, Reclamation shall either (a) execute a Programmatic Agreement pursuant to 36 C.F.R. § 800.14(b), or (b) request, take into account, and respond to the comments of the ACHP under 36 C.F.R. § 800.7. Prior to such time, Reclamation may consult with the other signatories to reconsider the terms of the Agreement and amend it in accordance with Stipulation XI below. Reclamation shall notify the signatories as to the course of action it will pursue.

XIII. Amendments

This Agreement may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

XIV. Termination

If any signatory to this Agreement determines that its terms will not or cannot be carried out, that party shall immediately consult with the other parties to attempt to develop an amendment per Stipulation XIV, above. If within thirty (30) days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the Agreement upon written notification to the other signatories.

Once the Agreement is terminated, and prior to work continuing on the undertaking, Reclamation must either (a) execute a new Programmatic Agreement pursuant to 36 CFR § 800.6, or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. Reclamation shall notify the signatories as to the course of action it will pursue.

XV. Attachments

All attachments developed and implemented in accordance with this Agreement are incorporated by reference into the Agreement and their terms and conditions shall have the same force and effect as this Agreement.

XVI. Execution

This Agreement shall take effect upon execution by the final Signatory to sign. Execution of this Agreement and implementation of its terms evidences that, per 36 CFR § 800.9, Reclamation has afforded the ACHP an opportunity to comment on the Project and its effects on historic properties; taking into account the effects of the project on historic properties; and satisfied its Section 106 responsibilities for all individual aspects of the Project.

SIGNATORIES:

BUREAU OF RECLAMATION, WESTERN COLORADO AREA OFFICE

_____ Date 9-23-19

Ed Warner, Western Colorado Area Office Manager

SIGNATORIES:

BUREAU OF LAND MANAGEMENT, SOUTHWEST DISTRICT OFFICE

Stephanie Connolly Date 10/1/19

Stephanie Connolly, Southwest District Office Manager

SIGNATORIES:

COLORADO STATE HISTORIC PRESERVATION OFFICE

for Holly K North Date 9/30/19
Steve Turner, State Historic Preservation Officer

Appendix 1: Definitions

A. Adverse Effect- "is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.5(a)(1)).

B. Archaeological Site- is a definite location of human activity, occupation, or use, greater than 50 years of age, identifiable through field inventory, historical documentation, or oral evidence.

C. Area of Potential Effect (APE)- means "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)).

D. Artifact- is any object made, modified, or used by humans, usually but not necessarily portable.

E. Consulting Parties- are all persons or groups that have been asked for input in regards to the development of this PA are considered to be consulting parties. They do not have to sign the PA and retain rights of consultation in those matters of concern to them.

F. Cultural Resources- are "any prehistoric and historic districts, sites, buildings, structures, objects, cultural landscapes, sacred sites, and traditional cultural properties (TCP). Within the broad range of cultural resources are those that have recognized significance, which are called historic properties" (LND 02-01 Appendix B (6)).

G. Curation- means "the long-term management and preservation of federally-owned museum property according to the standards in Reclamation Manual (RM) Directive and Standard (D&S), Museum Property Management, LND 02-02" (LND 02-01 Appendix B (9)).

H. Effect- means "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36CFR 800.16(i)). An effect may be either negative or positive.

I. Historic Properties- are "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties" (36 CFR 800.16(l)(1)). Federal agencies treat sites unevaluated for the NRHP as eligible for management purposes.

J. Mitigation- is an action implemented to eliminate, avoid, minimize, or reduce the severity of an adverse impact on a particular resource resulting from the proposed action or its alternatives. Mitigation can include one or more of the following: (1) avoiding impacts; (2) minimizing impacts by limiting the degree or magnitude of an action; (3) rectifying impacts by restoration, rehabilitation, or repair of the affected environment; (4) reducing or eliminating impacts over time; and (5) compensating for the impact by replacing or providing substitute resources or environments to offset the loss.

K. Monitoring- typically refers to reconnaissance level field investigation of an archaeological site by an archaeologist. Monitoring can be conducted to ensure that ground-disturbing activities do not adversely affect cultural resources, or to regularly assess site condition.

L. Museum Property- is "personal property acquired according to a rational scheme that is preserved, studied, and interpreted for public benefit" (LND 02-01 Appendix B (17)). Museum property includes items representing archaeology, archives, art, biology, ethnography, geology, history, paleontology, and their associated records. Items which illustrate the history or the mission of Reclamation such as historic documents, plans, maps, and fine art, including those that have been or are being displayed in Reclamation offices, are examples of museum property. Archaeological and paleontological resources collected under legal mandates, once accessioned, are also museum property.

M. Sacred Site- refers to "any specific, discrete, narrowly delineated location on Reclamation land that is identified by an Indian tribe, or Indian individual determined an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious importance to, or ceremonial use by, an Indian religion" (LND 02-01 Appendix B (26)).

N. Signatory Parties- are Parties who assume obligations under the agreement and become formal signatories. Signatory has a special meaning which is the ability to terminate or agree to amend the Programmatic Agreement. The term does not include others who sign the agreement as concurring parties.

O. Traditional Cultural Properties- are defined as "a property that are listed in, or is eligible for inclusion in, the National Register because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and important in maintaining the continuing cultural identity of the community" (National Register Bulletin #38).

P. Undertaking- means "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval" (36 CFR 800.16(y)).

Appendix 2: Discovery Plan

PARADOX VALLEY UNIT PROJECT DISCOVERY PLAN (September 2019)

During an Undertaking

In the event of an inadvertent discovery of a potential cultural resource made during an undertaking, the following actions will be initiated:

A. All work within 50 feet of cultural materials will cease.

B. The archaeological monitor will be called in to assess the discovery if they are not already in the immediate area.

C. The monitor will immediately assess the discovered resource. This assessment will include:

1. The nature of the discovery, including the number and kinds of artifacts exposed, as well as the presence/absence of features.
2. The spatial extent of the discovery using auger and shovel tests, as well as cleaning trench profiles or bladed areas.
3. The nature of deposition, including any exposed stratigraphy.

Cultural resources discovered during an undertaking will be reported to Reclamation's Western Colorado Area Office (WCAO) Archaeologist immediately. Reclamation's WCAO Archaeologist will then have 48 hours to notify the consulting parties, by phone and/or email, of the discovery and all known information relating to the discovery.

Within 5 business days of notification, each newly discovered cultural resource will be documented and evaluated for NRHP eligibility, and a proposed mitigation plan will be written, as necessary, and Reclamation will submit all documentation by letter and/or email to the consulting parties for consultation under 36 CFR § 800.6. Consulting parties will have 5 business days to respond to this documentation.

Reclamation shall take into account the consulting parties' recommendations regarding NRHP eligibility and proposed actions, and then carry out appropriate actions. Reclamation's WCAO Archaeologist shall document the action completed and submit a report of the action to all consulting parties.

Appendix 3: NAGPRA POA

A WRITTEN PLAN OF ACTION FOR THE TREATMENT OF INTENTIONALLY EXCAVATED OR INADVERTENTLY DISCOVERED HUMAN REMAINS, FUNERARY OBJECTS, SACRED OBJECTS, OR OBJECTS OF CULTURAL PATRIMONY FOR THE PARADOX VALLEY UNIT PROJECT (September 2019)

Pursuant to the Native American Graves Protection and Repatriation Act of 1990, as amended (NAGPRA) (25 USC 3001 et seq.), and 43 CFR 10.5(e) of the implementing regulations as set forth in Native American Graves Protection and Repatriation Regulations (43 CFR 10), the following written Plan of Action (POA), will be implemented for all inadvertent discoveries and intentional excavations made within the Paradox Valley Unit construction project area. This POA outlines the procedures for the treatment of human remains, funerary objects, sacred objects, or objects of cultural patrimony (hereinafter, NAGPRA items) that may be encountered during construction activities.

This POA was developed based on Federal laws and regulations, Reclamation's policies and directives and standards, and Reclamation's current and past consultation with Native American tribes. It is to be carried out in a timely and respectful manner.

This POA was developed in consultation with the Hopi Tribe, the Navajo Nation, the Ute Indian Tribe of the Uintah and Ouray Reservation, the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, and Zuni Pueblo who hereinafter are referred to as the consulting tribes.

I. Kinds of Objects to Be Considered as NAGPRA Items

For all discoveries, the kinds of objects to be considered, and referred herein as NAGPRA items as defined in 43 CFR 10.2 (d), include four types of Native American objects. The term *Native American* means of, or relating to, a tribe, people, or culture indigenous to the United States, including Alaska and Hawaii:

1. *Human remains* means the physical remains of the body of a person of Native American ancestry. The term does not include remains or portions of remains that may reasonably be determined to have been freely given or naturally shed by the individual from whose body they were obtained, such as hair made into ropes or nets. For the purposes of determining cultural affiliation, human remains incorporated into a funerary object, sacred object, or object of cultural patrimony, as defined below, must be considered as part of that item.

2. *Funerary objects* means items that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains. Funerary objects must be identified by a preponderance of the evidence as having been removed from a specific burial site of an individual affiliated with a particular Indian tribe or Native Hawaiian organization or as being related to specific individuals or families or to known

human remains. The term *burial site* means any natural or prepared physical location, whether originally below, on, or above the surface of the earth, into which, as part of the death rite or ceremony of a culture, individual human remains were deposited, and includes rock cairns or pyres which do not fall within the ordinary definition of gravesite. For purposes of completing the summary requirements in §10.8 and the inventory requirements of §10.9:

i. *Associated funerary objects* means those funerary objects for which the human remains with which they were placed intentionally are also in the possession or control of a museum or Federal agency. Associated funerary objects also means those funerary objects that were made exclusively for burial purposes or to contain human remains.

ii. *Unassociated funerary objects* means those funerary objects for which the human remains with which they were placed intentionally are not in the possession or control of a museum or Federal agency. Objects that were displayed with individual human remains as part of a death rite or ceremony of a culture and subsequently returned or distributed according to traditional custom to living descendants or other individuals are not considered unassociated funerary objects.

3. *Sacred objects* means items that are specific ceremonial objects needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present-day adherents. While many items, from ancient pottery sherds to arrowheads, might be imbued with sacredness in the eyes of an individual, these regulations are specifically limited to objects that were devoted to a traditional Native American religious ceremony or ritual and which have religious significance or function in the continued observance or renewal of such ceremony. The term *traditional* religious leader means a person who is recognized by members of an Indian tribe or Native Hawaiian organization as:

i. Being responsible for performing cultural duties relating to the ceremonial or religious traditions of that Indian tribe or Native Hawaiian organization, or

ii. Exercising a leadership role in an Indian tribe or Native Hawaiian organization based on the tribe or organization's cultural, ceremonial, or religious practices.

4. *Objects of cultural patrimony* means items having ongoing historical, traditional, or cultural importance central to the Indian tribe or Native Hawaiian organization itself, rather than property owned by an individual tribal or organization member. These objects are of such central importance that they may not be alienated, appropriated, or conveyed by any individual tribal or organization member. Such objects must have been considered inalienable by the culturally affiliated Indian tribe or Native Hawaiian organization at the time the object was separated from the group. Objects of cultural patrimony include items such as Zuni War Gods, the Confederacy Wampum Belts of the Iroquois, and other objects of similar character and significance to the Indian tribe or Native Hawaiian organization as a whole.

II. Inadvertent Discoveries of NAGPRA Items

1. All NAGPRA items encountered will be treated with dignity, care, and respect.

2. If potential NAGPRA items are inadvertently discovered within the project area, all ground-disturbing activities shall cease within 50 feet of the discovery location. Visual inspection of the potential NAGPRA items shall be limited to determinations of age (of both the human remains and the interment), sex, and cultural affiliation while leaving all items in place and protected. To the extent possible, no handling, brushing clean, or disarticulating potential NAGPRA items are allowed at this time. No photographs shall be taken.

3. The person making the discovery, whether archeological contractor, inspector (construction and/or environmental), or other individual, must provide immediate telephone notification of the inadvertent discovery, with written confirmation, to Reclamation. Notifications shall contain the following information:
    a. A verbal description of the potential NAGPRA items found, the context in which they are located, and the circumstances of their discovery;
    b. The exact location of the potential NAGPRA items;
    c. A preliminary assessment of the potential NAGPRA items observed;
    d. An assessment of the complexity of discovery and the likelihood of disturbance if left in situ; and
    e. Any other pertinent information.

4. Reclamation's Western Colorado Area Office (WCAO) Archaeologist will:
    a. Within 48 hours of notification, visit the discovery location to confirm the discovery of potential NAGPRA items;
    b. Immediately take all appropriate measures to protect the potential NAGPRA items from further disturbance, including as appropriate, stabilization or covering, until a decision is made regarding removal or preservation in situ.
    c. Establish a record of discovery.

5. Within 24 hours of visiting the site Reclamation's WCAO Archaeologist will contact the local law enforcement agency to confirm the discovery site is not a crime scene.

6. Reclamation's WCAO Archaeologist will, as soon as possible, but no later than three (3) business days after receipt of the written confirmation of notification:
    a. Determine whether the inadvertent discovery of potential NAGPRA items are Native American and subject to NAGPRA regulations; and or if they are of other ethnicity and whether state burial law applies.
    b. Determine whether the inadvertent discovery occurred on Federal lands or if they are on state or private land beyond the exterior boundaries of Federal land and state burial law applies.

c. Determine whether there is evidence of an Archeological Resources Protection Act of 1979, as amended (16 USC 470aa et seq.) (ARPA) violation or looting present.

7. If the inadvertent discovery of potential NAGPRA items are determined to be Native American and that NAGPRA regulations apply, Reclamation's WCAO Archaeologist will:
    a. Certify receipt of the notification;
    b. Until disposition is determined and as practicable, leave the NAGPRA items in situ;
    c. Take immediate steps to further secure and protect the inadvertent discovery, which may include the posting of a 24-hour security guard;
    d. If the NAGPRA items are no longer in danger of disturbance, appropriately document the NAGPRA items and location; and
        i. NAGPRA items left in situ shall remain in the custody of the applicable land manager/owner and will not be repatriated under NAGPRA; and
        ii. For NAGPRA items left in situ, specific locations will be mapped and recorded using the most accurate standard available.

8. Following the determination that NAGPRA regulations apply, Reclamation's WCAO Archaeologist shall:
    a. If the discovery occurred on Bureau of Land Management (BLM)-managed lands, notify the BLM Archaeologist within one (1) business day, after receipt of the written confirmation of discovery, followed by written notification within three (3) business days. This notification must include, but is not limited to, information about the kinds of NAGPRA items, their condition, and the circumstances of their discovery.
    b. Notify any known lineal descendants of a deceased Native American individual whose human remains and associated funerary objects were discovered of such discovery, and, with respect to a discovery of NAGPRA items, notify the Indian tribes likely to be culturally affiliated with the cultural items, the Indian tribe that aboriginally occupied the area, any other Indian tribe known to have a cultural relationship to the cultural items, and consulting tribes to this POA, by telephone and email, within one (1) business day, after receipt of the written confirmation of discovery, followed by written notification within three (3) business days. This notification must include, but is not limited to, information about the kinds of NAGPRA items, their condition, and the circumstances of their discovery.
    c. Notify the Colorado State Historic Preservation Office (COSHPO) by telephone and email, within one business (1) day, after receipt of the written confirmation of discovery, followed by written notification within three (3) business days of the inadvertent discovery of NAGPRA items. This notification must include, but is not limited to, information about the kinds of NAGPRA items, their condition, and the circumstances of their discovery. A copy of the email notification will be concurrently sent to Reclamation staff, including but not limited to the Upper Colorado Regional Archeologist, the Federal Preservation Officer, and the National Curator and NAGPRA Coordinator.

9. Upon certification of notification, the inadvertent discovery of NAGPRA items will be recorded archeologically, as detailed in the *Intentional Excavation of NAGPRA Items* section of this POA, with analysis of the NAGPRA items conducted as detailed in the *Kinds of Analysis Planned for Each Kind of NAPGRA Item s*ection of this POA.
    a. If, after appropriate notifications, the NAGPRA items are under imminent or anticipated threat of disturbance, and it is necessary to remove the NAGPRA items from the discovery location, they will be intentionally excavated according to the *Intentional Excavation of NAGPRA Items* section of this POA.

III. Intentional Excavation of NAGPRA Items

1. All NAGPRA items encountered will be treated with dignity, care, and respect.

2. Prior to any excavation of NAGPRA items, Reclamation's WCAO Archaeologist shall consult with any known lineal descendants, Indian tribes likely to be culturally affiliated with the NAGPRA items, the Indian tribes which aboriginally occupied the area, any Indian tribes that have a demonstrated cultural relationship for the NAGPRA items, and the consulting Native American tribes to this POA.

3. Tribal traditional non-invasive treatment, if any, will be afforded the NAGPRA items prior to excavation, if requested by a consulting Indian tribe. Specific tribal members and/or traditional religious leaders will be granted the opportunity, access, and privacy required for traditional treatment of the NAGPRA items, in compliance with NAGPRA, American Indian Religious Freedom Act (AIRFA), and other applicable federal statutes and regulations.

4. Excavation and/or removal of NAGPRA items shall be accordance with the Archaeological Resources Protection Act (ARPA), as amended (16 USC 470aa et seq.) and its implementing regulations, Protection of Archaeological Resources (43 CFR 7), as identified in 43CFR 10.3(b).

5. All actions related to the intentional excavation of NAGPRA items shall be carried out by, or under the direct supervision of, a person or persons meeting qualifications set forth in 43 CFR 7.8(a)(1) and further defined in Secretary of the Interior's Professional Qualification Standards (48 FR 44738-44739).

6. Any person proposing to excavate and/or remove archaeological resources from public lands, and to carry out activities associated with such excavation and/or removal, shall apply to the Federal land manager for a permit for the proposed work, and shall not begin the proposed work until a permit has been issued (43 CFR 7.5(a)). In lieu of a permit, a contract with reference to ARPA, may substitute.

7. Any person proposing to excavate and/or remove archeological resources from private lands, and to carry out activities associated with such excavation and/or removal, shall:
    a. Obtain any state permits to conduct archeological excavations on private lands.
    b. Comply with Colorado Statutes – CRS 24-80-401-411: Historical, Prehistorical, and Archaeological Resources; and CRS 24-80-1301-1305: Unmarked Human Graves.
    c. Prior to any excavations on private lands, a signed agreement with Reclamation, private land owner(s) and the Indian tribe(s) meeting the NAGPRA definition for priority of control, concerning the transfer of NAGPRA items to the Indian tribe(s).

8. ARPA procedures include, but are not limited to, the following:
    a. NAGPRA items will be removed using standard professional archeological practices in a culturally sensitive manner.
    b. NAGPRA items will be recorded in a descriptive non-invasive level including measurements, type, and morphology.
    c. NAGPRA items will be sketched in situ.
    d. Vertical provenience data shall be tracked through the use of controlled levels within a standard grid unit.
    e. Additional descriptions, drawings, and measurements of NAGPRA items will be conducted to document the discovery and the removal.
    f. Specific locations will be mapped and recorded using the most accurate archaeological standards available.

9. Documentation pertaining to the NAGPRA items and their removal shall be prepared by or submitted to Reclamation's WCAO Archaeologist by any contractors or persons assisting in removal.
    a. A report shall be prepared documenting the findings and in compliance with ARPA.

10. Upon completion of intentional excavation, the NAGPRA items will be:
    a. All intentionally excavated NAGPRA items will be held at a secure facility as determined by Reclamation's WCAO Archaeologist until disposition is made through the NAGPRA process.
    b. At all times after disinterment, the NAGPRA items will be kept in a locked room with access restricted only to authorized Reclamation staff, and tribal delegates upon request.
    c. All intentionally excavated NAGPRA items will be placed in containers made of natural materials (e.g., linen, cotton, new cardboard boxes) and boxes will be placed on a dedicated shelf.

11. NAGPRA items will not be displayed to the public or press, nor, as practicable, discussed before or with the public or press.

12. Disposition of all NAGPRA items will be consistent with 43CFR 10.6 and the *Specific Information Used to Determine Custody* section of this POA.

IV. Kinds of Analysis Planned for Each Kind of NAGPRA Item

Following the inadvertent discovery or intentional excavation of NAGPRA items, analysis of the NAPGRA items may consist of one or more of the following:

1. Non-destructive visual analysis, including determining age and sex of individuals. Human remains shall not be brushed clean or otherwise handled unless necessary to make age and sex determinations.

2. All analysis for inadvertent discoveries shall take place on site. If needed, security of the site will be accomplished as set forth in II(7)(c).

3. Analysis of the remainder of the NAGPRA items (with the exception of the human remains) will be completed according to ARPA and its implementing regulations, as well as using the best professional archeological and/or ethnographical research analysis methods.

4. Reports and accompanying documentation pertaining to the NAGPRA items and non-destructive analyses shall be prepared by Reclamation's WCAO Archaeologist, and/or submitted to Reclamation's WCAO Archaeologist by any contractors assisting in the analyses. Analysis reporting may be incorporated into the excavation reports as noted in III(9).
    a. A copy of the documentation shall be submitted to the Indian tribe meeting the NAGPRA definition for priority of control.

V. Specific Information Used to Determine Custody

In the event of the removal of NAGPRA items on federally managed land within the Paradox Valley Unit project area, the following specific information will be used to determine custody in the priority order listed below, pursuant to 43 CFR 10.6 (a).

1. Custody will go to the lineal descendent of the deceased individual.
    a. A lineal descendent is defined as an individual tracing his or her ancestry directly and without interruption by means of the traditional kinship system of the appropriate Indian tribe or by the common law system of descendance to a known Native American individual (43 CFR 10.14(b)).

2. Where a lineal descendent cannot be ascertained or no claim is made, custody will go to the Indian tribe on whose tribal land the NAGPRA items were excavated intentionally or discovered inadvertently.

3. On federal non-tribal lands, custody will go to the Indian tribe with the closest cultural affiliation with the NAGPRA items.
    a. Cultural affiliation, pursuant to 43 CFR 10.14(c) means a relationship of shared group identity that may be reasonably traced historically or prehistorically between a present-day Indian tribe or Native Hawaiian organization and an identifiable earlier group. All of the following requirements must be met to determine cultural affiliation between a present-day Indian tribe and the human remains, funerary objects, sacred objects, or objects of cultural patrimony of an earlier group:
        i. Existence of an identifiable present-day Indian tribe with standing under NAGPRA; and
        ii. Evidence of the existence of an identifiable earlier group. Support for this requirement may include, but is not necessarily limited to evidence sufficient to:
            1. establish the identity and cultural characteristics of the earlier group,
            2. document distinct patterns of material culture manufacture and distribution methods for the earlier group, or
            3. establish the existence of the earlier group as a biologically distinct population; and
        iii. Evidence of the existence of a shared group identity that can be reasonably traced between the present-day Indian tribe and the earlier group. Evidence to support this requirement must establish that a present-day Indian tribe has been identified from prehistoric or historic times to the present as descending from the earlier group.
    b. This evidence may exist as geographical, kinship, biological, archeological, anthropological, linguistic, folklore, oral tradition, historical, or other relevant information or expert opinion.
    c. Claimants do not have to establish cultural affiliation with scientific certainty.

4. Through consultation with any known lineal descendants, Indian tribes likely to be culturally affiliated with the NAGPRA items, the Indian tribes which aboriginally occupied the area, any Indian tribes that have a demonstrated cultural relationship for the NAGPRA items, and the consulting Native American tribes to this POA, pursuant to 43 CFR 10.6, upon preponderance of the evidence, Reclamation's WCAO Reviewing Official shall identify which Native American tribe(s) appears to be entitled to custody of the NAGPRA items. For the purposes of this POA, Reclamation's Reviewing Official has been designated as the WCAO Archaeologist. If multiple tribal claimants are identified, Reclamation's WCAO Reviewing Official will request the tribes to designate one tribe to accept responsibility on behalf of the group of tribal claimants.

VI. Notice of Intended Disposition

Within 30 calendar days after determination of custody, Reclamation's WCAO Archaeologist, pursuant to 43 CFR 10.6(c), shall publish a Notice of Intended Disposition (NID) that shall:

1. Be published two times (at least a week apart) in a newspaper of general circulation in the area in which the NAGPRA items were inadvertently discovered or intentionally excavated. This may include, but is not limited to: The Journal; the Montrose Daily Press; The San Juan Record; The Times Independent; and
2. Be published two times (at least a week apart) in a newspaper of general circulation in the area or areas in which the affiliated Indian tribes now reside. This may include but is not limited to: The Journal; The Durango Herald; Farmington Daily Times; The Tribune News; The Vernal Express; The Salt Lake Tribune; The Gallup Sun; and the Navajo Times, and
3. Provide information as to the nature and affiliation of the NAGPRA items, and
4. Solicit further claims to custody.

Provided no disputes or counter claims are received, and as agreed upon by the claimant tribe(s) and Reclamation's WCAO Reviewing Official, after 30 days after publication of the second notice, Reclamation's WCAO Archaeologist may proceed with disposition of the NAGPRA items.

If, however, additional claimants do come forward within the 30-day period after publication of the second notice and Reclamation's WCAO Reviewing Official cannot clearly determine which claimant is entitled to custody, Reclamation's WCAO Archaeologist will not transfer custody of the NAGPRA items until such time as the proper recipient is determined pursuant to 43 CFR 10.

Reclamation's WCAO Archaeologist will send certified copies of the NID and information on when and in what newspaper(s) the NID was published to the Manager, National NAGPRA Program, and concurrently to Reclamation staff, including but not limited to the Upper Colorado Regional Archeologist, the Federal Preservation Officer, and the National Curator and NAGPRA Coordinator.

VII. Disposition of NAGPRA Items

Disposition is the transfer of control over NAGPRA items inadvertently discovered or intentionally excavated on Federal or tribal lands after November 16, 1990, to lineal descendants or Indian tribes that have been determined to be legitimate claimants based on preponderance of the evidence. In completing the disposition, the claimant formally accepts control (ownership) and custody (possession). Disposition is documented and must be consistent with 25 USC 3002, "Ownership," and 43 CFR 10.6, "Custody".

For the Paradox Valley Unit construction project, Reclamation's WCAO Reviewing Official may proceed with disposition provided the following is completed:

1. Inventory of inadvertent discovered NAGPRA items.
2. Inventory of intentionally excavated NAGPRA items.
3. Report on the findings from the intentionally excavated NAGPRA items.
4. Report on the analysis from the intentionally excavated NAGPRA items.
5. Report on the determination of custody.

6. Proof of the Notice of Intended Disposition publications with no disputes or counter claims.
7. Receipt of formal claim by Indian tribe(s).
8. Selection of lead Indian tribe(s), if appropriate.
9. Signed transfer of custody form between Reclamation and the claimant tribe(s), including an inventory of NAGPRA items, to transfer custody of the NAGPRA items.

If the cultural affiliation of NAGPRA items can be determined, the culturally affiliated tribe may take custody and rebury human remains or may coordinate with the Southern Ute Indian Tribe and the Ute Mountain Ute Tribe to complete the actions. As agreed to in consultation, the Southern Ute Indian Tribe and Ute Mountain Ute Tribe shall act as lead tribes in disposition of NAGPRA items of culturally unidentifiable origins. The consulting tribes authorize the Southern Ute Indian Tribe and the Ute Mountain Ute Tribe to carry out the terms of this protocol.

For NAGPRA items recovered, Reclamation's WCAO Reviewing Official will provide for the reburial in an established cemetery, that is as close to the location of the inadvertent discovery or intentional excavation as practicable. Concerning disposition and reburial, Reclamation will cover costs associated with, but not limited to, tribal travel costs and the purchase of cemetery plots, vaults, and headstones.

VIII. Documentation of NAGPRA Activities

Following disposition, a number of steps must be taken by Reclamation's WCAO Archaeologist before the NAGPRA process is considered complete.

1. Copies of all supporting documentation, including final reports, MOAs, inventories, and reburial locations, must be sent to Reclamation's Upper Colorado Regional Archaeologist and Reclamation's National Curator and NAGPRA Coordinator. Documentation identified above in Section VII, numbers 1-9.

2. A copy of the NID and information on when and where it was published must be sent to the National NAGPRA Program.



9-24-19

Ed Warner, Area Manager — Date

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