U.S. Department of the Interior
Bureau of Land Management

Twin Bridges Bowknot Helium Project
Administrative Draft Environmental Assessment
Emery County, Utah
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The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

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ABBREVIATIONS

APD: Application for Permit to Drill

BGEPA: Bald and Golden Eagle Protection Act

BLM: Bureau of Land Management

BTU: British thermal unit

CEQ: Council on Environmental Quality

CFR: Code of Federal Regulations

dB: decibel

dBA: A-weighted decibel

DR: decision record

EA: environmental assessment

EIS: environmental impact statement

EO: executive order

ESA: Endangered Species Act

EPA: U.S. Environmental Protection Agency

FLPMA: Federal Land Policy and Management Act

FO: field office

FONSI: finding of no significant impact

GHG: greenhouse gas

GIS: geographic information system

GMU: game management unit

ID Team: Interdisciplinary Team

LWC: land with wilderness characteristics

m: meter

MBTA: Migratory Bird Treaty Act

MLA: Mineral Leasing Act

NEPA: National Environmental Policy Act

NPS: National Park Service

NRA: national recreation area

NRCS: Natural Resources Conservation Service

OHV: off-highway vehicle

RFFA: reasonably foreseeable future action

RMP: resource management plan

ROS: Recreation Opportunity Spectrum

ROW: right-of-way

SITLA: School and Institutional Trust Lands Administration

SRMA: special recreation management area

SSPS: special-status plant species

SSURGO: Soil Survey Geographic database

STATSGO: State Soil Geographic database

SWCA: SWCA Environmental Consultants

SWReGAP: Southwest Regional Gap Analysis Project

UDOGM: Utah Division of Oil, Gas, and Mining

U.S.: United States

USC: United States Code

UDNR: Utah Division of Natural Resources

USDOI: U.S. Department of the Interior

USDOT: U.S. Department of Transportation

UDWR: Utah Division of Wildlife Resources

USFWS: U.S. Fish and Wildlife Service

CHAPTER 1. PURPOSE AND NEED

1.1 INTRODUCTION

This environmental assessment (EA) has been prepared to analyze the potential impacts of Twin Bridges LLC's (Twin Bridges') proposed application for permits to drill (APD) its federal oil and gas lease for exploratory helium, including the associated federal authorizations that would be necessary to support an APD, including underground authorizations to access its oil and gas leases and various rights of way permits the well pad and product lines (collectively the Project). The proposed Project is located in Emery County, Utah (the Project).

This EA is a site-specific analysis of potential impacts that could result from the implementation of the Proposed Action or its alternatives. An EA assists the Bureau of Land Management (BLM) in project planning, ensuring compliance with the National Environmental Policy Act (NEPA) of 1969, and determining whether any significant impacts could result from the analyzed actions. The Council on Environmental Quality (CEQ) updated the regulations implementing the procedural provisions of the NEPA in 2020. These new regulations became effective on September 14, 2020. As outlined in 40 Code of Federal Regulations (CFR) 1506.13 of the new regulations, the new regulations apply to all NEPA processes begun after the effective date, but agencies have the discretion to apply them to ongoing NEPA processes. The BLM had already initiated the preparation of this EA on September 14, 2020. Therefore, the BLM is completing the EA using the CEQ NEPA regulations that were in place before September 14, 2020. Significance is defined by the applicable CEQ regulations for implementing NEPA in 40 CFR 1508.27. An EA provides evidence for determining whether to prepare a finding of no significant impact (FONSI) or an environmental impact statement (EIS). A FONSI documents why the selected action would not result in significant environmental impacts beyond those already addressed in BLM's *Price Field Office Record of Decision and Approved Resource Management Plan* (Price RMP) (BLM 2008a), as amended. If the BLM determines that approving Twin Bridges' ROWs and/or APDs would result in significant impacts, then the BLM would prepare an EIS for the action. If not, a decision record (DR) may be signed for the EA that approves the alternative selected.

1.1.1 Background and Project Overview

Twin Bridges holds three mineral leases in Emery County, Utah, all located within a recently designated wilderness area (see Appendix F Map F-1). Twin Bridges acquired two mineral leases with the Utah School and Institutional Trust Lands Administration (SITLA):

- ML-53189 was acquired on July 1, 2015, and is located in Section 2, Township 26 South (T26S), Range 16 East (R16E) (596 acres).
- ML-53420 was acquired on December 1, 2016, and is located in Section 36, Township 25 South (T25S), R16E (640 acres).

In addition to these SITLA leases, on December 11, 2018 Twin Bridges also purchased a federal oil and gas lease (Parcel 257, UTU-93713), which is located in Section 7, and portions of Sections 5, 6, and 8, Township 26 South, Range (T26S), Range 17 East (R17E) (1,410 acres). On February 18, 2020, Twin Bridges and BLM entered into a Contract for Extraction and Sale of Federal Helium (Contract No. 20-02) for the federal lease pursuant to the Helium Privatization Act 50 United States Code (USC) 167.

Surface ownership of the potentially affected lands includes federal land managed by the U.S. Department of the Interior (USDOI) BLM Price Field Office (FO), as well as state land managed by SITLA. On March 12, 2019, Congress enacted the John D. Dingell, Jr. Conservation, Management, and Recreation Act

(Dingell Act) (16 United States Code [USC] 1132; Public Law 116-9, Title 1, Subtitle C, Part II, Subpart B, Section 1231(a)(7), which, in part, designated more than 1,300,000 acres of land as a Wilderness Area, including all of the lands surround the leases themselves (see Appendix F, Map F-1). BLM is required to manage the Labyrinth Canyon Wilderness 54,643 acres in accordance with the provisions of the Wilderness Act of 1968. Two existing roads in the vicinity, Emery County Road 1025 and Emery County Road 1026, were excluded from the Labyrinth Canyon Wilderness. The terminus of Emery County Road 1025 (Spur Road 1025) includes a disturbed circular roundabout that was also excluded from the Labyrinth Canyon Wilderness. Additionally, Congress designated 49.2 miles of the Green River in Labyrinth Canyon to be managed as a Scenic River under the provisions of the Wild & Scenic Rivers Act of 1968.

The BLM has considered a range of options that would allow Twin Bridges the opportunity to explore, develop, helium in accordance with its valid existing rights under its Federal and SITLA leases. Twin Bridges has submitted two Federal APDs and applied for associated Federal ROWs and authorizations that represent different surface locations for the facilities required to access the mineral resources associated with the Federal and SITLA leases. In association with this EA, the BLM is considering approving one of the surface locations and associated facilities. As described throughout this EA, in order to develop its Federal Lease and potentially the two SITLA parcels (which do not require a Federal APD), the alternatives considered in this EA include (1) approval of a well pad (via an off-lease ROW if the off-lease alternative is selected or approval of an on-lease well pad if the on-lease alternative is selected), (2) three ROW authorizations for pipelines (one 14 inch gathering pipeline, one 8 inch produced water pipeline, and one 8 inch fluids transfer pipeline) and one ROW for running power and communication infrastructure that would run from the well pad location to the proposed processing plant, (3) a ROW for proposed improvements to either Spur Road 1025 (if the off-lease well pad alternative is selected) or County Road 1026 (if the on-lease well pad alternative is selected), and (4) up to three separate underground authorizations to horizontally drill to each of the three leases. In addition to these federal authorizations, Twin Bridges has applied to the SITLA for a permit to construct and operated a helium processing plant on SITLA lands. The location of the processing plant on SITLA lands varies based on the location of the well pads and associated production facilities (see Appendix F Map F-1). The proposed helium processing plant is necessary to separate helium from noncommercial gases.

1.2 PURPOSE AND NEED FOR FEDERAL ACTIONS

The purpose of the federal action is to respond to Twin Bridges' applications for APD/ROW, so that it may develop its two SITLA leases and one Federal Lease, etc. The need is established by the various statutes and BLM's responsibility under the Mineral Leasing Act (MLA) of 1920, as amended by the Federal Land Policy and Management Act (FLPMA) of 1976; the Wilderness Act of 1964, which addresses preservation and allowable uses within designated wilderness areas; the Wild & Scenic Rivers Act of 1968, which addresses preservation of outstandingly remarkable values with designated river corridors; the Federal Onshore Oil and Gas Leasing Act of 1987; and the Helium Privatization Act of 1996, which establishes the BLM's authority and authorizes the Secretary of the Interior to enter into agreements with private parties for the recovery and disposal of helium on federal lands.

1.3 DECISIONS TO BE MADE

On the basis of this NEPA analysis, the BLM may select one of the 3 alternatives analyzed in this EA. If the BLM selects Alternative A (off-lease well pad) or Alternative B (on-lease well pad), the BLM may approve the associated ROW applications, underground authorizations, and APD for the Federal lease with no modifications, or the BLM may approve the applications with adjustments or conditions. These adjustments or conditions could include actions to minimize impacts to wilderness character within the Labyrinth Canyon Wilderness, to address potential impacts to the Green River Wild and Scenic River

corridor, and other actions that might be necessary to prevent unnecessary or undue degradation of public lands. If the BLM determines that the approvals could result in significant impacts, then the BLM would prepare an EIS for the action. If not, a Decision Record may be signed for the EA that approves the alternative selected.

1.4 RELATIONSHIP TO POLICIES, PROGRAMS, AND PLANS

1.4.1 Conformance with BLM Resource Management Plan

The BLM lands are administered with direction provided in land use plans that establish the goals and objectives for the management of the resources and land uses. BLM resource management plans (RMPs) must be prepared in accordance with FLPMA. The affected Federal lands are managed by BLM Price FO. The applicable RMP is the Price RMP (BLM 2008a), as amended.

The Price RMP, as amended, provides guidance for the management of 2.5 million acres of public land administered by BLM in Carbon and Emery Counties in central-eastern Utah. The purpose of the Price RMP is to provide a comprehensive framework for public land management within the jurisdiction of the Price FO and its allocation of resources pursuant to the multiple-use and sustained-yield mandate of FLPMA.

The Proposed Action and Alternatives are in conformance with the Price RMP because they are consistent with the following RMP decisions (objectives, terms, and conditions):

- Provide opportunities for mineral exploration and development under the mining and mineral leasing laws subject to legal requirements to protect other resource values.
- Manage mineral leasing, exploration and development while minimizing impact to other resource values.
- Additional ROWs will be granted consistent with RMP goals and objectives.
- Use proper design techniques and mitigation measures, future projects and use authorizations under this plan to minimize contrast with the characteristic landscape and not exceed the VRM [Visual Resource Management] Management Class Standards.

The Price RMP describes specific lease stipulations that apply to a variety of resources. The BLM would apply appropriate stipulations at the permitting stage to ensure compliance with the RMP and all applicable laws, regulations, and policies.

1.4.2 Relationship to Other Federal Laws, Regulations, and Policies

Executive Order (EO) 13817 (83 *Federal Register* 23295), issued on December 20, 2017, outlines the importance of critical minerals, including helium, and the need to streamline leasing and permitting to expedite exploration, production, processing, reprocessing, recycling, and domestic refining of critical minerals.

Under Title V of FLPMA, BLM has discretion to authorize ROWs for a variety of uses, including roads and pipelines, while taking into consideration impacts on natural and cultural resources (including historical resources). When issuing any ROW grants, the BLM must include appropriate terms and conditions, including any actions that the BLM determines are appropriate "to minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment."

Sections 302, 303, and 310 of FLPMA and BLM's associated regulations at 43 CFR 2920 allow the BLM to issue leases, permits, and easements for the non-Federal use of public lands. If underground authorizations are issued by the BLM to access the Federal and SITLA mineral leases, the BLM would do so utilizing the 43 CFR 2920 regulations.

Sections 4(d)(2) and 4(d)(3) of the Wilderness Act of 1964 describe how minerals and mining activities are to be managed in wilderness areas. The BLM manages mineral resources within designated wilderness in accordance with the BLM's wilderness regulations at 43 CFR 6305 (Access to State and Private Lance of Valid Occupancies within Wilderness Areas). Manual 6340 – Management of Designated Wilderness Areas (BLM 2012) also directs the BLM to honor valid existing rights while preserving wilderness character to the greatest extent possible. In accordance with BLM Manual 6340, the BLM will grant access to valid mineral rights that are wholly within a designated wilderness, as provided for in Section 5(b) of the Wilderness Act, in a manner consistent with other areas in the National Wilderness Preservation System similarly situated. In most cases, this means such access will be treated in the same way as access to inholdings, but in some instances, applying the regulations found at 43 CFR 6305.30 may result in granting mineral lease holders a greater degree of access than would be granted an inholder.

1.4.3 Consistency with Other Federal and Local Land Management Plans and Policies

The BLM will process and evaluate the ROW applications and APDs submitted by Twin Bridges pursuant to the BLM's statutory mandates and authorities governing federal helium leasing and other federal authorities to include the MLA (as amended), the Wilderness Act of 1964, NEPA (as amended), FLPMA, and the Helium Privatization Act and regulations (43 CFR 16.1(a) and 16.2).

The BLM reviewed the land use plans for the state of Utah, as well as Emery County's General and Land Use Plans, and considered the land management objectives established in these plans. The state manages SITLA lands under a mandate to produce funding for the state's school system. SITLA makes surface land available for easements, including those associated with roads and pipelines.

1.4.4 Federal, Tribal, State, and Local Approvals

Twin Bridges would need to obtain federal, state, and local permits before construction. Key federal, state, and local permits, approvals, and authorizing actions for construction, operation, maintenance, and abandonment of the Project are included in Appendix A.

1.5 IDENTIFICATION OF ISSUES

A BLM Interdisciplinary Team (ID Team) reviewed the proposed well locations and ROW applications submitted by Twin Bridges using an ID Team Checklist (Appendix B) and identified resources that may be affected by the Proposed Action and Alternative that warranted analysis in the EA. The resources and issues identified by the BLM ID Team include the following:

- **Air Quality and Greenhouse Gas (GHG) Emissions**:
  - What are the potential effects of the Project on air quality?
  - What are the potential GHG emissions of the Project and how do GHG emissions contribute to climate change?
- **Soils**: What are the potential effects on soils from the construction, operation, and maintenance of the Project?

- **Vegetation**: What are the potential effects on vegetation from the construction, operation, and maintenance of the Project?
- **Special Status Plants**: How would the Project affect known populations and/or habitat of federally listed endangered and BLM sensitive plants including flat-top buckwheat, Utah spurge, trotter's oreoxis and entrada rushpink?
- **General Wildlife**: What are the potential effects of the Project on general wildlife species (e.g., desert bighorn sheep, pronghorn, and BLM sensitive species, including their habitats)?
- **Special Status Wildlife**: What are the potential effects of the Project on migratory birds, raptor species, bat species, kit fox and Mexican spotted owl including their habitat?
- **Recreation**: How would the Project affect recreation opportunities in the analysis area?
- **Wilderness**: What are the potential effects of the Project on wilderness?
- **Lands with Wilderness Characteristics (LWCs)**: What are the potential effects of the Project on LWCs?
- **Visual Resources**: What are the potential effects of the Project on the visual landscape of the region?

CHAPTER 2. DESCRIPTION OF THE ALTERNATIVES

2.1 INTRODUCTION

This EA analyzes the potential impacts of implementing Alternative A (Proposed Action), Alternative B (On-Lease Surface Action), and Alternative C (No Action). The No Action Alternative is considered and analyzed to provide a baseline against which to compare the impacts of the two action alternatives. Appendix F, Figure F-1 contains a map of the facilities associated with Alternative A and Alternative B.

Both Alternatives A and B would be implemented in a sequential manner, with Twin Bridges first constructing access road improvements, constructing the well pad, and drilling an initial exploratory well. If sufficient quality and quantity of helium-bearing gas is produced from the original exploratory well, Twin Bridges would develop a second exploratory well, construct the proposed processing facility on SITLA lands, and install the pipelines and communication infrastructure between the well pad and processing facility. Up to 5 additional production wells may be developed from the proposed well pad under both Alternatives A and B.

2.2 ALTERNATIVE A – PROPOSED ACTION: BOWKNOT 36-1

Under Alternative A, the BLM would issue Twin Bridges a ROW to construct road improvements to Spur Road 1025 from Emery County Road 1025 to the proposed well pad, a ROW to construct an off-lease well pad, underground authorizations required to access the Federal and SITLA mineral leases pursuant to 43 CFR 2920, approve Twin Bridges' APD for the 5-2 well, and issue three ROWs for pipelines (one 14 inch gathering pipeline, one 8 inch produced water pipeline, and one 8 inch fluids transfer pipeline) and one ROW for running power and communication infrastructure that would run from the well pad location to the proposed processing plant. Up to 5 additional development well may be drilled from the proposed well pad.

Twin Bridges conducted geological research to define the structure of the subsurface helium reservoir and determined that the crest of the target formation occurs under its SITLA lease ML-53420 located in Section 36, T25S, R16E, Emery County, Utah. Therefore, Twin Bridges proposes to drill proposed well 36-1, which targets the formation under this SITLA lease, as the first well to be developed under this alternative. To conduct exploratory drilling and testing for helium resources on this lease, Twin Bridges has included the following primary components in its Proposed Action (Appendix F, Figure F-2):

- Road improvements on approximately 2.7 miles of Spur Road 1025 from Emery County Road 1025 to the proposed well pad. Upgrades to the road would result in 9.9 acres of surface disturbance.
- Construction of a 5.4-acre well pad located in an area of existing disturbance.
- Drilling and testing of one exploratory helium well (Bowknot State 36-1) on state lease ML-53420 located in Section 36, T25S, R16E, Emery County, Utah.

If a sufficient quality and quantity of helium-bearing gas is confirmed through flow testing of the exploratory well, the following actions would also be constructed:

- Installation of three pipelines and one conduit: 1) up to 14-inch-diameter steel or fiber-reinforced polyethylene gathering pipeline, 2) up to 8-inch-diameter polyethylene fluid transfer pipeline, 3) an 8-inch diameter polyethylene produced water pipeline, and 4) up to 6-inch-diameter conduit for running control and power cables. All infrastructure would be buried (3–4 feet) within a 30-foot-wide ROW parallel to Spur Road 1025, Emery County Road 1025, and Emery County Road

1010. Approximately 4.9 miles of proposed pipeline ROW from the well pad to the proposed processing facility would result in 17.8 acres of surface disturbance. The proposed pipelines are shown in Figure F-2 in Appendix F.

- Drilling, testing and production of a second delineation well (Bowknot 5-2) from the same well pad as the State 36-1 well under the terms and stipulations of Twin Bridges' federal lease UTU-93713 located in Section 7 and portions of Sections 5, 6, and 8, T26S, R17E, Emery County, Utah. The drilling of the second delineation well is subject to the terms of the federal helium Contract No. 20-02.
- Drilling and production of up to five additional development wells targeting the mineral resources underneath Twin Bridges' SITLA and Federal leases. The number of wells would be determined based upon the results of the initial test well and subsequent delineation well. The number of development wells needed would largely be dictated by the viability of future horizontal drilling. It is possible that the mineral resources under Twin Bridges' leases could be adequately drained with the two initial wellbores, however up to five additional wells could be needed. All future wells would be drilled from the 5.4 acre well pad and no additional disturbance would occur.
- Construction of a helium processing plant on SITLA-managed lands in Section 16, T25S, R16E, Emery County, Utah.

2.2.1 Additional Delineation Well and Development Wells

If a sufficient quality and quantity of helium-bearing gas is produced from the original exploratory well on the SITLA lease, ML-53420 , Twin Bridges would drill a subsequent delineation well (Bowknot 5-2) under the terms and stipulations of its federal lease UTU-93713 located in Sections 5, 6, 7, and 8, T26S, R17E, Emery County, Utah. Drilling and completion procedures would be similar to those described above and no new surface disturbance would occur (the well would be drilled from the existing 36-1 well pad). Additional surface facilities would be limited to an additional wellhead, separator, and flowlines to connect to the well to existing facility and pipeline network. All other existing infrastructure would be utilized for the subsequent well.

Based upon the results of the initial well test and subsequent delineation well, up to 5 additional development wells could be drilled and put into production targeting the mineral resources under both SITLA leases and the Federal lease. The number of development wells needed would largely be dictated by the viability of future horizontal drilling. It is possible that the mineral resources under Twin Bridges' leases could be adequately drained with the two initial wellbores, however up to five additional wells could be needed. As stated above, additional surface facilities would be limited to an additional wellheads, separators, and flowlines to connect to each well to existing facility and pipeline network. All other existing infrastructure would be utilized for the subsequent wells. All wells would be drilled from the 5.4 acre well pad and no additional disturbance would occur.

Twin Bridges' detailed Project description is in Appendix G, which describes the processes involved in the Project construction and operation. These processes include construction of access roads and road improvements; construction of the well pad; drilling activities; well completion and testing; water supplies; construction of a pipeline; construction of a processing plant (on non-federal lands); product transportation; hazardous waste material and handling; construction of additional delineation wells; interim reclamation; well abandonment and final reclamation; and Applicant-committed environmental protection measures.

2.3 ALTERNATIVE B – ON-LEASE SURFACE FACILITY: BOWKNOT 5-1

Under Alternative B, the BLM would issue Twin Bridges a ROW to construct road improvements to Emery County Road 1026 from the beginning of the road to the proposed well pad, underground authorizations required to access the SITLA mineral leases pursuant to 43 CFR 2920, approve Twin Bridges' APD for the 5-1 well and associated well pad, and issue three ROWs for pipelines (one 14 inch gathering pipeline, one 8 inch produced water pipeline, and one 8 inch fluids transfer pipeline) and one ROW for running power and communication infrastructure that would run from the well pad location to the proposed processing plant. Up to 6 additional exploration and development well may be drilled from the proposed well pad.

A second action alternative has been developed in which the first exploratory drilling occurs on Twin Bridges' existing federal lease (UTU-93713). This alternative would consist of the following primary components (Appendix F, Figure F-6):

- Road improvements on approximately 4.0 miles of Emery Country Road 1026 to the proposed well pad. Upgrades to the road would result in 14.5 acres of surface disturbance.
- Construction of a 7.3-acre well pad located in a previously undisturbed area.
- Drilling and testing of one exploratory helium well (Bowknot 5-1) on federal lease UTU-93713 located in Section 7 and portions of Sections 5, 6, and 8, T26S, R17E, Emery County, Utah. The 5-1 well would be completed under terms within federal helium Contract No. 20-02.

If a sufficient quality and quantity of helium-bearing gas is confirmed through flow testing of the exploratory well, the following actions would also be undertaken:

- Construction of a helium processing plant located on SITLA-managed lands in Section 16, T26S, R16E, Emery County, Utah.
- Installation of three pipelines and one conduit: 1) up to 14-inch-diameter steel or fiber-reinforced polyethylene gathering pipeline, 2) up to 8-inch-diameter polyethylene fluid transfer pipeline, 3) an 8-inch diameter polyethylene produced water pipeline, and 4) up to 6-inch-diameter conduit for running control and power cables. All infrastructure would be buried (3–4 feet) within a 30-foot-wide ROW parallel to Emery Country Road 1026 and Emery County Road 1010. Construction and installation along the 5.6-mile-long proposed pipeline ROW would result in 20.5 acres of surface disturbance.
- Drilling, testing and production of a second delineation well. The design and target of the second delineation well would be determined based on the results of the 5-1 exploration well.
- Drilling and production of up to five additional development wells. The number of wells would be determined based upon the results of the initial test well and subsequent delineation well. The number of development wells needed would largely be dictated by the viability of future horizontal drilling. It is possible that the reservoir could be adequately drained with the two initial wellbores, however up to five additional wells could be needed. All future wells would be drilled from the 7.3 acre well pad and no additional disturbance would occur.

2.3.1 Additional Delineation Well and Development Wells

If a sufficient quality and quantity of helium-bearing gas is produced from the original exploratory well, Twin Bridges would drill a subsequent delineation well under the terms and stipulations of its federal lease UTU-93713 located in Sections 5, 6, 7, and 8, T26S, R17E, Emery County, Utah or under State

lease ML-53420 located in Section 36, T25S, R16E, Emery County, Utah. Drilling and completion procedures would be similar to those described above and no new surface disturbance would occur (the well would be drilled from the existing 7.3 acre well pad). Additional surface facilities would be limited to an additional wellhead, separator, and flowlines to connect to the well to existing facility and pipeline network. All other existing infrastructure would be utilized for the subsequent well.

Based upon the results of the initial well test and subsequent delineation well, up to 5 additional development wells could be drilled and put on production. The number of development wells needed would largely be dictated by the viability of future horizontal drilling. It is possible that the reservoir could be adequately drained with the two initial wellbores, however up to five additional wells could be needed. As stated above, additional surface facilities would be limited to an additional wellheads, separators, and flowlines to connect to each well to existing facility and pipeline network. All other existing infrastructure would be utilized for the subsequent wells. All wells would be drilled from the 7.3 acre well pad and no additional disturbance would occur.

Twin Bridges has a detailed Project description located in Appendix G. The Alternative B details are very similar to Alternative A as construction and operation sequences are the same and construction and operational methods are the same.

2.4 ALTERNATIVE C – NO ACTION ALTERNATIVE

Under the No Action Alternative, Twin Bridges' ROW applications and APDs would be denied, and the action alternatives would not be developed. Exploration by Twin Bridges to access its UTU-93713 federal lease and SITLA leases would need to be assessed and conducted in a different manner.

2.5 SUMMARY OF PROJECT COMPONENTS AND PROPOSED SURFACE DISTURBANCE FOR EACH ALTERNATIVE

Table 2-1 summarizes the Project components and the subsequent surface disturbance associated with each proposed alternative.

Table 2-1. Summary of Alternatives

Alternative	Project Component	Location/Specifics	ROW Dimensions	Disturbance (acres)
Alternative A – Proposed Action: Bowknot 36-1	Road upgrades	Spur Road 1025	30-foot-wide ROW for approximately 2.7 miles (14,445 feet)	9.9
	Well pad	Section 26, T25S, R16E	300 × 590 feet	5.4 (2.4 after initial reclamation)
	Pipeline ROWs	Well pad to gas plant	30-foot-wide ROW for approximately 4.9 miles (25,880 feet)	17.8
	Gas plant	Section 16, T25S, R16E, Emery County	Not applicable	10.0

Alternative	Project Component	Location/Specifics	ROW Dimensions	Disturbance (acres)
Total Disturbance of Alternative A				**43.1**
Alternative B – On-Lease Surface Facility: Bowknot 5-1	Road upgrades	Emery County Road 1026	30-foot-wide ROW for approximately 4.0 miles (21,140 feet)	14.5
	Well pad	Section 7, T26S, R17E	400 × 500 feet	7.3 (3.4 after initial reclamation)
	Pipeline ROWs	Well pad to gas plant	30-foot-wide ROW for approximately 5.6 miles (29,780 feet)	20.5
	Gas plant	Section 16, T26S, R16E, Emery County	Not applicable	10.0
Total Disturbance of Alternative B				**52.3**
Alternative C – No Action Alternative	Project application would be denied, and no new develop would occur.			0.0
Total Disturbance of Alternative C				**0.0**

2.6 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Twin Bridges originally submitted an APD for Alternative B, as described in this EA. The BLM worked with Twin Bridges to consider other alternatives that would reduce impacts on BLM-managed resources, including the Labyrinth Canyon Wilderness Area during the early review of the APD for Alternative B. The result of these conversations was the development of Alternative A, which would locate the surface facilities outside of the Labyrinth Canyon Wilderness Area. The BLM, in collaboration with Twin Bridges, did not identify any other alternatives that would be technically feasible for evaluation in the EA.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter presents the existing environment and the environmental consequences on resources that could be affected by Alternative A (Proposed Action: Bowknot 36-1), Alternative B (On-Lease Surface Facility Alternative: Bowknot 5-1), or Alternative C (No Action Alternative). In accordance with NEPA regulations (40 CFR 1500.4(g)), the Price FO ID Team used internal scoping to identify the natural and cultural resources that could be affected by the Proposed Action. The ID Team Checklist prepared by BLM Price FO staff (Appendix B) lists all the resources considered and indicates whether they are (a) not present in the area that would be affected by the Proposed Action, (b) present but not affected to a degree that requires detailed analysis, or (c) present with potential for relevant impacts that need to be analyzed in detail in the EA. As described in Section 1.6, the resources that were identified as present with the potential to be impacted (PI) include: air quality and GHG emissions; soils; vegetation; special status plants, including federally listed threatened, endangered, and/or candidate plant species and BLM-listed sensitive plant species; general wildlife; special status wildlife, including federally listed threatened, endangered, and/or candidate wildlife species; recreation; wilderness; LWCs; and visual resources. A description of these resources and potential Project-related impacts, including cumulative effects, are provided in Sections 3.2 through 3.10.

3.1.1 General Setting

The Project is in southeastern Emery County, Utah, approximately 30 miles south of Green River, Utah, and is on the Leadville Formation, at the eastern edge of the San Rafael Desert, near Keg Spring Canyon, Keg Knoll and a BLM wilderness area (Labyrinth Canyon Wilderness Area). Emery County Road 1010 from Interstate 70 near Green River provides access to the Project site. The proposed well pads would be located approximately 4,630 feet (Alternative A) and 5,250 feet above mean sea level (Alternative B). Characteristic vegetation primarily includes blackbrush (*Coleogyne ramosissima*), Mormon tea (*Ephedra* sp.), and sand sagebrush (*Artemisia filifolia*) shrublands with areas of exposed bedrock and sand sheets known as surficial eolian deposits.

3.1.2 Past, Present, and Reasonably Foreseeable Future Actions

For all resources identified as present with the potential to be impacted, the impacts of past and present actions are captured through the description of the affected environment and environmental consequences for that resource. None of the past or present actions described in those sections are considered connected actions to the Project. The geographic scope (analysis area) for cumulative effects was assessed for each resource to determine the area potentially affected by past and present actions and reasonably foreseeable future actions (RFFAs). The temporal scope (time frame for cumulative effects analysis) was identified as 20 years, which is the plan life of the Project. A review of RFFAs based on resource-specific geographic scopes found no RFFAs in the vicinity of the Project.

3.2 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

This section outlines the procedures and analyses used in conducting the air quality assessment. The impact assessment examines and quantifies the impacts from potential emissions sources that may be developed.

NEPA requires the BLM to analyze impacts on air quality and other components of the human environment, such as water quality, soil, flora, and fauna from major federal actions. Other relevant laws and regulations associated with this analysis include FPLMA; the federal Clean Air Act (CAA) of 1970 and CAA Amendments in 1977 and 1990; the CEQ regulations for implementing NEPA; and the Utah Division of Air Quality regulations.

3.2.1 Affected Environment

3.2.1.1 *Regulatory Framework Existing Setting*

The development of helium resources, such as the proposed action, would emit air pollutants that are regulated under the regulatory framework of the CAA including the applicable provisions of the National Ambient Air Quality Standards (NAAQS), various Federal regulatory standards, and minor and major source air permitting. A detailed explanation of the regulatory framework for air quality and greenhouse gas emissions is found in Appendix H of this document.

The 2020 Monitoring Report from the Utah Bureau of Land Management details the air monitoring data from 2019 at the county-level for the state of Utah. The detailed report lists the current air emissions statewide by source. Current greenhouse gasses and other air quality pollutant emissions within the state can be found using this document. The 2020 Monitoring Report also details the emission inventories for different Utah airsheds for 2017.

3.2.2 Environmental Consequences

3.2.2.1 *Analysis Methods and Assumptions*

Several methods and assumptions were used to determine the Project's impact to air quality and greenhouse gas emissions. Emissions calculations for the Project were subdivided into construction-related emissions (those emissions that are expected to be temporary in nature) and operations-related emissions (those emissions that are expected to occur throughout the operational lifetime of the Project). A detailed list of methods and assumptions can be found in Appendix H of this document.

3.2.2.1.1 ISSUE INDICATORS

The following indicators were used to analyze impacts to air quality:

- Emission estimates for regulated pollutants and GHGs
- Comparison of Project emission estimates to county emissions inventories
- Exceedance of FLAG screening-level criteria
- National Ambient Air Quality Standards (NAAQS)

3.2.2.2 *Environmental Consequences – Alternative A*

A detailed breakdown of the construction emissions is in Appendix H of this document. The estimated construction emissions are in Table 3-1.

3.2.2.2.1 TOTAL CONSTRUCTION EMISSIONS

Direct and indirect construction activities would result in air pollutant emissions from equipment exhaust, including the use of drills during construction; vehicle exhaust from travel to and from the Project site; and fugitive dust from soil disturbance. Table 3-1 presents the estimated total criteria air pollutant, HAPs,

and GHG emissions from Alternative A construction activities, as well as a comparison with county-level annual emissions based on calculating the total Alternative A construction emissions as a percentage of the total county emissions estimated in the 2017 National Emissions Inventory. The calculation methodology, which details the equations, emission factors, and assumption used, can be found in Appendix H.

Table 3-1. Estimated Total Construction Emissions – Alternative A

Construction Activity	Emissions (tpy)							Emissions (metric tpy)
	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOCs	HAPs	CO_2e
Fugitive dust	–	–	–	11.95	1.19	–	–	–
Heavy equipment combustive emissions	10.50	39.88	0.739	2.07	2.01	2.936	0.1620	4,419.67
Commuting vehicles	0.81	0.76	0.0013	126.78	12.71	0.066	0.0239	146.91
Wind erosion	–	–	–	3.18	0.48	–	–	–
Completion flaring	94.31	20.69	0.18	2.27	2.27	5.08	0.56	32,317.44
Alternative A – Total Construction Emissions	105.62	61.33	0.919	146.24	18.66	8.081	0.7474	**36,884.03**
Emery County – Total Annual Emissions*	**14,686**	**18,117**	**5,797**	**7,336**	**1,504**	**14,740**	**3,339**	**15,171,711.00**
Construction Emissions Percentage of County Total	0.719%	0.339%	0.016%	1.994%	1.241%	0.055%	0.022%	0.243%

SO_x = sulfur oxides

* From 2017 National Emissions Inventory (EPA 2020b)

The overall projected emissions estimate for each pollutant from the construction of the Project is small compared with the proportion each pollutant contributes to the county's annual emissions. Furthermore, this comparison is even smaller when the indirect Project construction emissions are removed from the emissions totals. Non-construction emissions from wind add particulate matter to the overall emission totals since wind can carry loose dirt and debris as a cause of indirect emissions. The construction emissions would be temporary and transient in nature and are not likely to impact compliance with the NAAQS National Ambient Air Quality Standards (NAAQS) in the county. Background concentrations can be found using the 2020 BLM Utah Air Monitoring Report (BLM, 2020e) which details air quality in different regions of Utah. Construction of the Project would have short-term, minor impacts on air quality.

3.2.2.2.2 TOTAL OPERATIONS AND MAINTENANCE EMISSIONS

Operations and maintenance emissions would include vehicle exhaust from travel to and from the well pad, access road, pipeline, and the processing plant for routine inspections; combustion emissions from the turbine, fugitive emissions from piping components; working emissions from storage tanks; well workover emissions; and blowdown venting at the well pad and processing plant. Table 3-2 presents the estimated total criteria air pollutant, HAPs, and GHG emissions from Alternative A operations activities, as well as a comparison with county-level annual emissions based on calculating the total Alternative A operations emissions as a percentage of the total county emissions estimated in the 2017 National Emissions Inventory.

Table 3-2. Estimated Total Operations & Maintenance Emissions – Alternative A

Operations Activity	Emissions (tpy)							Emissions (metric tpy)
	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOCs	HAPs	CO_2e
Heavy equipment combustive emissions	0.09	0.32	0.009	0.02	0.02	0.023	0.001	42.66
On-road equipment	0.67	0.12	0.0005	47.51	4.76	0.024	0.007	63.26
Turbine	3.00	4.50	1.146	1.60	0.64	7.000	0.254	36,011.83
Fugitive components	–	–	–	–	–	1.901	1.294	72.17
Water tank	–	–	–	–	–	0.13	0.013	22.98
Sump tank	–	–	–	–	–	0.05	0.005	0.00
Blowdowns	–	–	–	–	–	0.221	0.151	15.76
Workover flaring	2.10	0.46	0.004	0.05	0.05	2.329	0.012	892.88
Alternative A – Total Operations Emissions	5.86	5.40	1.159	49.18	5.47	11.68	1.737	**37,121.54**
Emery County – Total Annual Emissions*	**14,686**	**18,117**	**5,797**	**7,336**	**1,504**	**14,740**	**3,339**	**15,171,711**
Operations Emissions Percentage of County Total	0.040%	0.030%	0.020%	0.670%	0.364%	0.079%	0.052%	0.245%

SO_x = sulfur oxides

* From 2017 National Emissions Inventory (EPA 2020b)

Emissions from vehicle travel during operations and maintenance would be minimal, and mileage for vehicle travel for routine inspection would be much less than during construction. Criteria pollutant emissions from vehicle exhaust during operations and maintenance would be substantially lower than the emissions generated during construction. Therefore, impacts to air quality resources from operations would be minor but long term.

Total operational GHG emissions for the 20 year life of the Project are 0.74 million metric tons CO_2e. Note that these emissions are for the life of the Project and are significantly lower than the total aggregate global emissions that drive climate change. According to the 2020 BLM Air Monitoring Report, 71.8 million metric tons of GHG emission in CO_2e were released in Utah, 6,676.6 million metric tons were released in the United States, while 46,140.95 million metric tons were released globally (BLM 2020e).

EPA Rule 40 CFR Part 98, Mandatory Reporting of Greenhouse Gases requires the mandatory reporting of GHG emissions for certain facilities that emit more than 25,000 metric tons of CO_2e emissions per year. Therefore, the proposed processing plant would likely be subject to these reporting requirements, depending on its actual level of operation.

Criteria air pollutant and GHG emissions from the construction, operation, and maintenance of the Project under Alternative A would result in a minor, long-term increase in emissions, as demonstrated in Table 3-1 and Table 3-2.

3.2.2.2.3 NEAR-FIELD MODELING ANALYSIS

The results from a nearfield modeling analysis (Kleinfelder, 2019) of an oil and gas development occurring in the same airshed as the Project showed no potential exceedances of any of the NAAQS in the analysis area, including at Arches and Canyonlands National Parks. Concentrations for the criteria air pollutants ranged from 2% to 94% of the NAAQS. Analysis of secondary air pollutants, such as O_3 and secondary $PM_{2.5}$, show that concentrations are considerably below impact thresholds. The cancer and non-carcinogenic risks from HAPs emissions are shown to be negligible from individual chemicals or a combination of chemicals. A visibility analysis at both Arches and Canyonlands National Parks shows no exceedance of screening criteria. Predictions of nitrogen and sulfur deposition are considerably lower than the critical load thresholds for Arches and Canyonlands National Parks. The nearfield modeling analysis evaluated the direct and indirect impacts for developing 45 oil and gas wells which is considerably higher that the level of development being considered for the Project. On the basis of this assumption, the use of nearfield modeling results for this analysis is conservative.

3.2.2.2.4 VISIBILITY

Sources of air pollution can cause visible plumes if emissions of particulates and NO_x are of sufficient magnitude. A plume will be visible if these emissions scatter or absorb sufficient light, making the plume brighter or darker than the viewing background. The primary variables that affect whether or not a plume is visible at a given location include the quantity of emissions, type of emissions, relative location of the emissions source and the observer, and the background visibility range.

VISCREEN software was used to assess potential visibility impacts within the near-field modeling at Canyonlands National Park. The closest distance to this Class I area is approximately 8.3 miles (13.3 km) southeast of the Alternative A proposed well pad.

The visibility impacts from the construction of Alternative A were analyzed using a Level 1 screening that assumed maximum hourly emission rates of 0.156 g/s for PM_{10} and 2.723 g/s for NO_x, as determined in the Construction Emissions section. These emission rates correspond to the operation of the drill rig engines. No on-road emissions were included in the model as those emissions take place at different locations along the access road and other roads connecting the Project with Green River, Utah.

Visibility impacts from the operation of Alternative A were analyzed assuming maximum hourly emission rates of 0.0898 g/s for PM_{10} and 0.9286071 g/s for NO_x, as determined in the Operations Emissions section. These emission rates correspond to the estimated emissions from the operation of the well pad without accounting for on-road emissions, because those emissions would occur at different locations along the access road and other roads connecting the Project with Green River, Utah. In specific, the activities that yielded the maximum hourly emission rate included the operation of engines for well recompletion and the flaring of these emissions.

In the VISCREEN model, it is assumed that other pollutants do not substantially affect visual air quality at the source-receptor distances analyzed in the VISCREEN model. A default particle size and density and conservative meteorological conditions were assumed (i.e., extremely stable [F] atmospheric conditions and very low wind speed [1 meters/second]).

The default Level 1 screening criteria were used. In addition, a background visibility range of 259.6 km was used for the VISCREEN analysis. A review of the recently measured visual ranges (257–264 km) at Canyonlands National Park indicated that the annual average visual range of 259.6 km would be considered reasonable for a plume impact evaluation.

The visual air quality parameter of interest presented by VISCREEN is "plume contrast," which is the contrast of the hypothetical plume against the background sky or background terrain that is assumed to be immediately adjacent to the plume.

The Level 1 screening results demonstrated that there would be no exceedances inside the Class I area due to the operational conditions evaluated; therefore, Canyonlands National Park would be protected from plume blight impacts during operations activities associated with Alternative A.

3.2.2.3 *Environmental Impacts – Alternative B*

3.2.2.3.1 TOTAL CONSTRUCTION EMISSIONS

As presented in Appendix H of this document, direct and indirect construction activities would result in air pollutant emissions from equipment exhaust, including the use of drills during construction; vehicle exhaust from travel to and from the Project site; and fugitive dust from soil disturbance. Table 3-3 presents the estimated total criteria air pollutant, HAPs, and GHG emissions from Alternative B construction activities, as well as a comparison with county-level annual emissions based on calculating the total Alternative B construction emissions as a percentage of the total county emissions estimated in the 2017 National Emissions Inventory.

Table 3-3. Estimated Total Construction Emissions – Alternative B

Construction Activity	Emissions (tpy)							Emissions (metric tpy)
	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOCs	HAPs	CO_2e
Fugitive dust	–	–	–	16.04	1.60	–	–	–
Heavy equipment combustive emissions	10.63	40.26	0.74014	2.09	2.03	2.963	0.1757	4,556.03
Commuting vehicles	0.77	0.74	0.00125	119.22	11.96	0.063	0.0230	140.06
Wind erosion	–	–	–	3.79	0.57	–	–	–
Completion flaring	94.31	20.69	0.18	2.27	2.27	5.08	0.56	32,317.44
Alternative B – Total Construction Emissions	105.70	61.69	0.92035	143.41	18.43	8.106	0.7601	**37,013.53**
Emery County – Total Annual Emissions*	**14,686.00**	**18,117.00**	**5,797.00**	**7,336.00**	**1,504.00**	**14,740.00**	**3,339.00**	**15,171,711.00**
Construction Emissions Percentage of County Total	0.72%	0.34%	0.02%	1.95%	1.23%	0.05%	0.02%	0.24%

SO_x = sulfur oxides

* From 2017 National Emissions Inventory (EPA 2020)

The overall projected emissions estimate for each pollutant from the construction of the Project is small compared with the proportion each pollutant contributes to the county's annual emissions. Furthermore, this comparison is even smaller when the indirect Project construction emissions are removed from the emissions totals. The construction emissions would be temporary and transient in nature. Construction of the Project would have short-term, minor impacts on air quality.

3.2.2.3.2 TOTAL OPERATIONS & MAINTENANCE EMISSIONS

As presented in Appendix H of this document, operations and maintenance-related emissions would include vehicle exhaust from travel to and from the well pad, access road, pipeline, and the processing plant for routine inspections; combustion emissions from the turbine, fugitive emissions from piping components; working emissions from storage tanks; well workover emissions; and blowdown venting at the well pad and processing plant.

Table 3-4 presents the estimated total criteria air pollutant, HAPs, and GHG emissions from Alternative B operations activities, as well as a comparison with county-level annual emissions based on calculating the total Alternative B operations emissions as a percentage of the total county emissions estimated in the 2017 National Emissions Inventory.

Table 3-4. Estimated Total Operations Emissions – Alternative B

Operations Activity	Emissions (tpy)							Emissions (metric tpy)
	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOCs	HAPs	CO_2e
Heavy equipment combustive emissions	0.09	0.32	0.009	0.02	0.02	0.023	0.001	42.66
On-road equipment	0.65	0.12	0.0005	45.79	4.58	0.023	0.006	61.23
Turbine	3.00	4.50	1.146	1.60	0.64	7.000	0.254	36,011.83
Fugitive components	–	–	–	–	–	1.901	1.294	72.17
Water tank	–	–	–	–	–	0.129	0.013	22.98
Sump tank	–	–	–	–	–	0.050	0.005	0.00
Blowdowns	–	–	–	–	–	0.221	0.151	15.76
Workover flaring	2.10	0.46	0.004	0.05	0.05	2.329	0.012	892.88
Alternative B – Total Operations Emissions	5.84	5.40	1.159	47.47	5.30	11.68	1.737	**37,119.51**
Emery County – Total Annual Emissions*	**14,686.00**	**18,117.00**	**5,797.00**	**7,336.00**	**1,504.00**	**14,740.00**	**3,339.00**	**15,171,711.00**
Operations Emissions Percentage of County Total	0.04%	0.03%	0.02%	0.65%	0.35%	0.08%	0.05%	0.24%

SO_x = sulfur oxides

* From 2017 National Emissions Inventory (EPA 2020b)

3.2.2.3.3 NEAR-FIELD MODELING ANALYSIS

Near-field impacts to air quality would be similar to those presented in Section 3.2.2.2 for Alternative A. However, as emissions under Alternative B are slightly lower than Alternative A, impacts would also be slightly less.

3.2.2.3.4 VISIBILITY

As presented in Section 3.2.2.2, VISCREEN software was used to assess potential visibility impacts within the near-field modeling at Canyonlands National Park. The closest distance to this Class I area is approximately 6.1 miles (9.8 km) southeast of the Alternative B proposed well pad.

The visibility impacts from the construction of Alternative B were analyzed using a Level 1 screening that assumed maximum hourly emission rates of 0.166 g/s for PM_{10} and 2.723 g/s for NO_x, as determined in the Construction Emissions section. These emission rates correspond to the operation of the drill rig engines. No on-road emissions were included in the model as those emissions take place at different locations along the access road and other roads connecting the Project with Green River, Utah.

Visibility impacts from the operation of Alternative B were analyzed assuming maximum hourly emission rates of 0.0898 g/s for PM_{10} and 0.929 g/s for NO_x, as determined in the Operations Emissions section. These emission rates correspond to the estimated emissions from the operation of the well pad without accounting for on-road emissions, because those emissions would occur at different locations along the access road and other roads connecting the Project with Green River, Utah. In specific, the activities that yielded the maximum hourly emission rate included the operation of engines for well recompletion and the flaring of these emissions.

In the VISCREEN model, it is assumed that other pollutants do not substantially affect visual air quality at the source-receptor distances analyzed in the VISCREEN model. A default particle size and density and conservative meteorological conditions were assumed (i.e., extremely stable [F] atmospheric conditions and very low wind speed [1 meters/second]).

The default Level 1 screening criteria were used. In addition, a background visibility range of 259.6 km was used for the VISCREEN analysis. A review of the recently measured visual ranges (257–264 km) at Canyonlands National Park indicated that the annual average visual range of 259.6 km would be considered reasonable for a plume impact evaluation.

3.2.2.4 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, Twin Bridges would not be permitted to construct the well pad and pipeline corridor, nor would it make road improvements. No surface disturbance would occur, and air resources would not be affected. Climate change would continue as defined by current trends.

3.2.2.5 *Cumulative Effects*

Impacts from past and present actions in the analysis area are captured in the discussion of the affected environment (Section 3.2.1). No RFFAs have been identified in the analysis area. No cumulative effects to air quality, beyond the potential impacts discussed in Section 3.2.2, are expected in the analysis area.

The Moab Master Leasing Plan (MLP) far-field modeling analysis (BLM 2015) examined multiple source impacts to NAAQS and AQRVs in the planning area using the CALMET/CALPUFF dispersion modeling system. The modeling domain for this EA analysis included the near-field (within 50-km) impact area for the Project. Three years of meteorological data sets were used to evaluate year-to-year variability and how variability impacts modeled concentrations:

- **High scenario**: no aggregation of wells on pads, 9 wells drilled per year, 100% of wells go into production (232 wells), 50% dust control, and more unpaved roads

- **Medium scenario**: no aggregation of wells on pads, 9 wells drilled per year, 60% of wells go into production (140 wells), 50% dust control, and fewer unpaved roads
- **Low scenario**: aggregation of four wells per pad, 4 wells drilled per year, 60% of wells go into production (140 wells), 70% dust control, and smallest number of unpaved roads

Modeling results show no exceedances of the NAAQS for any pollutant for any of the modeled scenarios (BLM 2015). The proposed development for the Project is substantially lower than all three Moab MLP scenarios for oil and gas development. From 2015 through 2019 an average of less than 2 wells have been drilled per year in the Moab Field Office, which includes most of the Moab MLP planning area. Development of the Project in addition to existing development in the area is closest to the low scenario analyzed in the Moab MLP. On the basis of this assumption, the cumulative impacts to air quality are within the range evaluated in the Moab MLP's modeling results.

Maximum modeled concentrations at Arches and Canyonlands National Parks showed no exceedances of the NAAQS for any criteria air pollutant for any of the modeled scenarios (BLM 2015). According to these modeling results, no NAAQS exceedances would be expected from the development of Alternative A or Alternative B.

Because GHGs circulate freely throughout Earth's atmosphere, climate change is a global issue. A recent Air Resource Management Strategy 2020 Monitoring Report examined climate change impacts in Utah. It noted the Utah Roadmap: Positive Solutions on Climate and Air Quality developed by the University of Utah Kem C. Gardner Policy Institute projected future GHG emissions in Utah under a "Business as Usual" scenario and a "Planned Reduction" scenario. This roadmap set a goal to reduce GHG emissions to about 15 MMT CO2e, approximately 80% below current emissions, but noted additional action by the State of Utah was needed.

Additionally, the Monitoring Report cited the U.S. Energy Information Administration (EIA) which provides projections of energy sector GHG emissions through the year 2050. These projections noted that energy related GHG emissions are expected to decrease in the short term as the power sector transitions away from coal, but these decreases may be offset from increases in the transportation and industrial sectors in the later years. Future economic growth was noted as the biggest factor in the national GHG emissions projections.

Further, the International Panel on Climate Change developed Representative Concentration Pathways (RCP) based on the amount of radiative forcing that is projected to occur by the year 2100 if actual atmospheric concentrations of GHGs follow one of four paths (RCP2.6, RCP4.5, RCP6, and RCP8.5). The national BLM normal and high emissions scenarios track closest to RCP 8.5 in 2020 and between RCP 2.5 and RCP 4.5 in 2030. The U.S. Geological Survey National Climate Change Viewer (USGS, 2019) provides a tool that can be used to evaluate potential climate change at the state and county level based on RCPs. The BLM oil and gas lease sale EA's found these scenarios show lower amounts of snow water equivalent and runoff for all future time periods resulting in increased frequency of drought and wildfires, increased demand for water compound by a reduced water supply, and increased impacts to human health.

The proposed action may result in emissions of (0.74 MMT CO_2e) over a 20 year period which would be that 0.06% of the low (1,086.27 MMT CO2e) and 0.05% of the high (1,325.05 MMT CO2e) aggregate emissions estimates based on EIA projections for oil and gas production growth. While annual GHG operation and combustion emissions would increase statewide emissions (71.8 MMT) by 0.05% and national emissions (6,676.6 MMT) by 0.0006%. All GHGs, regardless of the source, contribute incrementally to the global climate change phenomenon. While GHG emissions resulting from individual decisions can certainly be modified or potentially prevented by analyzing and selecting reasonable

alternatives that appropriately respond to the action's purpose and need, the BLM has limited decision authority to meaningfully or measurably prevent the cumulative climate change impacts that would result from global emissions.

3.3 SOIL RESOURCES

The analysis area for soil-related issues consists of the following 10-digit hydrologic unit code (HUC-10) watersheds: Salt Wash-Green River, Moonshine Wash, Taylor Canyon-Green River, and Horseshoe Canyon. This area covers 529,837.05 acres and was chosen because it provides a distinct, natural topographic boundary in which to analyze potential impacts to soil and because it encompasses the proposed Project.

3.3.1 Affected Environment

3.3.1.1 *Emery County General Plan Existing Setting*

The analysis area occurs entirely within the Colorado Plateau ecological province. Soils of the Colorado Plateau are relatively young and undeveloped. Soil types in the analysis area were identified and described using land cover data from the State Soil Geographic (STATSGO) database and the Soil Survey Geographic (SSURGO) database, which provide spatial reference and descriptive data for soil characteristics. A total of 123 soil types are in the analysis area, and two of these soil types are specifically in the disturbance area. The two soil types identified within the disturbance area are characterized as Rock outcrop-Moffat-Moenkopie and Sheppard-Nakai-Moffat. These soils exist as a sand sheet landscape called surficial eolian deposits, which are sand deposits from parent material (Natural Resources Conservation Service [NRCS] 2020). This soil is sensitive and is considered saline and highly erodible (NRCS 2020). There are no available data for biological soil crusts in the disturbance area, though this area has high potential for them. Soils of this type may be especially vulnerable to impacts and harder to reclaim or restore after disturbance (BLM 2007b).

Past and present actions that have affected and could continue to affect soils in the analysis area include surface disturbance from oil and gas development and associated infrastructure, geophysical exploration, livestock grazing, range improvements, off-highway vehicle (OHV) use, ROW authorizations, and recreation. These activities may have resulted in short-term and long-term impacts to soils by contributing to reduced soil productivity, soil compaction, loss of biological soil crusts, soil erosion, and surface runoff. These past and present cumulative effects, along with ongoing landscape-scale phenomena including climate change and drought, could lead to a loss of soil productivity and an increase in soil erosion and soil loss in the analysis area over time.

3.3.2 Environmental Consequences

3.3.2.1 *Environmental Impacts – Alternative A*

Implementation of Alternative A would cause both temporary and permanent disturbance to soils in the analysis area. The proposed well pad would cause 5.4 acres of temporary disturbance (2.4 acres of permanent disturbance after initial reclamation) (0.0001% of the analysis area), and the proposed pipeline ROW would cause 17.8 acres of temporary disturbance (0.00003% of the analysis area). The proposed gas plant would cause 10.0 acres of permanent disturbance (0.00001% of the analysis area). There would also be permanent long-term disturbance to soil from approximately 9.9 acres of road upgrades during pipeline construction. The Project would cause 22.3 acres of permanent disturbance (0.00004% of the analysis area) and 20.8 acres of temporary disturbance (0.00003% of the analysis area), for a total of 43.1 acres of soil disturbance in the analysis area.

These disturbances could result in soil compaction, increased susceptibility to soil erosion, mixing of soil horizons, changes in soil function due to soil exposure from vegetation removal, and loss of soil productivity (ability to support vegetation). Soil types that would be disturbed are highly erodible and susceptible to wind erosion and to water erosion. Because of this susceptibility, loss of soil and soil productivity could occur in areas of surface disturbance (0.00008% of the analysis area). A loss of soil and soil productivity could reduce the health of local vegetation communities and impact the livestock and wildlife that depend on them. Restoration treatments for soil and vegetation in the drylands of the southwestern United States can be time-consuming and expensive with low success (Lovich and Bainbridge 1999). This is because drylands exist within fragile soils and are particularly susceptible to degradation (Copeland et al. 2018).

Should biological soil crusts be encountered and disturbed, it would lead to reduced soil productivity, decreased plant cover and vigor, and increased wind and water erosion. Severity, size, frequency, and timing of a surface-disturbing activity affect the degree of impacts to biological soil crusts. “Soil crust populations are degraded when mechanical disturbances such as vehicular traffic, land clearing, or trampling disturb the soil surface. While any of these disturbances may not directly eliminate soil crusts, repeated disturbance degrades and fragments crust cover and may keep it in an early successional state” (Bryce 2012:51).

The disturbance of 43.1 acres of soil represents a loss of this resource in terms of structure and function. Because of the highly saline and erodible nature of the soil, combined with the arid climate, successful reclamation would be difficult, and the loss of soil productivity may essentially be permanent, even with the proposed reclamation. However, the analysis area is generally undeveloped, and a permanent loss of soil would be relatively small (0.00008%) when compared with the total amount of soil types present in the analysis area.

3.3.2.2 *Environmental Impacts – Alternative B*

The type of impacts on soils from Alternative B would be similar to those from Alternative A; however, the location and magnitude of the impacts would be different. Implementation of Alternative B would cause both temporary and permanent disturbance to soils in the analysis area. The proposed well pad would cause 7.3 acres of temporary disturbance (3.4 acres of permanent disturbance after initial reclamation) (0.0001% of the analysis area), and the proposed pipeline ROW would cause 20.5 acres of temporary disturbance (0.00003% of the analysis area). The proposed gas plant would cause 10.0 acres of permanent disturbance (0.00001% of the analysis area). There would also be permanent long-term disturbance to soil from approximately 14.5 acres of road upgrades during pipeline construction. Implementation of the Project would cause 27.9 acres of permanent disturbance (0.00005% of the analysis area) 24.4 acres of temporary disturbance (0.00004% of the analysis area), for a total of 52.3 acres of soil disturbance in the analysis area.

3.3.2.3 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, Twin Bridges would not be permitted to construct the well pad and pipeline ROW, nor would it make road improvements. No surface disturbance to soil would occur, and there would be no permanent or temporary loss of soil. Existing, approved uses (e.g., recreation) would continue to occur that could potentially impact soils.

3.3.2.4 *Cumulative Effects*

Impacts from the past and present actions in the analysis area, defined as the Salt Wash-Green River, Moonshine Wash, Taylor Canyon-Green River, and Horseshoe Canyon HUC-10 watersheds are captured in the discussion of the affected environment (Section 3.3.1). No RFFAs have been identified in the analysis area.

Under all alternatives, the proposed development would result in surface disturbance, which would contribute incrementally to the cumulative impacts on soil from past and present actions (described in Section 3.3.1) The alternatives that would result in more surface disturbance would have a larger incremental impact cumulatively. Alternative B (52.3 acres of disturbance) is anticipated to result in the most surface disturbance associated with the gas development, followed in descending order by Alternative A (47.2 acres of disturbance) and Alternative C (0 acres of disturbance).

3.4 VEGETATION

The analysis area for vegetation-related issues consists of the Salt Wash-Green River, Moonshine Wash, Taylor Canyon-Green River, and Horseshoe Canyon HUC-10 watersheds. This area covers 529,837.05 acres and was chosen because it provides a distinct, natural topographic boundary in which to analyze potential impacts to vegetation, because vegetative connectivity is linked to watersheds, and because it encompasses the proposed Project.

3.4.1 Affected Environment

3.4.1.1 *Existing Setting*

Vegetation communities in the analysis area were identified and described using land cover data developed by the Southwest Regional Gap Analysis Project (SWReGAP), which provides spatial reference and descriptive data for characteristics of the land surface. A total of 23 land cover classes are in the analysis area, and four of these land cover classes are specifically affected by the proposed surface facilities. Affected vegetation is characterized as salt desert shrub with a high percentage (50%–75%) of bare ground. Common plant species include Mormon tea (*Ephedra* sp.*)* and blackbrush (*Coleogyne ramosissima*), often with green Mormon tea (*Ephedra viridis*), Torrey's Mormon tea (*Ephedra torreyana*), or spiny hopsage (*Grayia spinosa*). Sand sagebrush (*Artemisia filifolia*) is codominant.

Past and present actions that have affected and will continue to affect vegetation in the analysis area include surface disturbance from oil and gas development and associated infrastructure, geophysical exploration, livestock grazing, range improvements, OHV use, ROW authorizations, and recreation. These activities could result in short-term and long-term impacts to vegetation by contributing to reduced soil productivity, soil compaction, loss of biological soil crusts, soil erosion, vegetation loss and destruction, and surface runoff. Development activities would also modify the composition and structure of vegetation communities and increase the potential for the introduction or spread of invasive, nonnative plant species and noxious weeds, especially in disturbed areas and along travel corridors. These changes, along with ongoing landscape-scale phenomena including climate change and drought, would lead to an increased distribution of altered and degraded vegetation communities in the analysis area over time.

3.4.2 Environmental Consequences

3.4.2.1 *Environmental Impacts – Alternative A*

Implementation of Alternative A would cause disturbance to vegetation in the analysis area. The proposed well pad would cause 5.4 acres of temporary disturbance (2.4 acres of permanent disturbance after initial reclamation, 0.0001% of the analysis area), and the proposed pipeline ROW would cause 17.8 acres of temporary disturbance (0.00003% of the analysis area). The proposed gas plant would cause 10.0 acres of permanent disturbance (0.00001% of the analysis area). There would also be permanent long-term disturbance to vegetation from approximately 9.9 acres of road upgrades during pipeline construction. The Project would cause 22.3 acres of permanent disturbance (0.00004% of the analysis area) and 20.8 acres temporary disturbance (0.00003% of the analysis area), for a total of 43.1 acres of vegetation disturbance in the analysis area.

Effects to vegetation from the Project would consist of damage to or loss of individual plants and could, as a result, include changes to community composition (species composition and plant density) on a localized basis. Clearing would remove protective vegetative cover in a sparsely vegetated landscape and could increase soil erosion and the transport of sediment. Grading, excavation, and backfilling could result in the mixing of topsoil with subsoil and in loss and alteration of seed banks, which could result in long-term reduction of productivity and introduction of noxious and invasive weeds. Improving restoration outcomes may require selecting species to match site conditions and ameliorating environmental stressors (Fick et al. 2016). Avoiding treatments that cause soil disturbance can also assist the restoration processes (Duniway et al. 2015). The land cover class that would experience the largest acreage of disturbance would be Colorado Plateau blackbrush Mormon tea shrubland because of its abundance in the area (36.26 acres of disturbance, or 0.00006% of this land cover class in the analysis area). Colorado Plateau mixed bedrock canyon tableland would experience 4.2 acres of disturbance (0.000007% of the analysis area), and the active and stabilized dune class would experience 2.50 acres of disturbance (0.000004% of the analysis area). Restoration treatments for soils and vegetation in the drylands of the southwestern United States can be time-consuming and expensive with low success (Lovich and Bainbridge 1999). This is because drylands exist within fragile soils and are particularly susceptible to degradation (Copeland et al. 2018).

The total proposed disturbance of 43.1 acres, including temporary disturbance areas, of vegetation represents a loss of this resource in terms of structure and function. Because of the highly saline and erodible nature of the soil, combined with the arid climate, successful reclamation would be difficult, and the acres of vegetation loss may essentially be permanent, even with the proposed reclamation. However, the analysis area is generally undeveloped, and a permanent loss of vegetation would be small (0.00008%) when compared with the total amount of vegetation types present in the analysis area.

3.4.2.2 *Environmental Impacts – Alternative B*

Implementation of Alternative B would cause both temporary and permanent disturbance to vegetation in the analysis area. The proposed well pad would cause 7.3 acres of temporary disturbance (3.4 acres of permanent disturbance after initial reclamation) (0.0001% of the analysis area), and the proposed pipeline ROW would cause 20.5 acres of temporary disturbance (0.00003% of the analysis area) in the analysis area. The proposed gas plant would cause 10.0 acres of permanent disturbance (0.00001% of the analysis area). There would also be permanent long-term disturbance to vegetation from approximately 14.5 acres of road upgrades during pipeline construction. Implementation of the Project would cause 27.9 acres of permanent disturbance (0.00005% of the analysis area) and 24.4 acres of temporary disturbance (0.00004% of the analysis area), for a total of 52.3 acres of vegetation disturbance in the analysis area.

Effects to vegetation from the Project would consist of damage to or loss of individual plants and could, as a result, include changes to community composition (species composition and plant density) on a localized basis. Clearing would remove protective vegetative cover in a sparsely vegetated landscape and could increase soil erosion and the transport of sediment. Grading, excavation, and backfilling could result in the mixing of topsoil with subsoil and in loss and alteration of seed banks, which could result in long-term reduction of productivity and introduction of noxious and invasive weeds. Improving restoration outcomes may require selecting species to match site conditions and ameliorating environmental stressors (Fick et al. 2016). Avoiding treatments that cause soil disturbance can also assist the restoration process (Duniway et al. 2015). The land cover class that would experience the largest acreage of disturbance would be intermountain basins active and stabilized dunes (23.06 acres, or 0.00004% of the analysis area). Colorado Plateau blackbrush Mormon tea shrubland (21.99 acres, or 0.00004% of the analysis area) would also experience these impacts.

The disturbance of 52.3 acres, permanent and temporary use areas, of vegetation represents a loss of this resource in terms of structure and function. Because of the highly saline and erodible nature of the soil, combined with the arid climate, successful reclamation would be difficult, and the acres of vegetation loss may essentially be permanent, even with the proposed reclamation. However, the analysis area is generally undeveloped, and a permanent loss of vegetation would be relatively small (0.0001%) when compared with the total amount of vegetation types present in the analysis area.

3.4.2.3 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, Twin Bridges would not be permitted to construct the well pad and pipeline ROW, nor would it make road improvements. No surface disturbance to vegetation would occur, and there would be no permanent or temporary loss of vegetation. Existing, approved uses (e.g., recreation) would continue to occur that could potentially impact vegetation.

3.4.2.4 *Cumulative Effects*

Impacts from past and present actions in the analysis area, defined as the Salt Wash-Green River, Moonshine Wash, Taylor Canyon-Green River, and Horseshoe Canyon HUC-10 watersheds are captured in the discussion of the affected environment (Section 3.4.1). No RFFAs have been identified in the analysis area.

Under all alternatives, the projected mineral development would result in surface disturbance, which would contribute to the cumulative impacts on vegetation. The alternatives that would be anticipated to result in more disturbance associated with mineral development would have a larger contribution to the cumulative impacts on vegetation. Alternative B (52.3 acres of disturbance) is anticipated to result in the most surface disturbance associated with the gas development, followed in descending order by Alternative A (43.1 acres of disturbance) and Alternative C (0 acres of disturbance).

3.5 SPECIAL-STATUS PLANT SPECIES

3.5.1 Existing Setting

The BLM Price FO ID Team reviewed the action alternatives and the habitat requirements for special-status plant species (SSPS) and determined that four BLM sensitive species—flat-top buckwheat (*Eriogonum corymbosum* var. *smithii*), Utah spurge (*Euphorbia nephradenia*), entrada rushpink (*Lygodesmia grandiflora* var. *entrada*), and Trotter's oreoxis (*Oreoxis trotteri*)—have the potential to

occur on the affected surface lands (Appendix B). Two federally listed species—Jones cycladenia (*Cycladenia humilis* var. *jonesii*) and Navajo sedge (*Carex specuicola*)—were also evaluated and were found to be not present; suitable habitat for these species does not on the affected surface lands.

3.5.1.1 *Regulatory Framework*

The special-status species evaluated in this EA consist of 1) all federally protected (i.e., endangered and threatened) species, 2) additional species listed by the USFWS as candidate and proposed and species under review (USFWS 2020b) and 3) BLM sensitive species (BLM 2018). The BLM manages certain sensitive species that are not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future. The authority for this policy and guidance is established by the Endangered Species Act (ESA) of 1973, as amended; Title II of the Sikes Act of 1960, as amended; FLPMA; USDOI Manual 235.1.1A (USDOI 2009); and BLM Manual 6840, *Special Status Species Management* (BLM 2008c).

3.5.1.2 *Affected Environment*

At the request of BLM, SWCA Environmental Consultants (SWCA) conducted general biological resources surveys and SSPS surveys on May 25 through 29, June 10 and 24, and July 13 through 17, 2020, on behalf of Twin Bridges. The purpose of the SSPS surveys was to evaluate the potential for SSPS to occur and to identify habitat communities for SSPS regulated by the USFWS under the ESA, as well as for BLM sensitive species. The surveys also documented observed plant species for impact analysis related to habitat for game and nongame species (see Section 3.4 for vegetation analysis). SSPS surveys were conducted in accordance with BLM Price FO protocol requirements (BLM 2020a). Full survey results and protocol parameters are documented in the biological survey report on file with the BLM Price FO (SWCA 2020).

Table H-6 in Appendix H describes the special-status species considered for analysis, general results of the SSPS surveys, habitat and range description, and potential occurrence under each alternative. The potential for occurrence of a species was identified using the following categories:

- ***Known to occur***—the species was documented in the analysis either during or before the survey by a reliable observer.
- ***May occur***—the analysis area is within the species' currently known range, and vegetation communities, soils, water quality conditions, etc., resemble those known to be used by the species.
- ***Unlikely to occur***—the analysis area is within the species' currently known range, but vegetation communities, soils, water quality conditions, etc., do not resemble those known to be used by the species, or the analysis area is clearly outside the species' currently known range.

Three BLM sensitive species—flat-top buckwheat, Utah spurge, and Trotter's oreoxis—have the potential to occur in the analysis area under both action alternatives; entrada rushpink has the potential to occur under Alternative B and is known to occur in the analysis area of Alternative A. These four species are analyzed in detail in Section 3.5.2.

3.5.2 Environmental Consequences

3.5.2.1 *Analysis Methods and Assumptions*

The SSPS analysis area for each alternative is 100 meters (m) buffered from the edge of disturbance of the proposed Project footprint. Analysis is stratified by known occupied habitat and potential habitat for each species. For the purposes of this analysis, known occupied habitat is defined as habitat within 100 m of a documented SSPS occurrence, and potential habitat is defined as suitable habitat that meets all or most of a species habitat and range requirements. Impact-causing elements are vegetation clearing, surface disturbance, and fugitive dust related to construction and vehicle use.

Assumptions:

- Localized populations are naturally affected by non-human-caused factors such as climate, natural predation, disease outbreaks, natural fire regimes, and competition for available habitat from other native species.
- Climatic fluctuation (e.g., drought) would continue to influence the health and productivity of special-status species habitat annually.
- Actions affecting one analyzed species would have similar impacts on other species that use the same habitats or areas.
- Surface-disturbing activities could lead to modification (positive or negative), loss (short or long term), or fragmentation of species habitat and/or the loss or gain of individuals, depending on the amount of area disturbed, species affected, and location of the disturbance.
- Changes in air, water, and habitat quality could lead to direct impacts and could have cumulative impacts on species survival.
- In disturbed areas, reestablishment of a vegetative landscape and plant composition similar to adjacent undisturbed lands, including trees and shrubs, could take more than 100 years.
- Plant populations counts are estimates based on best-available data and informed by a presence/absence level survey protocol; undetected individuals may exist in the analysis area.

3.5.2.2 *Environmental Impacts – Alternative A*

3.5.2.2.1 FLAT-TOP BUCKWHEAT (ERIOGONUM CORYMBOSUM VAR. SMITHII), UTAH SPURGE (EUPHORBIA NEPHRADENIA) AND TROTTER'S OREOXIS (OREOXIS TROTTERI)

During the 2020 SSPS surveys, no individuals of flat-top buckwheat, Utah spurge, or Trotter's oreoxis were detected. However, potential habitat for these species occurs within the 431.7-acre analysis area. Direct impacts to potential habitat and loss associated with surface disturbance for this species' habitat would be expected on 42.7 acres. The remaining 389.0 acres would be subject to indirect impacts such as increased fugitive dust, increase soil erosion, impacts to pollinator habitat, and a potential for establishment of nonnative or invasive species (or both). Direct and indirect impacts to species' potential habitat may lead to the loss of suitability of available habitat.

3.5.2.2.2 ENTRADA RUSHPINK (LYGODESMIA GRANDIFLORA VAR. ENTRADA)

During the 2020 SSPS surveys, approximately 837 individuals of entrada rushpink were identified as both single occurrences and denser "clusters" in the Alternative A analysis area (SWCA 2020). In the analysis area, approximately 100.1 acres of occupied habitat and 331.6 acres of potential habitat exist for this species. Of the known occupied habitat, approximately 7.7 acres is in the proposed pipeline and access road ROW disturbance area.

Direct impacts and loss of individuals due to surface disturbance and vegetation clearing and loss of seed bank would occur in up to 7.7 acres of occupied habitat in the ROW corridor (7.7%). Indirect impacts to known occupied habitat outside the areas of proposed surface disturbance (92.4 acres, or 92.3% of known occupied habitat in the analysis area) may include, but are not limited to, fragmentation of habitat, increased fugitive dust from construction and vehicular traffic, impacts to associated pollinator communities, introduction of nonnative or invasive species (or both), increased soil erosion, and changes in vegetation structure or composition.

Additionally, 331.6 acres of potential habitat for this species, which includes areas suitable for occupancy if populations were to expand, would be expected to have 33.2 acres of direct impacts and loss due to surface disturbance associated with the proposed Project. An additional 296.6 acres of potential habitat may be subject to indirect impacts such as increased fugitive dust, increase soil erosion, impacts to pollinator habitat and a potential for establishment of nonnative or invasive species (or both). Direct and indirect impacts to potential habitat may result in degradation and loss of suitability characteristics of habitat surrounding known populations of this species. Direct and indirect impacts to known occupied habitat would be mitigated through the application of the applicant-committed environmental protection measure. Twin Bridges is committed to coordinating with BLM biologists to alter the road expansions and pipeline installation methods, in the proposed ROW, to minimize mortality and direct impacts to identified individuals.

3.5.2.3 *Environmental Impacts – Alternative B*

SSPS surveys in the Alternative B analysis area were negative for all target species. However, the analysis area contains approximately 485.9 acres of potential habitat for flat-top buckwheat, Utah spurge, Trotter's oreoxis, and entrada rushpink. Direct impacts to potential habitat and loss associated with surface disturbance would be expected on 52.3 acres. The remaining 433.6 acres would be subject to indirect impacts such as increased fugitive dust, increased soil erosion, impacts to pollinator habitat, and potential for establishment of nonnative or invasive species (or both). Direct and indirect adverse impacts to potential habitat may reduce the suitability of available habitat.

Alternative B would have fewer impacts to known occupied habitat of entrada rushpink, compared with Alternative A, because this species is not known to exist in the analysis area. However, given that the surface disturbance under Alternative B is approximately 18.3% (54.1 acres) larger than that under Alternative A, there would be a proportional 18.3% larger potential impact to flat-top buckwheat, Utah spurge, Trotter's oreoxis, and entrada rushpink potential habitat. Because no occurrences of the analyzed special-status species were found to occur in the Alternative B analysis area, the applicant-committed environmental protection measure is not applicable for this analysis.

3.5.2.4 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, the Twin Bridges' APDs and ROW applications would be denied, and the surface disturbance and other impacts associated with the development proposed under the action alternatives would not occur. The No Action Alternative would have no impacts on SSPS in the analysis area.

3.5.2.5 *Cumulative Effects*

Impacts from past and present actions in the analysis area, defined by the proposed Project footprint with a 100-meter buffer, are captured in the discussion of the environmental impacts (Section 3.5.2). No RFFAs have been identified in the analysis area. No cumulative effects to SSPS from Alternative A, Alternative B, or the No Action Alternative, beyond the potential impacts discussed in Section 3.5.2, are expected in the analysis area.

3.6 GENERAL WILDLIFE

3.6.1 Existing Setting

The BLM Price FO ID Team reviewed the action alternatives and potential impacts to wildlife species and determined that pronghorn (*Antilocapra americana*) is known to occur and desert bighorn sheep (*Ovis canadensis nelsoni*) have the potential to occur in and around the affected surface lands.

3.6.1.1 *Regulatory Framework*

The BLM Price FO manages habitat for wildlife, in conjunction with the Utah Division of Wildlife Resources (UDWR). UDWR, which was established as the state wildlife authority under Section 23-14-1 of the Utah Code, operates under the authority granted by the Utah Legislature in Title 23 of the Utah Code.

3.6.1.2 *Affected Environment*

SWCA conducted general biological resources surveys and SSPS surveys on May 25 through 29, June 10 and 24, and July 13 through 17, 2020, as required by the BLM Price FO. The purpose of the biological surveys was to evaluate the potential for wildlife, including special-status species, to occur and to identify habitat communities for special-status species regulated by the USFWS under Section 7 of the ESA and to identify migratory bird nests protected by the Migratory Bird Treaty Act (MBTA) of 1918 (see Section 3.7 for survey results and analysis of special-status wildlife species, including migratory birds). The surveys also documented all observed wildlife and plant species for impact analysis related to game and nongame species.

The 2020 biological surveys documented that wildlife habitat present in the biological survey areas (SWCA 2020) primarily consists of salt desert shrub with a high percentage of bare ground dominated by mormon tea and blackbrush (*Coleogyne ramosissima*) with sand sagebrush (*Artemisia filifolia*) as a significant co-dominant species (see Section 3.4). Specific wildlife species observed during the 2020 biological surveys are listed in Table 3-5.

Table 3-5. Wildlife Species Observed during the 2020 Biological Surveys

Common Name	Scientific Name
Mammals	
Bat species	Unidentified
Black-tailed jackrabbit	*Lepus californicus*
Coyote (scat)	*Canis latrans*
Desert cottontail	*Slyvlagus nuttallii*
Kangaroo rat	*Dipodomys deserti*
Pack rat (burrow)	*Neotoma* sp.
Pronghorn	*Antilocapra americana*
Striped skunk	*Mephitis*
Reptiles	
Long-nosed leopard lizard	*Gambelia wislizenii*
Birds	
Common raven	*Corvus corax*
Turkey vulture	*Cathartes aura*
Horned lark	*Eremophila alpestris*
Scrub jay	*Aphelocoma californica*

During the biological and raptor-specific surveys, no passerine or raptor nests, inactive or active, were observed on the affected surface lands. See Section 3.7.2 for further analysis regarding potential impacts to migratory birds.

3.6.1.2.1 BIG GAME

Pronghorn (Antilocapra americana)

Pronghorn can be found throughout the United States, west of the Mississippi River. In Utah, management efforts have resulted in a distribution of year-round populations throughout most of Utah's suitable desert habitat, with a statewide population estimated to be 15,695. Generally, pronghorn populations in Utah are year-round residents and do not participate in large seasonal migratory movements (UDWR 2017). UDWR (2017) estimates the current pronghorn population to be approximately 1,040 within the San Rafael North Game Management Unit (GMU 12), which encompasses approximately 1,077,239 acres in the state. Both action alternatives would be within year-round substantial habitat, as mapped by UDWR (2017).

In Utah, this species is primarily associated with shrub-steppe habitat and prefers large open areas and rolling or flat terrain due to its reliance on keen eyesight and swift movement to avoid predators (UDWR 2017; BLM 2008a). Habitat requirements of this species are primarily based on the availability of forb and grass forage, as well as the presence of water sources (UDWR 2017; NatureServe 2020). During the desert wet season when forage is readily available, pronghorn have been observed to occupy habitat greater than 4 miles from their primary water source. However, during the dry season, pronghorn require approximately 3 liters of water or greater for survival (UDWR 2017). This species' breeding season is from mid-September to early October, with births occurring primarily in May to early June (NatureServe 2020).

Stability of Utah's pronghorn populations greatly depends on the size and quality of available habitats to meet nutritional needs. Pronghorn habitat fragmentation and degradation in Utah is related to increased frequency of wildfire exacerbated by invasive species, including cheatgrass (*Bromus tectorum*); encroachment of shrubland plant communities into grasslands; vegetation community changes due to drought; overgrazing; fencing; and anthropogenic development (UDWR 2017).

Habitats for big-game and nongame species in the analysis area are delineated by UDWR. In developing and mapping big-game habitats, UDWR designates season of use (e.g., summer, winter, fawning) and habitat importance (i.e., substantial or crucial). Crucial habitat is defined as habitat essential to the life-history requirements of the species for which it was designated. UDWR periodically reviews these habitat areas through coordination with the various land management agencies and revises habitat boundaries as needed.

Desert Bighorn Sheep (*Ovis canadensis nelsoni*)

Bighorn sheep are native to western North America and inhabit some of the most remote and rugged parts of the Colorado Plateau (UDWR 2018). Both subspecies of bighorn sheep are native to Utah and are found within their respective suitable habitat throughout the state.

Desert bighorn sheep are uniquely adapted to inhabit remote and rugged parts of the Colorado Plateau. Suitable habitat for this species is characterized by rugged terrain, including canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches (Shackleton et. al. 1999; UDWR 2018). Desert bighorn populations are found primarily in the southern half of the state and are generally year-round residents without distinct seasonal migratory patterns (UDWR 2018). This subspecies' breeding season is from August to November, with calving occurring from February to May (UDWR 2018).

UDWR (2018) estimates that the current population of desert bighorn sheep in Utah is approximately 2,900. Within the San Rafael North GMU, the population was last estimated to be 124 individuals, as of 2015 (UDWR 2018).

UDWR has identified areas of bighorn sheep year-long crucial and substantial habitat. These areas are generally related to the steep canyons associated with Labyrinth Canyon along the Green River and various side canyons, including Horseshoe, Keg Spring, and Three Canyons (UDWR).

3.6.2 Environmental Consequences

3.6.2.1 *Analysis Methods and Assumptions*

Noise disturbance, increased vehicle traffic, and loss of available habitat are the impact-causing elements that could deter wildlife populations, including populations of desert bighorn sheep and pronghorn, to use suitable habitat in the analysis area. The analysis area is the 1,077,239-acre boundary of the San Rafael North GMU. Although the majority of the analysis area is on BLM land, the UDWR manages these species populations in coordination with federal agencies. The analysis discusses the potential impacts to general wildlife habitat, as well as populations of desert bighorn sheep and pronghorn populations.

Assumptions:

- Localized populations are naturally affected by non-human-caused factors such as climate, natural predation, disease outbreaks, natural fire regimes, and competition for available habitat from other native species.
- Climatic fluctuation (e.g., drought) would continue to influence the health and productivity of special-status species habitat annually.

- Actions affecting one analyzed species would have similar impacts on other species that use the same habitats or areas.
- Surface-disturbing activities could lead to modification (positive or negative), loss (short or long term), or fragmentation of species habitat and/or the loss or gain of individuals, depending on the amount of area disturbed, species affected, and location of the disturbance.
- Changes in air, water, and habitat quality could lead to direct impacts and could have cumulative impacts on species survival.
- The total amount of new surface disturbance allowed by an alternative is a good index of potential impacts to wildlife species. Success of reclamation measures prescribed as a condition of development is unknown, and the potential impact of surface disturbance on special-status species populations could be underestimated.
- In disturbed areas, reestablishment of a vegetative landscape and plant composition similar to adjacent undisturbed lands, including trees and shrubs, could take more than 100 years.

3.6.2.2 *Environmental Impacts – Alternative A*

3.6.2.2.1 GENERAL WILDLIFE

Impacts to plant communities and wildlife habitats from the construction of the proposed Project would include 33.2 acres of direct impacts from vegetation removal on BLM-managed surface lands. Direct impacts would occur during site preparation and would continue until revegetation of the affected surface lands is achieved following reclamation efforts and natural re-establishment of desert plant communities (see Appendix G of this document for reclamation details; see also Figure F-2 in Appendix F).

Direct impacts to wildlife would include the removal or crushing of existing vegetation, increased risk of mortality related to increased vehicular traffic, loss or degradation of native habitat, and displacement of wildlife species from birthing/roosting and foraging areas. The aforementioned direct impacts are attributed to activity higher than baseline levels due to construction and operation of the proposed Project, increased human activity including vehicle use, and associated noise disturbance (see Appendix G).

Noise disturbance could impact wildlife by interfering with animals' abilities to detect important sounds or by posing an artificial threat to animals (Clinton and Barber 2013). Construction equipment associated with the proposed Project would result in short-term elevated noise levels up to 100 decibels (dB). However, standard operation activities of the well pad and facility site would result in an estimated 68 dB and 75 dB, respectively. Currently, the noise profile of the surrounding area is characterized by the wilderness area and the existing recreational access road and is not proximal to existing mineral development infrastructure, which would change with development of the proposed Project. Indirect impacts on vegetation and habitat would occur from deposition of fugitive dust generated during vegetation clearing and grading activities, from the use of access roads, and from wind and water erosion of exposed soils. This could reduce photosynthesis and productivity, increase water loss in plants near the affected surface lands (Eveling and Bataille 1984), and result in injury to leaves. Localized fugitive dust could be generated from the large areas of disturbed soil from blading associated with construction. Plant community composition would be altered proportionally to the proposed vegetation removal on 33.2 acres. Additionally, any surface disturbance could increase the establishment of new populations of invasive, nonnative species. Noxious weed seed could be carried to and from the affected surface lands by construction equipment and transport vehicles. Mitigation measures to control the spread of weeds would be negotiated with the Price FO. Changes to plant populations and community composition, including establishment of nonnative or noxious weeds, may lead to a variation in availability of suitable habitat.

Disturbance of 33.2 acres associated with the proposed action would result in direct loss of vegetation and available forage and may contribute to habitat fragmentation and mortalities for present wildlife species. However, the 33.2 acres accounts for less than 0.01% of the available habitat in the analysis area and is not likely to result in significant loss of suitable habitat or available forage for general wildlife species due to the availability of adjacent habitat.

3.6.2.2.2 BIG GAME

Primary direct impact concerns related to big-game species are associated with reduction of suitable habitat, behavior changes due to noise disturbance, and mortality related to vehicular collisions.

The affected surface lands are located in UDWR-designated substantial year-round habitat for pronghorn and crucial year-round habitat for desert bighorn sheep (UDWR 2017, 2018). The area is considered to be known occupied habitat for pronghorn because this species was observed during the 2020 biological survey of the analysis area (see Table 3-5). The affected surface lands also contain suitable foraging habitat for desert bighorn sheep; however, preferred canyon and cliff habitat occurs approximately 416 m southeast of the proposed well-pad location in Keg Spring Canyon. Under Alternative A, approximately 33.2 acres (less than 0.01% of the analysis area) of new surface disturbance would result in a reduction to available foraging habitat for big-game species, as well as a reduction in crucial desert bighorn sheep habitat that has been modeled in association with Keg Spring Canyon.

In the southwestern United States, bighorn sheep and pronghorn have been evaluated for impacts and behavioral change from anthropogenic noise activities (Jansen et al. 2009; Berger et al. 2007). In the presence of mineral development activities, bighorn sheep have been known to habituate to predictable anthropogenic activities (such as vehicular traffic, construction, and consistent increased noise); however, when immediately proximal to disturbance, they have exhibited, in some cases, increased “vigilance time” but were not deterred from foraging locations (Jansen et al. 2009; Berget et al. 2007). While acclimation to anthropogenic activities would decrease potential long-term displacement and loss of habitat, the potential for indirect impacts of vehicular collision mortality would increase with increased traffic and activity related to the Project.

While big-game species, such as desert bighorn sheep and pronghorn, do not have specific wildlife management noise disturbance tolerance thresholds, increased noise disturbance above ambient levels could impact ungulate wildlife species, at least until the point at which adjacent populations acclimate to increased anthropogenic disturbance such as vehicular traffic, construction noise, and drilling activities.

Under this alternative, construction activities would be conducted between November 1 and February 28, unless otherwise authorized by the BLM (see Appendix G). The timing restriction would reduce the period during which impacts related to construction activities, such as noise and increased vehicular traffic, would occur. Because construction activities are the primary concern as a source for high noise disturbance, the timing limitation would result in the greatest potential for noise impacts to occur outside of the breeding season for pronghorn and during only 25% (November) of the desert bighorn sheep breeding season. For each of these species, breeding season increases the vulnerability to impacts associated with displacement in suitable and crucial habitat because that is when dispersed males congregate and compete to establish dominance and breeding rights with nearby females (UDWR 2017, 2018). Due to the applicant-committed environmental protection measures designed around MSO breeding season, the initial proposed Project construction period (November 1–February 28) would occur outside of the pronghorn calving period and during only 25% (February) of the desert bighorn sheep calving season. The timing restriction placed on construction activities would reduce the potential for noise impacts to affect big-game species during reproductive seasons following initial establishment of the proposed Project. Operational activities associated with the proposed Project may lead to avoidance of the immediate vicinity until localized populations become accustomed to the activity and noise levels

(Jansen et al. 2009; Berget et al. 2007). This level of disturbance is not likely to lead to a loss of viability of populations due to the availability of adjacent suitable habitat and likelihood for acclimatation of localized populations to long-term operational activities.

3.6.2.3 *Environmental Impacts – Alternative B*

3.6.2.3.1 GENERAL WILDLIFE

Impacts to plant communities and wildlife habitats from the construction of the proposed Project would include 37.8 acres of direct impacts from vegetation removal on BLM-managed surface lands. Direct impacts would occur during site preparation and would continue until revegetation of the affected surface lands is achieved following reclamation efforts and natural re-establishment of desert plant communities. Under Alternative B, approximately 3.9 acres of the proposed well-pad location would be reclaimed during interim reclamation (Appendix G) for reclamation details; see also Appendix F, Figure F-3). Direct and indirect impacts to general wildlife from Alternative B would be similar to those described under Alternative A (see Section 3.6.2.2.) However, under Alternative B, the increased footprint size required to access and construct infrastructure would result in more surface disturbance (approximately 4.6 acres or 12.1% larger), compared with that under Alternative A (Appendix F, Figure F-2). Because of increased surface disturbance under Alternative B, the proposed Project would result in proportionally (12.1%) more direct and indirect impacts to wildlife species, compared with those described under Alternative A.

3.6.2.3.2 BIG GAME

The affected surface lands are located in UDWR-designated substantial year-round habitat for pronghorn and crucial year-round habitat for desert bighorn sheep (UDWR 2017, 2018). The area is considered to be known occupied habitat for pronghorn because this species was observed during the 2020 biological survey of the analysis area (see Table 3-5). The area also contains suitable foraging habitat for both species; however, preferred canyon and cliff habitat occurs approximately 470 m east of the proposed well-pad location, with Keg Spring Canyon occurring approximately 1,251 m east. Under Alternative B, approximately 37.8 acres of new surface disturbance (less than 0.01% of the analysis area) would result in a reduction to available foraging habitat for big-game species, as well as a reduction in crucial desert bighorn sheep habitat, which has been modeled in association with Keg Spring Canyon.

The type of noise impacts would be similar to those described under Alternative A; however, because the proposed Project footprint would result in approximately 12.1% greater surface disturbance, and approximately the same geographic extent of noise impacts related to construction activities and noise disturbance due to the same amount of required infrastructure and access would be expected (see Sections 2.2–2.3).

The primary difference in direct and indirect impacts analyzed for big-game species under Alternative B is the lack of applicant-committed timing restrictions related to Mexican spotted owl habitat. Due to the increased distance from suitable modeled nesting habitat, measures related to Mexican spotted owl breeding season are not necessary under this alternative and thus do not provide the same secondary protection to big-game breeding seasons during the initial year of development. Under this alternative, construction and drilling operations have the potential to occur year-round following approval of Twin Bridges' APDs and ROW applications. Thus, impacts from noise disturbance and increased vehicle traffic from Project activities could occur during pronghorn and desert bighorn sheep reproductive seasons. This would increase the likelihood of adverse impacts to these species' reproductive success, compared with that under Alternative A. However, this level of disturbance is not likely to lead to a loss of viability of populations due to the availability of adjacent suitable habitat and likelihood for acclimatation of localized populations to long-term operational activities.

3.6.2.4 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, the Twin Bridges' APDs and ROW applications would be denied, and the surface disturbance and other impacts associated with the development proposed under the action alternatives would not occur. The No Action Alternative would have no impacts on wildlife, including big game in the analysis area.

3.6.2.5 *Cumulative Effects*

Impacts from past and present actions in the cumulative effects analysis area, defined as a 1-mile buffer around the proposed developments, are captured in the discussion of the environmental impacts (Section 3.6.2). A 1-mile buffer was selected as the cumulative effects analysis area because this area would include the extent of all direct and indirect impacts on wildlife and wildlife habitat anticipated from the Project. No RFFAs have been identified in the analysis area. No cumulative effects to wildlife, including big game, from Alternatives A or B or the No Action Alternative, beyond the potential impacts discussed in Section 3.6.2, are expected in the analysis area.

3.7 SPECIAL-STATUS WILDLIFE SPECIES

3.7.1 Existing Setting

The Price FO ID Team reviewed the action alternatives locations and habitat requirements for special-status wildlife species included in Appendix H, and determined that one USFWS threatened species, Mexican spotted owl (*Strix occidentalis lucinda*), and five BLM sensitive species had the potential to occur within the species' respective analysis areas. BLM also determined that detailed analysis of potential impacts to migratory birds and raptor species would be required (BLM 2020d).

Under all action alternatives, the proposed Project would source water from existing water rights entities and does not propose any action that would further deplete water in the Colorado River or its tributaries. Thus, all alternatives would result in a USFWS effects determination of **No Affect** due to lack of suitable habitat for aquatic species within proximity of the proposed Project location and no impacts to water availability. Therefore, BLM determined that detailed analysis of potential impacts to aquatic species within the Colorado River Basin would not be required (BLM 2020d).

3.7.1.1 *Regulatory Framework*

The special-status species evaluated in this EA consist of 1) all federally protected (i.e., endangered and threatened) species, 2) additional species listed by the USFWS as candidate and proposed and species under review (USFWS 2020), and 3) BLM sensitive species (BLM 2018). The BLM manages certain sensitive species that are not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future. The authority for this policy and guidance is established by the ESA, as amended; Title II of the Sikes Act, as amended; FLPMA; USDOI Manual 235.1.1A (USDOI 2009), and BLM Manual 6840 (BLM 2008c).

3.7.1.1.1 MIGRATORY BIRD TREATY ACT

Most bird species are protected by the MBTA, which implements various treaties and conventions between the United States and other countries for the protection of migratory birds. Under the MBTA, unless permitted by regulations, it is unlawful to 1) pursue, hunt, take, capture, or kill; 2) attempt to take,

capture, or kill; and 3) possess, offer to sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried, or received, any migratory bird, part, nest, egg, or product, manufactured or not. USFWS regulations broadly define "take" under the MBTA to mean "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." Under the MBTA, "take" does not include habitat loss or alteration.

3.7.1.1.2 BALD AND GOLDEN EAGLE PROTECTION ACT

In addition to protection under the MBTA, bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are also protected under the Bald and Golden Eagle Protection Act (BGEPA). The BGEPA prohibits anyone from taking, possessing, or transporting any eagle or eagle parts (including nests, eggs, feathers, etc.) without prior authorization. This includes both active nests and inactive nests. Activities that directly or indirectly lead to take are prohibited without a permit.

3.7.1.2 *Affected Environment*

Table 3-3 in Appendix H of this document describes the special-status species considered for analysis, general results of the species-specific surveys, habitat and range description, and potential occurrence under each alternative. The potential for occurrence of a species was identified using the following categories:

- ***Known to occur***—the species was documented in the analysis either during or before the survey by a reliable observer.
- ***May occur***—the analysis area is within the species' currently known range, and vegetation communities, soils, water quality conditions, etc., resemble those known to be used by the species.
- ***Unlikely to occur***—the analysis area is within the species' currently known range, but vegetation communities, soils, water quality conditions, etc., do not resemble those known to be used by the species, or the analysis area is clearly outside the species' currently known range.

3.7.1.2.1 MIGRATORY BIRDS

Suitable nesting habitat for migratory birds is present throughout the affected surface lands, as evidenced by avian activity and the presence of passerine, corvid, and raptor species. During biological surveys that were completed to support the Project, no active or inactive passerine or corvid nests were identified within the analysis area.

3.7.1.2.2 RAPTORS

Bald eagles and golden eagles are protected under the MBTA and the BGEPA. Bald eagles are found typically in association with water and nest and breed from October to July throughout the Southwest. Golden eagles nest primarily on rock ledges or cliffs and occasionally in large trees at elevations ranging from 4,000 to 10,000 feet above mean sea level. Golden eagles are typically found in mountainous regions of open country, prairies, arctic and alpine tundra, open wooded areas, and barren areas. Both bald and golden eagles are carnivores. Bald eagles prey on fish but also on mammals, especially prairie dogs (*Cynomys* sp.). Golden eagles feed mainly on small mammals, as well as invertebrates, carrion, and other wildlife (Stahlecker and Walker 2010). During biological surveys completed to support the Project, no active or inactive passerine or corvid nests were identified within the analysis area; however raptors were determined to have the potential to occur due to the presence of suitable foraging habitat within the affected surface lands (BLM 2020d).

3.7.1.2.3 BAT SPECIES

Four additional BLM sensitive species—fringed myotis (*Myotis thysanodes*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Corynorhinus townsendii*), and western red bat (*Lasiurus blossevillii*)—have the potential to occur on the affected surface lands due to the presence of suitable foraging habitat (BLM 2020d).

3.7.1.2.4 KIT FOX

The kit fox most often occurs in open prairie, plains, and desert habitats with a home range of approximately 11km^2 (4.2 mi^2). This species is a meso-carnivore which opportunistically eats small mammals (primarily rabbits and hares), small birds, invertebrates, and plant matter (List and MacDonald 2006). The species is primarily nocturnal, but individuals may be found outside their dens during the day. This species was determined to have the potential to occur on the affected surface lands due to the presence of suitable den and foraging habitat (BLM 2020d).

3.7.1.2.5 MEXICAN SPOTTED OWL

The Mexican spotted owl is one of the largest owl species of North America and one of three subspecies of spotted owl that are geographically delineated. The species habitat range covers the southwestern states of Arizona, Utah, Colorado, New Mexico, and Texas, and south to central Mexico (USFWS 2004). Mexican spotted owl is found in the southern and eastern parts of Utah on the Colorado Plateau, where it is a rare permanent resident.

Across the species' range, the Mexican spotted owl normally occupies old-growth forest in mixed conifer, pine-oak woodland, deciduous riparian, or a combination of these habitats that will support a home range of 1,400 to 4,500 acres (USFWS 2012). Habitat also typically has a structured canopy, a perennial water source, and a rodent-dominated prey base of adequate size. In Utah, however, breeding owls primarily inhabit deep, steep-walled canyons and hanging canyons. These canyons typically are surrounded by terrain that does not appear to provide nest/roost habitat but may provide foraging habitat for owls (USFWS 2012). Mexican spotted owl home ranges include activity centers that represent concentrated use areas for nesting, roosting, and foraging. Proximal areas to roosting must provide extensive foraging opportunities with dietary preferences relying on small mammals such as mice, woodrats, and voles (NPS 2010). Adult birds are faithful to their nesting sites and return year after year to breed in the same location.

The Mexican spotted owl (*Strix occidentalis lucida*) was listed as threatened under the ESA on March 16, 1993 (*Federal Register* 58:14248). Critical habitat originally was designated on March 16, 1993 (*Federal Register* 58:14248), and subsequently revoked on March 25, 1998 (*Federal Register* 63:14378). Critical habitat was designated again on February 1, 2001 (*Federal Register* 66:8530) and further revised to its current extent on August 31, 2004 (*Federal Register* 69:53181). Designated critical habitat is located in Utah, Colorado, Arizona, and New Mexico.

The primary threat to Mexican spotted owls in the United States is the risk of stand-replacing wildfire (USFWS 2012). However, fire is not a landscape-scale threat to Mexican spotted owl habitat on the Colorado Plateau, as the cliff and canyon habitat experiences a very low incidence and extent of stand-replacing fire (USFWS 2012).

3.7.2 Environmental Consequences

3.7.2.1 *Analysis Methods and Assumptions*

Noise disturbance, increased vehicle traffic, and loss of available habitat are the impact-causing elements that could deter special-status wildlife populations from inhabiting or using suitable habitat in the analysis area. Because of the uniqueness of each species' habitat and range requirements, the analysis areas are specific to the species or management concern.

Assumptions:

- Localized populations are naturally affected by non-human-caused factors such as climate, natural predation, disease outbreaks, natural fire regimes, and competition for available habitat from other native species.
- Climatic fluctuation (e.g., drought) would continue to influence the health and productivity of special-status species habitat annually.
- Actions affecting one analyzed species would have similar impacts on other species that use the same habitats or areas.
- Surface-disturbing activities could lead to modification (positive or negative), loss (short or long term), or fragmentation of species habitat and/or the loss or gain of individuals, depending on the amount of area disturbed, species affected, and location of the disturbance.
- Changes in air, water, and habitat quality could lead to direct impacts and could have cumulative impacts on species survival.
- Impacts to special-status species could be more significant than impacts to non-special-status species.
- The USFWS would be consulted on any action that could affect any listed plant, fish, or wildlife species or their habitat. Consultation with the USFWS, as required by the ESA, would ensure additional protection for special-status species and mitigation of impact from the proposed Project. The USFWS would have jurisdiction over the management of federally listed plant, fish, and wildlife populations, critical habitat, and migratory birds.
- The total amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special-status species. Success of reclamation measures prescribed as a condition of development is unknown, and the potential impact of surface disturbance on special-status species populations could be underestimated.
- In disturbed areas, reestablishment of a vegetative landscape and plant composition similar to adjacent undisturbed lands, including trees and shrubs, could take more than 100 years.
- Noise levels in the analysis area could be impacted by noise from mineral development, including equipment use and vehicle noise associated with well-pad and associated infrastructure construction, well drilling and completion, wellhead operation, and operation and maintenance activities.
- Noise level analysis utilizes estimated dB levels for construction and operation activities provide by Twin Bridges and are based on anticipated equipment.
- Noise level analysis assumes single point source location noise levels. Interaction of multiple source locations was not modeled.
- Noise-level analysis does not account for changes in topography within the vicinity of the Project location.

Conditions of Approval:

- In consultation with the BLM no drilling, completion, or well testing activities would occur within 0.5 mile of Mexican spotted owl habitat during the nesting season (March 1–October 31). These activities would be conducted between November 1 and February 28 unless and until a complete survey has been conducted, no owls have been documented, and permission is granted by the authorized officer following consultation with the U.S. Fish and Wildlife Service (USFWS).

During construction and operation activities, noise monitoring would be conducted at the boundary of Keg Spring Canyon (Mexican spotted owl modeled habitat) per agreed upon applicant, BLM and USFWS monitoring protocol to ensure disturbance does not exceed 68 A-weighted decibel (dBA) per the Mexican Spotted Owl Recovery Plan. If exceedances above 68 dBA are detected, appropriate measures will be taken to mitigate noise to below 68 dBA. The monitoring protocol would be in effect unless and until the species-specific survey protocol is completed, until no owls have been documented, and permission is granted by the authorized officer following consultation with the USFWS.

3.7.2.2 *Environmental Impacts – Alternative A*

3.7.2.2.1 MIGRATORY BIRDS

In general, no major or long-term effects on migratory birds are anticipated from the implementation of the proposed Project. Construction disturbance within 42.7 acres could lead is not likely to lead to incidental mortality or displacement of migratory birds as no active or inactive nests were found during the 2020 biological survey, if present. If migratory birds did occur during later Project phases, they would likely move into adjacent habitat in response to vegetation removal. Adult migratory birds would not likely be directly harmed by the proposed Project because of their mobility and ability to avoid areas of human activity.

If feasible, vegetation removal associated with the proposed Project would occur outside the migratory bird breeding season (March 1–August 31). Any vegetation removal during the breeding bird season could be preceded by preconstruction nesting surveys up to 7 days prior to vegetation removal to identify any occupied nests. If active nests are located during the surveys, avoidance buffers (as determined by the BLM Price FO) would be established around occupied nests or construction would not begin until young birds have fledged. If preconstruction nesting surveys are conducted and do not find any active nests then, it is assumed that construction could begin between March 1 and August 31 without directly harming eggs, nestlings, or active nests.

3.7.2.2.2 RAPTOR SPECIES

Activities on the affected surface lands are not expected to impact bald or golden eagles because the area lacks suitable nesting habitat for these two species (SWCA 2020). Adult eagles would not likely be directly harmed by the proposed Project because of their mobility and ability to avoid areas of human activity. During the 2020 raptor surveys, no raptor species or active/inactive nests were observed within a 0.5-mile buffer of the affected surface lands and one turkey vulture was observed in flight (SWCA 2020). Thus, no impacts to raptor species, other than a general reduction of available foraging habitat proportional to the 42.7 acres of new surface disturbance, would be expected under Alternative A.

3.7.2.2.3 BAT SPECIES

The proposed Project is located approximately 416 meters northwest from the edge of Keg Springs Canyon where suitable cliff and canyon roosting habitat is present. At the base of Keg Springs Canyon riparian vegetation is present and may provide suitable roosting habitat for Western Red bats, a tree

roosting species. The affected surface lands and biological survey area does not provide roosting habitat and proposed Project activities are not expected to impact availability or likelihood of use of this habitat in proximity to the proposed Project. The affected surface lands does contain vegetation communities in which these species are known to utilize for foraging purposes. However, as these species utilize nocturnal and/or crepuscular foraging periods, daytime activities such as construction, operation, and vehicle use are not expected to interfere with bat behavioral patterns or availability of food sources.

The Proposed Action is not anticipated to cause long-term impacts to bat species with potential to occur or their habitat due to the availability of adjacent suitable foraging habitat. The Alternative A proposed action may impact individuals or localized foraging habitat (42.7 acres) but would not likely contribute to a trend toward federal listing or cause a loss of viability to the populations or species.

3.7.2.2.4 KIT FOX

The proposed Project contains suitable foraging habitat for small mammal prey species for the kit fox due to the presence of desert habitat. During the 2020 biological surveys, no kit fox dens or sign of species occupancy were observed (SWCA 2020). Similar to general wildlife, direct impacts to kit fox would include the removal or crushing of existing vegetation, burrow collapse, increased risk of mortality related to increased vehicular traffic, loss or degradation of native habitat, and displacement of individuals from burrows, birthing locations, and foraging areas. The aforementioned direct impacts are attributed to activity higher than baseline levels due to construction and operation of the proposed Project, increased human activity including vehicle use, and associated noise disturbance. However, as this species is primarily nocturnal risk of displacement due to increased activity and risk of mortality from vehicular collision is reduced. Additionally, as no dens are present within the biological survey area, no impacts to kit fox reproduction or occupied burrows is expected due to the proposed surface disturbance.

The Alternative A proposed action is not anticipated to cause long-term impacts to the kit fox or its habitat because of the availability of adjacent suitable habitat. The proposed Project may impact individuals or localized reduction of available foraging habitat proportional to the 42.7acres of new surface disturbance expected under Alternative A, less than 0.01% of an average kit fox home range (List and MacDonald 2006). The proposed Project is not likely to contribute to a trend toward federal listing or cause a loss of viability to the population or species as this species home range typically extends.

3.7.2.2.5 MEXICAN SPOTTED OWL

Under Alternative A, the proposed well pad is located approximately 416 meters northwest from the boundary of Keg Springs canyon which has been previously mapped as potential Mexican Spotted Owl nesting habitat (Willey 1995, 2002). The desert shrubland surrounding the canyon also meets requirements for foraging habitat for owls by providing populations of small mammal prey species. No MSO protected activity centers have been designated by the USFWS in proximity to the proposed Project.

Due to the well pad's proximity of the Alternative A proposed Project location to previously mapped-suitable habitat and that the well pad represents the potentially significantly large noise disturbance, a species-specific survey protocol for Mexican Spotted Owl was initiated in 2020. An initial habitat suitability study was conducted on May 26, 2020 to verify the suitability of modeled habitat in Keg Springs Canyon and within 0.5 miles of the analysis area. The suitability survey confirmed suitable nesting habitat in Keg Springs Canyon and three survey call locations were established following USFWS Mexican Spotted Owl Recovery Plan Survey Protocol (SWCA 2020; USFWS 2012). Per the survey protocol, the first year of survey was done by completing four calling sessions at established suitable habitat locations May–August 2020 (SWCA 2020). The 2020 species-specific survey results were

negative with no detection of owls within the survey area. The proponent has committed to conducting year two surveys per the USFWS protocol in 2021 to confirm the suitable habitat is unoccupied. Due to the in-progress survey protocol, the following analysis assumes there is potential for current MSO occupancy of Keg Springs Canyon. Following the execution of the USFWS MSO Recovery Plan Survey Protocol, if surveys are negative and confirm lack of presence of MSO within the Keg Springs Canyon, the following potential impacts would not apply to existing MSO populations.

Noise disturbance was determined to have the greatest a potential impact to MSO habitat suitability and is further analyzed in detail below. As there is expansive desert shrubland vegetation available for foraging within the analysis area, the reduction of 42.7 acres of new surface disturbance is not expected to impact available prey populations.

Mexican spotted owls are sensitive to noise-producing anthropogenic activities because their natural behavior relies heavily of auditory communications during nocturnal breeding and foraging habits (USFWS 2012). MSO utilize calls for pair communication, "territorial defense, feeding nestlings, and post-fledging activities" (USFWS 2012). As described in the 2012 Mexican Spotted Owl Recovery Plan, infrequent noise-producing activities are assumed to have little long-term adverse impacts to owls, however long-term noise pollution may impact individuals or isolated populations and/or may reduce habitat suitability (USFWS 2012). However, noise disturbance can result in behavioral changes such as flushing from perch locations and altered nesting and roosting activities which may then increase threat to predation and/or heat-related stress (USFWS 2012). Research related to distance and noise levels that may alter owl behavior found that greater distance from the point source location led to less reactionary behavior, with close noise resulting in greater flushing and behavioral change (Pater et al. 2009; USFWS 2012). Quantified level at which owl sensitivity increases has been shown to be approximately 72.3 dB (69 dBA), however no studies have been conducted on the influence of habitat type (canyon vs. forest) on level of behavioral response of owls (USFWS 2012). The nature of canyon habitat may also amplify noises and inherently may have less locations suitable for MSO nesting and roosting with adequate thermal protection compared to densely forested habitat.

Due to the remote location of the proposed Project the soundscape is likely similar to that recorded in nearby Canyonlands National park, with an ambient sound level of 20-28 dB with natural sound predominating and human-caused noise such as aircraft overflights or vehicular traffic creating distinct noise events (Abrose and Burson 2004). The soundscape between the flat desert area of the affected surface lands, which is sparsely vegetated, and Keg Springs Canyon may vary due to an increase in riparian vegetation and topography within the canyon. Proposed activities including concentrated construction activity and operations of the facility and well pad would result in point sources of noise. Noise levels from point sources would decrease by 6 dBA for every doubling of the distance away from the source following noise attenuation principles (ANSI 2018; MAS Environmental 2006). The following noise impact analysis utilized the conservative ambient baseline level of 20 dB due to the remote nature of the analysis area. However, the existing access road which overlaps a portion of the proposed Project is known to be utilized by recreationalists and has existing vehicular traffic that would intermittently increase noise levels above the 20 dB baseline value (see Section 3.8 for further information on recreation).

It is estimated that Project construction with standard equipment would produce a short-term level of 100 dB at the construction site reaching the ambient background level (approximately 20 dBA) beyond an approximate distance of 9.1 km (ANSI 2018; OMNI 2020)). During construction of the well pad (closest to the canyon), attenuated noise from equipment would be approximately 46.8 dB (OMNI 2020). The primary point source locations for long-term operational noise would be the well pad and the proposed processing facility. It is estimated that operational activities at the facility site would average 75 dBA and the well pad operational activities would average 68 dBA at the point source location. The proposed

facility site location is located approximately 5,736 meters from the boundary of Keg Spring Canyon MSO habitat. Assuming standard topography noise attenuation, the operational noise would dissipate to 20 dB approximately 514 meters from the facility location (ANSI 2018; OMNI 2020). At the boundary of the canyon, the noise disturbance from the facility site would attenuate to well below the ambient noise levels (ANSI 2018; MAS Environmental 2006). The Alternative A well pad location is located approximately 416-meters from the boundary of Keg Spring Canyon. Assuming standard topography noise attenuation, the operational noise would dissipate from 68 dBA to a baseline noise level of 20 dBA approximately 230 meters from the edge of the well pad (ANSI 2018, OMNI 2020). At the boundary of the canyon, the noise disturbance would be approximately 14.8 dB and below the ambient noise level (ANSI 2018; OMNI 2020).

The noise disturbance related to the proposed action would occur first during the construction phase of the proposed Project and then during the following operational phases. As the construction noise level of 100 dBA at the point source would be at an impactful level above 69 dBA at the intersection with Keg Spring Canyon. During the operational phases on the proposed Project, two-point locations for long-term noise point source locations are proposed. However, noise from the facility site and well pad would dissipate to the level of ambient sound prior to reaching the edge of Keg Springs Canyon habitat and is not expected to lead to disturbance of present owls or decrease the suitability of the habitat for future nesting/roosting purposes. As the level noise disturbance leading of significant change in MSO behavior is approximately 69 dBA (comparable to noise output from a vacuum cleaner), the level of long-term noise proposed is not likely to lead to an increase in flushing behavior or incremental and general behavior changes of MSO, if present, related to choice of nest locations and success of communication activities between individuals.

To avoid any potential impacts to MSO and their habitat, the Alternative A proposed action includes species-specific applicant-committed environmental protection measures. Under the timing restriction environmental protection measure and BLM condition of approval, construction and operation activities would be conducted between November 1, 2020 and February 28, 2021, outside MSO nesting and breeding season. This timing restriction would be in effect pending the completion of a second year of species-specific surveys per the USFWS Mexican Spotted Owl Recovery Plan Survey Protocol in spring/summer 2021 survey period (Appendix G) (SWCA 2020; USFWS 2012). Following completion of the species-specific surveys, a full survey report would be submitted to the BLM and USFWS for review and concurrence of findings. If MSO is found to be not present, the BLM may give the operator written consent for Project construction and operations to be conducted year-round. If surveys detect MSO, then timing restrictions would remain in effect for the life of the Project. When in place, the timing restriction would reduce the period during which impacts related to construction and operation activities, such as noise from machinery and increased vehicular traffic, would occur to outside of higher sensitivity time periods for this species. Additionally, during construction and operation of the proposed Project noise monitoring would be completed at the edge of Keg Spring Canyon per a protocol agree upon by the applicant, BLM and USFWS to ensure that noise levels do not exceed 69 dBA per the MSO recovery plan (USFWS 2012). If noise levels exceed 69 dBA at the monitoring site(s), operations would be suspended, and the operator would contact the BLM authorized officer.

With application of the timing restriction and commitment to complete a second year of surveys per the USFWS Mexican Spotted Owl Recovery Plan Survey Protocol, noise impacts from the Alternative A proposed action are not anticipated to lead to take or a reduction in available suitable nesting/breeding habitat. As there are no direct impacts from surface disturbance to suitable MSO habitat Keg Spring Canyon and indirect noise impacts would occur outside of breeding and nesting season or if MSO is detected, noise monitoring will occur to monitor and appropriate mitigate as needed at the edge of Keg Springs Canyon, the proposed action would result in a USFWS effects determination of **May Affect, Not Likely to Adversely Affect**.

3.7.2.3 *Environmental Impacts – Alternative B*

3.7.2.3.1 MIGRATORY BIRDS

In general, no major or long-term effects on migratory birds are anticipated from the implementation of the Alternative B proposed action. Alternative B shares impact indicators and potential risk of adverse as described under Environmental Impacts— Alternative A (see Section 3.7.2.2). Incidental mortality or displacement of migratory bird species is possible on a local scale due to new surface disturbance of 52.3 acres. Alternative B would result in 18.3% more surface disturbance compared to Alternative A, and a proportional increase in risk of adverse impacts related migratory bird habitat removal and incidental mortality.

If feasible, vegetation removal associated with the proposed Project would occur outside the migratory bird breeding season (March 1–August 31). Any vegetation removal during the breeding bird season could be preceded by pre-construction nesting surveys up to 7 days prior to vegetation removal to identify any occupied nests. If active nests are located during the surveys, avoidance buffers (as determined by the BLM PFO) would be established around occupied nests or construction would not begin until young birds have fledged. If pre-construction nesting surveys are implemented and construction begins between March 1 and August 31, no eggs, nestlings, or active nests are anticipated to be directly harmed by the Alternative B proposed action.

3.7.2.3.2 RAPTOR SPECIES

Activities on the affected surface lands are not expected to impact bald or golden eagles. Because the affected surface lands lacks suitable nesting habitat for these two species, the proposed Project is not anticipated to cause take of individual bald or golden eagles, their nests, or their eggs (SWCA 2020). Adult eagles would not likely be directly harmed by the proposed Project because of their mobility and ability to avoid areas of human activity. During the 2020 raptor surveys, no active/inactive nests were observed within a 0.5 miles buffer from the affected surface lands and one turkey vulture was observed in flight (SWCA 2020). Thus, no impacts to raptor species, including golden eagles, outside of general reduction of available foraging habitat proportional to the 52.3 acres of new surface disturbance is expected under Alternative B.

3.7.2.3.3 BAT SPECIES

The affected surface lands also contains suitable foraging habitat for both species, however preferred canyon and cliff habitat occurs approximately 470 meters east of the proposed well pad location, with Keg Springs Canyon occurring approximately 1,251 meters east-northeast (SWCA 2020).

The Alternative B Project location is located approximately 1,251 meters west-southwest from the edge of Keg Springs Canyon and approximately 470 meters west of an unnamed cliff band where suitable cliff and canyon roosting habitat is present. At the base of Keg Springs Canyon riparian vegetation is present and may provide suitable roosting habitat for Western Red bats, a tree roosting species. The affected surface lands and biological survey area do not provide roosting habitat and proposed Project activities are not expected to impact availability or likelihood of use of this habitat in proximity to the proposed Project (SWCA 2020). The affected surface lands do contain vegetation communities in which these species are known to utilize for foraging purposes. However, as these species utilize nocturnal and/or crepuscular foraging periods, daytime activities such as construction, operation, and vehicle use are not expected to interfere with bat behavioral patterns or availability of food sources.

The Proposed Action is not anticipated to cause long-term impacts to bat species with potential to occur or their habitat because a large portion of proposed Project disturbance would be revegetated and reclaimed following construction. The Alternative B proposed action may impact individuals or localized foraging habitat proportional to the proposed surface disturbance of 52.3 acres, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the populations or species.

3.7.2.3.4 KIT FOX

The Alternative B affected surface lands contains suitable foraging habitat for small mammal prey species for the kit fox due to the presence of desert habitat. During the 2020 biological surveys, no kit fox dens or sign of species occupancy were observed within the area (SWCA 2020). For this species, Alternative B shares impact indicators and potential risk of adverse as described in Section 3.7.2.2. Incidental mortality or displacement of kit foxes is possible on a local scale due to surface disturbance of 52.3 acres. Alternative B would result in 18.3% more surface disturbance compared to Alternative A, however risk of mortality related to increased vehicular traffic would be comparable. Additionally, as no dens are present within the biological survey area, no impacts to kit fox reproduction or occupied burrows is expected due to the proposed surface disturbance.

The Alternative B proposed action is not anticipated to cause long-term impacts to the kit fox or its habitat because a large portion of proposed Project disturbance would be revegetated and reclaimed following construction. The proposed Project may impact individuals or localized reduction of available foraging habitat proportional to the 52.3 acres of new surface disturbance expected under Alternative B, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

3.7.2.3.5 MEXICAN SPOTTED OWL

The Alternative B proposed action well pad and facility site are located approximately 1,251 meters and 7,742 meters, respectively, from Keg Springs Canyon modeled MSO habitat (Willey 1995, 2002). Thus, BLM determined that although suitable foraging habitat may be present within and around the proposed Project location, the proposed action was not within 0.5 miles of mapped suitable nesting/roosting habitat for the species.

The Alternative B proposed action would result in a USFWS effects determination of **No Affect** due to lack of suitable habitat within proximity of the proposed Project location.

3.7.2.4 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, the Twin Bridges' APDs and ROW applications would be denied, and the surface disturbance and other impacts associated with the development proposed under the action alternatives would not occur. The No Action Alternative would have no impacts on special-status wildlife in the species-specific analysis areas.

3.7.2.5 *Cumulative Effects*

Impacts from past and present actions in species-specific analysis areas, are captured in the discussion of the environmental impacts (see Section 3.7.2). No RFFAs have been identified in the analysis area. No cumulative effects to special-status wildlife species, beyond the potential impacts discussed in Section 3.7.2, are expected.

3.8 RECREATION

3.8.1 Affected Environment

The analysis area for recreation includes the Project footprint with a 3-mile buffer (60,474 acres). This analysis area was chosen because it includes popular recreational areas that have the potential to be impacted by the visual, noise, and surface disturbances resulting from the proposed Project. These recreational areas include the Five Hole Arch Trail, nearby portions of the Green River, and portions of the Labyrinth Canyon and Labyrinth Rims/Gemini Bridges Special Recreation Management Areas (SRMAs).

3.8.1.1 *Regulatory Framework*

The Price FO RMP describes the following management goals for recreation in the analysis area (BLM 2008a:103):

- To establish management that provides necessary public services, authentic recreation experiences, and opportunities within allowable use levels; minimizes user conflicts; and maintains the healthy ecosystems and settings that provide the basis for recreation and experience.
- To provide an environment for and encourage entrepreneurial activities that are supportive of the recreation program goals and objectives.

The RMP provides an extensive list of management actions or decisions for recreation, including general management decisions for recreation and specific management decisions for developed recreation sites, use of the Recreation Opportunity Spectrum (ROS) classification system, SRMAs, extensive recreation management areas, special recreation permitting, and OHV recreation.

3.8.1.2 *Existing Setting*

The analysis area is in a remote region of southeastern Utah that is well known for its recreational opportunities. There are no developed recreational facilities within the analysis area, and access to the analysis area is from unpaved roads. The nearest towns are Green River, Hanksville, and Moab, Utah, all of which are within 40 miles of the Project footprint. Two national parks, a national recreation area, the San Rafael Swell, and Goblin Valley State Park are within 30 miles of the analysis area. The analysis area overlaps portions of the Labyrinth Canyon Wilderness Area. It also overlaps the following popular recreation destinations: a northern portion of the Labyrinth Canyon SRMA; a small portion of the western edge of the Labyrinth Rims/Gemini Bridges SRMA; Five Hole Arch Trail (also known as Colonnade Arch Trail); and portions of the Green River, a popular designation for river rafting, which is approximately 2 miles east of the Project footprint.

Recreation is a highly valued use of BLM-administered public land in the analysis area. Because there are no developed recreation sites in the area, all recreation is considered to be dispersed. Visitors to the analysis area and surrounding region currently engage in a wide variety of motorized and nonmotorized recreational activities. The busiest seasons tend to be spring and fall, although visitation occurs throughout the year. Recreation activities include climbing, hiking, canyoneering, biking, OHV (all-terrain-vehicle and motorcycle) use, driving for pleasure, cultural and paleontological resource viewing, boating on the Green River, camping, hunting, and horseback and mule riding.

An important element of recreation is the visitor experience. Different types of visitors seek different experiences for their chosen recreation activity. The visitor experience depends on factors such as interaction with other people (a low degree of interaction to a high degree of interaction), the presence of

infrastructure (no infrastructure to heavy infrastructure such as developed campgrounds), the level of risk (low-risk activities to high-risk activities), opportunities for solitude and closeness to nature, and the level of physical effort (easy to strenuous). The BLM seeks to provide multiple visitor experiences meeting different recreation needs and desires while observing resource protection and other management requirements.

3.8.1.2.1 LABYRINTH CANYON SPECIAL RECREATION MANAGEMENT AREA

The Labyrinth Canyon SRMA covers 45,862 acres and is administered by the Price FO. The analysis area overlaps approximately 17,599 acres of the northern portion of the SRMA. The portion of the Labyrinth Canyon SRMA overlapped by the analysis area is managed under the ROS as primitive (12,204 acres), semi-primitive motorized (4,995 acres), and semi-primitive non-motorized (400 acres). The portion of the Labyrinth Canyon SRMA overlapped by the analysis area includes a portion of Labyrinth Canyon and some other tributary canyons of the Green River. Portions of the Three Canyon and Keg Knoll recreation focus areas are within the Labyrinth Canyon SRMA in the analysis area. Three Canyon is a side canyon of Labyrinth Canyon that overlaps the northern portion of the analysis area and is often visited by river rafters on a hike. It is also a less technical canyon for canyoneering (although side forks of the canyon have more technical routes). It contains a small intermittent stream and occasional pools. The Keg Knoll recreation focus area overlaps the southern portion of the analysis area and is a popular dispersed camping site. There is also a primitive airstrip (Keg Knoll Airstrip) just north of the proposed Bowknot 5-1 well pad in the Labyrinth Canyon Wilderness Area. This airstrip receives a low level of use by recreational aircraft.

The Green River, a large-volume desert river meandering through the scenic high-walled cliffs of Labyrinth Canyon, is easily accessible to rafters and runs through the Labyrinth Canyon SRMA. It is federally adjudicated as navigable water, and lands below the 1897 high-water line are state owned. The flat water of the canyon attracts numerous recreational users seeking a scenic river float. Impacts occur from concentrated use along the river, primarily in camping areas. Resource damage may also occur because the canyon attracts a large number of novice and first-time river runners (BLM 2008a).

3.8.1.2.2 LABYRINTH RIMS/GEMINI BRIDGES SPECIAL RECREATION MANAGEMENT AREA

The Labyrinth Rims/Gemini Bridges SRMA covers 300,650 acres and is administered by the Moab FO. The analysis area overlaps a small portion (approximately 787 acres) of the western edge of the Labyrinth Rims/Gemini Bridges SRMA, immediately east of the Green River. The Labyrinth Rims/Gemini Bridges SRMA in the analysis area is managed under a nonmechanized recreation focus. There are no paved roads, developed recreation facilities, or developed trails within the portion of the Labyrinth Rims/Gemini Bridges SRMA overlapped by the analysis area, and recreation opportunities are primarily backcountry opportunities associated with the Green River and Labyrinth Canyon.

3.8.1.2.3 FIVE HOLE ARCH TRAIL

Five Hole Arch Trail is entirely within the analysis area. The trail begins in the northeastern portion of the federal lease area, and the arch is approximately 1 mile to the northeast as the crow flies (i.e., in a direct line). The arch is approximately 1.8 miles southeast of the proposed 36-1 well pad and approximately 1.5 miles northeast of the proposed 5-1 well pad. The trailhead is not signed; it is accessible by an unpaved dirt road that is passable by standard passenger vehicle, but higher-clearance vehicles are preferred. Because of its remoteness and the relative difficulty in accessing the trailhead, the Five Hole Arch Trail receives approximately 800 to 1,200 visitors annually, which is much less use than other, more accessible trails in the region, such as the trails in and around Canyonlands National Park (733,996 visitors in 2019),

Arches National Park (1.7 million visitors in 2019), Goblin Valley State Park (301,089 visitors in 2019), and the San Rafael Swell (NPS 2020a, 2020b; Utah Division of Natural Resources [UDNR] 2019). The relatively lower level of visitation provides users with outstanding opportunities for solitude, primitive recreational experiences, and other experiences more associated with wilderness areas than developed recreation areas.

3.8.1.2.4 GREEN RIVER

A designated 49.2 mile scenic river segment of the Green River Wild & Scenic River, established in 2019 under the John D. Dingell, Jr. Conservation, Management and Recreation Act, meanders through Labyrinth Canyon in the eastern portion of the analysis area, approximately 2 miles east of the Project footprint. The analysis area overlaps approximately 4.5 miles of the Green River scenic river corridor, protected under the Wild & Scenic River Act of 1968 out to a distance of ¼ mile from the highwater mark of the river. There are no developed recreational facilities along the portions of the Green River that are overlapped by the analysis area. However, the portion of Labyrinth Canyon that the Green River passes through within the analysis area is a popular river rafting destination, and shorelines within the canyon provide backcountry camping and hiking opportunities for river users almost any time of the year except winter, when there may be ice on the river. More specifically, rafters sometimes hike up from the Green River to Fivehole Arch or hike in along the canyon leading southwest from Trin Alcove. River rafters typically begin their trips through Labyrinth Canyon at either Green River or Ruby Ranch (23 miles downstream from Green River) and end their trips at Mineral Bottom (accessed via State Route 313 north of Moab) (BLM 2020a).

3.8.2 Environmental Consequences

3.8.2.1 *Analysis Methods*

The analysis of potential impacts to recreational access and experience within the analysis area considers the known recreation sites and activities, the types of recreational user, and the types of recreational experience available in the analysis area. The analysis is organized by the main recreation resources overlapped by the analysis area: Labyrinth Canyon SRMA, Labyrinth Rims/Gemini Bridges SRMA, Five Hole Arch Trail, and Green River. The types of recreation impacts considered in the analysis include the potential impacts from the surface-disturbing activities, human presence, noise, and visual disturbance created by the proposed Project.

Because Project impacts would occur in a remote area near designated wilderness, where recreational users are expecting a more primitive recreational experience in a landscape that has little-to-no evidence of human activity, recreational users may be more sensitive to impacts from the proposed construction, drilling, and production operations activities.

3.8.2.2 *Environmental Impacts – Alternative A*

3.8.2.2.1 LABYRINTH CANYON SPECIAL RECREATION MANAGEMENT AREA

Under Alternative A, there would be approximately 5.7 acres of surface disturbance in the Labyrinth Canyon SRMA. The surface disturbance in the SRMA would be from proposed improvements to Spur Road 1025, the pipeline ROW, and the well pad and would represent approximately 0.01% of the SRMA. The proposed disturbance would be entirely within land classified as semi-primitive motorized (approximately 0.1% of this ROS classification in the analysis area). Because this would represent such a small portion of the SRMA and lands classified as semi-primitive motorized, it would represent a negligible loss of lands available for recreation in the SRMA. However, the construction, drilling, and

operation of the proposed well pad, pipeline, and processing plant, as well as the proposed road improvements, would represent approximately 43.1 acres of surface disturbance in and adjacent to the SRMA and would result in visual and noise impacts that have the potential to affect the recreation experience of users of the SRMA. Because of increased human activity and use of construction and drilling equipment, these impacts would be most pronounced during construction and drilling activities. A more detailed discussion of potential visual resources impacts is included in Section 3.10.

The proposed road upgrades would take 10 to 14 days to complete, creating a temporary disruption in recreational access to the area. The road upgrades may increase recreational visitation to the SRMA and surrounding area by making the area more accessible. This increased visitation would impact wilderness characteristics such as sense of solitude. However, because this area experiences less recreational visitation than the Five Hole Arch area, the impacts from increased visitation under Alternative A would not be great as the increased visitation to the Five Hole Arch area expected under Alternative B as a result of road upgrades.

The proposed well-pad construction would take 10 to 14 days to complete. Installation of the proposed pipeline would occur over 30 days. Construction of the proposed processing plant would take 25 weeks to complete. It is assumed that construction noise would be approximately 100 dB (ANSI 2018) at the construction site and that the noise level would decrease the farther one is from the construction site. Construction and drilling noise would be a temporary impact on recreational users within approximately 1 mile of the construction site, because noise would be noticeable (ANSI 2018; MAS Environmental 2006). However, construction and drilling noise would decrease to the level of a whisper at approximately 2 miles away and would be less audible at farther distances (ANSI 2018; MAS Environmental 2006).

Potential impacts to recreational users from the production operations of the proposed well pad, pipeline, and processing plant would be minor. Because the applicant would use acoustic mitigation on all rotating equipment (generators, compressors, and recycle pumps) to reduce noise impacts, noise from production operations of the well pad and pipeline would be negligible. Because the processing plant would be approximately 3 miles from the SRMA, it would have no noise impacts on recreational users in the SRMA. Permanent equipment would be painted to blend with the natural surroundings and effects on views from the SRMA would be minimal. Specific colors would be determined in coordination with BLM and SITLA. Road base and well pad base material would, to the extent possible, be generated from onsite cut and fill material. Any materials brought in from off-site for the well pad base and road base would be of a similar color. The pipeline would be buried and would not be visible from the SRMA. The processing plant would also be painted to blend in with the natural surroundings and is unlikely to be visible from the SRMA. Appropriate use of down lighting at the plant would reduce impacts on the night skies, reducing potential visual impacts on recreational users who camp in the SRMA. There would be no impacts to the Keg Knoll Airstrip because the closest proposed surface disturbance would be approximately 2 miles north of the airstrip.

One-to-two semi-truck trips per day to the processing plant would also result in potential visual and noise impacts on the recreational experience, as well as impacts to wilderness characteristics such as sense of solitude.

3.8.2.2.2 LABYRINTH RIMS/GEMINI BRIDGES SPECIAL RECREATION MANAGEMENT AREA

Under Alternative A, there would be no surface disturbance in the Labyrinth Rims/Gemini Bridges SRMA. The portion of the SRMA within the analysis area is east of the Green River and approximately 2.5 miles east of the Project footprint. Recreational users along the eastern rim of Labyrinth Canyon may see or hear (or both) construction and drilling activities associated with the proposed well pad, pipeline,

processing plant, and road improvements. Assuming construction noise is approximately 100 dB at the construction site, the noise level would decrease to approximately 28 dB at a distance of approximately 2.5 miles from the construction site, which would make it as audible as a whisper (ANSI 2018; MAS Environmental 2006).

Potential impacts to recreational users from the production operations of the proposed well pad, pipeline, and processing plant would be negligible. Because of the distance between these proposed facilities and the SRMA, there would be no noise impacts from production operations. Because the pipeline would be buried, the processing plant and well-pad facilities would be painted to blend in with the natural surroundings, and because of intervening topography, the visual impacts on recreational users in the SRMA would be negligible.

3.8.2.2.3 FIVE HOLE ARCH TRAIL

Under Alternative A, the proposed surface disturbance closest to the Five Hole Arch trailhead, trail, and the arch itself would be the proposed well pad, which would be approximately 2 miles northwest of the trail and arch. The construction, drilling, and operation of the proposed well pad and pipeline, as well as the proposed road improvements, would result in visual and noise impacts that have the potential to affect the recreation experience of users of the Five Hole Arch Trail. The proposed road improvements may also increase visitation around Five Hole Arch by making the area more accessible.

Assuming construction and drilling noise is approximately 100 dB at the construction site, the noise level would decrease to approximately 30 dB at a distance of approximately 2 miles from the construction site, which would make it as audible as a whisper (ANSI 2018; MAS Environmental 2006). The proposed processing plant would be approximately 5 miles northwest of the trail; therefore, construction and operation of the plant would not result in visual or noise impacts that affect users of the trail.

Potential impacts from the operation of the proposed well pad, pipeline, and processing plant would be minor. Noise from production operations of the well pad and pipeline would be negligible. Because the processing plant would be approximately 5 miles from the trail, it would have no noise impacts on trail users. Permanent production equipment on the well pad would be painted or buried to blend in with the natural surroundings to reduce impacts on views from the trail. Because the equipment would be painted, and the trail would be approximately 2 miles away with intervening topography helping to obscure the view of the equipment, potential impacts on recreational users' visual experience would be minor. A more detailed discussion of potential visual resources impacts is included in Section 3.10. The pipeline would be buried and would not be visible from the trail. The processing plant would also be painted to blend in with the natural surroundings and is unlikely to be visible from the trail. Appropriate use of down lighting at the plant would reduce impacts on the night skies, reducing potential visual impacts on recreational users who camp near the trail.

3.8.2.2.4 GREEN RIVER

Under Alternative A, the proposed surface disturbance closest to the Green River would be the proposed well pad, which would be approximately 2 miles west of the river. Because of the topography of the canyon, none of the proposed surface disturbance would be visible to recreational users on the river. Because of distance and topography, it is unlikely that recreational users on the river would be affected by noise from construction and drilling activities. Assuming construction and drilling noise is approximately 100 dB at the construction site, the noise level would decrease to approximately 30 dB at a distance of approximately 2 miles from the construction site, which would make it as audible as a whisper (ANSI 2018; MAS Environmental 2006). However, because of the sound of the flowing river, the noise from construction and drilling would likely be inaudible to recreational users floating in this section of the river.

3.8.2.3 *Environmental Impacts – Alternative B*

3.8.2.3.1 LABYRINTH CANYON SPECIAL RECREATION MANAGEMENT AREA

Under Alternative B, all surface-disturbing activities would occur outside the Labyrinth Canyon SRMA. However, construction, drilling, and operation of the proposed well pad, pipeline, and processing plant, as well as the proposed road improvements, would represent approximately 52.3 acres of surface disturbance near the Labyrinth Canyon SRMA. The proposed surface disturbance related to the well pad and road improvements would be closest to the Labyrinth Canyon SRMA, within approximately 1 mile. Recreational users in the portions of the SRMA nearest the proposed surface-disturbing activities could be affected by the noise and visual disturbance associated with the proposed construction, drilling, and operation of the well pad and road improvements. The proposed road improvements may also increase recreational visitation to the SRMA and surrounding area by making the area more accessible. These impacts would be similar to those discussed for the SRMA in Section 3.8.2.2 but would be less pronounced because the surface disturbance under Alternative B would occur entirely outside the SRMA. There would be no impacts to the Keg Knoll Airstrip because the proposed surface disturbance would not overlap or interfere with operation of the airstrip.

One-to-two semi-truck trips per day to the processing plant would also result in potential visual and noise impacts on the recreational experience, as well as impacts to wilderness characteristics such as sense of solitude.

3.8.2.3.2 LABYRINTH RIMS/GEMINI BRIDGES SPECIAL RECREATION MANAGEMENT AREA

Under Alternative B, there would be no surface disturbance in the Labyrinth Rims/Gemini Bridges SRMA. The portion of the SRMA within the analysis area is east of the Green River and approximately 2.2 miles east of the Project footprint. Because proposed surface-disturbing activities under Alternative B would be approximately the same distance from the Labyrinth Rims/Gemini Bridges SRMA as under Alternative A, potential impacts to recreational users in the SRMA would be similar to those discussed for the SRMA in Section 3.8.2.2.

3.8.2.3.3 FIVE HOLE ARCH TRAIL

Under Alternative B, the proposed surface disturbance closest to the Five Hole Arch trailhead, trail, and the arch itself would be the proposed well pad, which would be approximately 0.5 mile southwest of the trailhead and approximately 1.5 miles southwest of the arch. The construction, drilling, and operation of the proposed well pad and pipeline, as well as the proposed road improvements, would result in visual and noise impacts that have the potential to affect the recreation experience of users of the Five Hole Arch Trail. Construction of the road improvements would result in a temporary disruption to recreational access to the Five Hole Arch Trail. The proposed road improvements may also increase visitation to Five Hole Arch by making the trailhead more accessible. This increased visitation would impact wilderness characteristics such as sense of solitude. Because this area is the most popular recreational area near the Project area, increased visitation from road upgrades would likely have a greater impact on recreational users than the road upgrades in lesser used areas of the Labyrinth Canyon SRMA described under Alternative A in Section 3.8.8.2.1.

Assuming construction and drilling noise is approximately 100 dB at the construction site, the noise level would decrease to approximately 42 dB at a distance of approximately 0.5 mile from the construction site (distance to trailhead), which would make it quieter than normal conversation noise levels (ANSI 2018; MAS Environmental 2006). Noise from construction and drilling would be approximately 32 dB at

approximately 1.5 miles from the construction site (distance to arch), which would make it as audible as a whisper. Visitors to the arch would have to drive past the proposed developments to access the trailhead. The elevation of the road drops shortly before and after the proposed well-pad location, limiting the viewshed of this alternative. The proposed developments would not be seen from the Five Hole Arch trailhead, the arch itself, or the dispersed camping areas. Visual disturbance and noise from construction and drilling at the well pad could have a temporary impact on recreational users of the Five Hole Arch Trail who are seeking a more primitive, wilderness-oriented recreational experience. A more detailed discussion of potential visual resources impacts is included in Section 3.10. The proposed processing plant would be approximately 5 miles southwest of the trail; therefore, construction and operation of the plant would not result in visual or noise impacts that affect users of the trail.

Potential impacts to recreational users from the production operations of the proposed well pad, pipeline, and processing plant would be minor. Because the applicant would use acoustic mitigation on all rotating equipment (generators, compressors, and recycle pumps) to reduce noise impacts, noise from production operations of the well pad and pipeline would be negligible. Because the processing plant would be approximately 5 miles from the trail, it would have no noise impacts on trail users. Permanent production equipment on the well pad would be painted or buried to blend in with the natural surroundings, and effects on views from the trail, which would be approximately 0.5 mile away, would be minimal. The pipeline would be buried and would not be visible from the trail. The processing plant would also be painted to blend in with the natural surroundings and is unlikely to be visible from the trail. Appropriate use of down lighting at the plant would reduce impacts on the night skies, reducing potential visual impacts on recreational users who camp near the trail.

3.8.2.3.4 GREEN RIVER

Under Alternative B, the proposed surface disturbance closest to the Green River would be the proposed well pad, which would be approximately 2 miles west of the river. Because the proposed surface-disturbing activities under Alternative B would be approximately the same distance from the Green River as those under Alternative A, potential impacts to recreational users on the Green River would be similar to those discussed for the river in Section 3.8.2.2.

3.8.2.4 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, the Twin Bridges would not be permitted to construct the well pad and pipeline ROW, nor would it make road improvements; therefore, the surface disturbance and other impacts associated with the proposed Project would not occur. The No Action Alternative would have no impacts on recreation within or at the Labyrinth Canyon SRMA, Labyrinth Rims/Gemini Bridges SRMA, Five Hole Arch Trail, or the Green River.

3.8.2.5 *Cumulative Effects*

Impacts from past and present actions in the analysis area are captured in the discussion of the affected environment (Section 3.8.1). The existing dispersed recreation activities discussed in Section 3.8.1 are expected to continue throughout the analysis area. No RFFAs have been identified in the analysis area. No cumulative effects to recreation, beyond the potential impacts discussed in Section 3.8.2, are expected in the analysis area.

3.9 WILDERNESS AREAS AND LANDS WITH WILDERNESS CHARACTERISTICS

3.9.1 Affected Environment

This section describes the affected environment for wilderness areas designated by Congress and LWCs. The analysis area includes a 3-mile buffer around Alternative A and Alternative B, which includes the Sweetwater Reef Unit A, Labyrinth Canyon Unit A, and Labyrinth Canyon Unit B LWC units totaling 100,449 acres and the Labyrinth Canyon Wilderness Area totaling 54,643 acres within the Price FO (see Figure F-1 in Appendix F). In addition, the analysis area includes the Moab FO Labyrinth Canyon non-Wilderness Study Area (WSA) lands with wilderness characteristics (Labyrinth Additions), which total approximately 24,300 acres along the Green River.

One of the key characteristics of lands meeting the qualities of wilderness is the requirement under the Wilderness Act that the parcels of land contain at least 5,000 contiguous roadless acres or be of sufficient size to allow for their preservation and use in an unimpaired condition. BLM Manual 6310, *Conducting Wilderness Characteristics Inventory on BLM Lands* (BLM 2012a), requires the areas being evaluated to be at least 5,000 acres in size, contiguous to other protected lands with wilderness characteristics, of sufficient size to be able to preserve and use in an unimpaired condition, or a roadless island.

Within the Moab FO, non-WSA lands with wilderness characteristics are those that have the appearance of naturalness and outstanding opportunities for solitude or primitive and unconfined recreation. Non-WSA lands with wilderness characteristics are areas having 5,000 acres, or areas less than 5,000 acres that are contiguous to designated wilderness, WSAs, or other administratively endorsed for wilderness management lands; or, in accordance with the Wilderness Act's language, areas "of sufficient size as to make practicable its preservation and use in and unimpaired condition." BLM used the same criteria for determining wilderness characteristics as in the 1979 wilderness inventory. Non-WSA lands with wilderness characteristics are managed in accordance with existing land use plans.

The other major criteria in evaluating wilderness characteristics is the naturalness of an area; opportunities for solitude or a primitive and unconfined type of recreation; and other supplemental values, including ecological, geological, or other features of scientific, educational, scenic, or historical value. While the Wilderness Act discusses and mandates these key characteristics of wilderness, the act does not clarify these terms. The BLM has subsequently defined these terms in BLM Manual 6310 and has described how to assess these conditions on parcels. The following are the terms clarified by BLM policy that are used to describe these key wilderness characteristics (BLM 2012a:6–9).

3.9.1.1 *Regulatory Framework*

The Wilderness Act of 1964 established the National Wilderness Preservation System, which outlines federal agency responsibility in administering and managing certain uses and monitoring wilderness character in wilderness areas that may have the potential to impair wilderness characteristics.

BLM Manual 6340, *Management of Designated Wilderness Areas* (BLM 2012b), provides guidance on managing lands designated by Congress as part of the National Wilderness Preservation System and National Landscape Conservation System. The objectives outlined in BLM Manual 6340 are as follows (BLM 2012b:1-1):

- Manage and protect BLM wilderness areas in such a manner as to preserve wilderness character.

- Manage wilderness for the public purposes of recreational, scenic, scientific, education, conservation, and historic use while preserving wilderness character.
- Effectively manage uses permitted under Section 4(c) and 4(d) of the Wilderness Act of 1964 while preserving wilderness character.

The BLM's authority to recommend lands for congressional wilderness designation expired in 1991 under FLPMA, Section 603 (43 USC 1782). However, Congress gave the BLM broad authority and discretion under FLPMA, aside from Section 603, to identify LWCs and, if appropriate, to manage lands to protect such characteristics. The LWC inventory authority comes from FLPMA, Title II, Section 201 (43 USC 1711(a)), which states that the BLM is to "prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values." The BLM makes decisions regarding the management of resources present on BLM-administered public lands, including LWCs, through the RMP planning process.

3.9.1.2 *Existing Setting*

In 2016, the Price FO conducted a wilderness inventory for portions of the Price FO, including the affected surface lands. The 2016 LWC inventory included 449,394 acres and 20 inventory units (BLM 2016). The effort was intended to document the presence or absence of wilderness characteristics consistent with BLM Manual 6310 (BLM 2012a). Of the 20 units that were inventoried, 263,705 acres, or 13 units, were determined to have wilderness characteristics. Included in this inventory were the Sweetwater Reef Unit A LWC, Labyrinth Canyon Unit A LWC, and Labyrinth Canyon Unit B LWC. These three LWC units were not carried forward in the approved RMP and therefore are not being managed for LWC.

In 1999, the Moab FO conducted an inventory of the Moab FO, including the Labyrinth Canyon area that falls within the analysis area. The effort was intended to ground-truth areas for wilderness characteristics and determine whether some areas should have been designated for wilderness study as part of the original 1976 FLPMA inventory process (BLM 1999). The 1999 inventory included 299,420 acres on Moab FO lands, of which, approximately 210,070 acres were found to have wilderness characteristics. Included in the 1999 inventory was Labyrinth Canyon, which was found to have 42,500 acres of wilderness characteristics. In 2003, the BLM made revisions to the 1999 inventory to account for 1) mapping corrections, 2) changes due to state lands along the perimeter boundaries of inventoried areas, 3) changes to vehicle cherry stems, 4) changes resulting from reevaluations of the wilderness character of certain inventoried lands and vehicle route determinations (BLM 2003). The total acreage Labyrinth Canyon was reduced from 42,500 acres to 24,300 acres during the 2003 inventory revisions. In 2019, the Dingell Act was passed into law. The Dingell Act protected public lands by designating approximately 1,300,000 acres of wilderness areas. Included in this designation was Labyrinth Canyon, which was designated as a wilderness area.

Acreages for the Labyrinth Canyon Wilderness and Labyrinth Canyon and Sweetwater Reef LWC units are shown in Table 3-6. Figure F-2 (Alternative A) and Figure F-6 (Alternative B) in Appendix F display the boundaries of the Labyrinth Canyon Wilderness in context with the Project.

Table 3-6. Wilderness Area and Lands with Wilderness Characteristics

Name	Total Acreage
Price FO	
Labyrinth Canyon Wilderness	54,643
Labyrinth Canyon Unit A LWC	20,023
Labyrinth Canyon Unit B LWC	11,078
Sweetwater Reef Unit A LWC	69,348
Moab FO	
Labyrinth Canyon non-WSA lands with wilderness characteristics	24,300
Area Managed as Wilderness	**54,643**
Total Area of LWC Units	**124,749**

3.9.1.2.1 WILDERNESS AREAS AND LANDS WITH WILDERNESS CHARACTERISTICS

Appendix H includes a summary of the naturalness, opportunities for solitude and primitive and unconfined recreation, supplemental values, and evidence of human activity for the Labyrinth Canyon Wilderness Area, Labyrinth Canyon Unit A and Unit B LWCs, and Sweetwater Reef Unit A LWC. This information was extracted from the *Utah Wilderness Inventory* (BLM 1999) and the *San Rafael Desert Lands with Wilderness Characteristics Inventory* (BLM 2016). For more detailed information on each of the units, please refer to the inventories.

3.9.2 Environmental Consequences

This section presents potential impacts to wilderness characteristics from implementing actions presented in Chapter 2.

3.9.2.1 *Environmental Impacts – Alternative A*

The proposed Project would be located in the 200-foot-wide area surrounding Spur Road 1025 that is outside of the Labyrinth Canyon Wilderness Area. Spur Road 1025 is currently a simple two-track primitive route that travels through areas of deep sand and slickrock sandstone. A portion of the affected surface lands is in the Labyrinth Canyon Unit A LWC, outside the 200-foot-wide area excluded from the LWC adjacent to Spur Road 1025. The proposed Project would not be located in the Sweetwater Reef Unit A LWC, because no road improvements would occur along Emery County Road 1010. In addition, the proposed pipeline ROW would be outside the Sweetwater Reef Unit A LWC. The proposed road improvements would occur along approximately 2.7 miles adjacent to Spur Road 1025. Approximately 18.7 acres are within the Labyrinth Canyon Unit A LWC.

3.9.2.1.1 LABYRINTH CANYON WILDERNESS AREA

Under Alternative A, no development would occur in the Labyrinth Canyon Wilderness Area. In addition, the upgrades to the road, proposed pipeline ROW, and the construction of the 5.4-acre well pad would be in areas of existing disturbance within an area excluded from the Labyrinth Canyon Wilderness Area. Before any construction, the boundaries of the Labyrinth Canyon Wilderness Area would be fenced off to prevent any disturbance outside the existing areas of disturbance. With the boundary avoidance design feature in place, the proposed Project would not reduce the size of the Labyrinth Canyon Wilderness Area.

The short-term and long-term indirect effects to wilderness characteristics of the Labyrinth Canyon Wilderness Area are detailed below.

Naturalness

Visual impacts and surface disturbance from the introduction of the road improvements, well pad, stockpile areas, and side cut and fill slopes to the landscape would have direct impacts on areas visible from the Labyrinth Canyon Wilderness Area within the analysis area. Specifically, the proposed action would increase the levels of trammeling and human development adjacent to and visible from within the wilderness. However, the road improvements and well pad would be in an area of existing disturbance. The current level of existing disturbance includes a two-track route and range improvement water tank. Installation of the road upgrades and well pad would increase the current level of disturbance at this location.

In particular, Alternative A would double the width and change road base of Spur Road 1025 in order to provide adequate access to the well pad. These changes would be for the duration of the lease. Spur Road 1025 would be made more visible from the Fivehole Arch trailhead and would be roughly perpendicular to the viewshed along the Fivehole Arch trail. Under Alternative A, Spur Road 1025 and the well pad would increase evidence of human development at the Fivehole Arch trailhead and visitors' experience of the quality of naturalness and solitude within the analysis area.

The only proposed Project activities within the Labyrinth Canyon Wilderness Area would include underground horizontal drilling that is unlikely to direct impacts to the wilderness area's naturalness.

Outstanding Opportunities for Solitude and Primitive and Unconfined Recreation

Outstanding opportunities for solitude would be indirectly impacted by the presence of trucks and heavy equipment during construction and drilling of the well pad. The proposed Project may be visible from the rim of the canyons to the east. Short-term visual contrast created by the proposed pipeline ROW would create a weak contrast at the boundary of the wilderness area and would attract attention from areas within the wilderness area. Long-term impacts from the introduction of the processing plant would create moderate contrast and would attract attention from areas within the wilderness area. Long-term impacts from the introduction of the Project would be minimized through reclamation of a portion of the well pad and through other applicant-committed environmental protection measures (Appendix G) in order to not attract the attention of the casual observer and not dominate the viewshed. For more detail on visual impacts, see Section 3.10. Impacts to solitude would occur along approximately 2.7 miles of Spur Road 1025 from Emery Country Road 1025 to the proposed well pad during construction and drilling. Once construction is complete, the only disturbance along Spur Road 1025 would be from the occasional truck accessing the well pad for maintenance or repairs. Once final reclamation activities are completed, there would be no transportation truck traffic noise or visual impacts along the Labyrinth Canyon Wilderness Area boundary.

Outstanding opportunities for primitive and unconfined recreation within the Labyrinth Canyon Wilderness Area would not be directly affected by the proposed activities. Access along on Spur Road 1025 and Emery Country Road 1025 would be maintained and improved by road upgrades, possible increasing visitation and affecting solitude to this portion of the wilderness area.

Supplemental Values/Special Features

The proposed Project would be located adjacent to and outside the boundaries of the Labyrinth Canyon Wilderness Area. However, the proposed Project would add human disturbance from infrastructure and truck traffic, which would be at the edge of a sandstone canyon. Therefore, there would be indirect impacts to supplemental values from the introduction of infrastructure to the extensive red bluff and sandstone canyon views within the Labyrinth Canyon Wilderness Area.

3.9.2.1.2 SWEETWATER REEF UNIT A LWC AND LABYRINTH CANYON UNIT A LWC

There would be no direct impacts to the Sweetwater Reef Unit A LWC because no road improvements are planned for Emery County Road 1010 and the pipeline would be constructed outside the boundaries of this LWC. This unit was not carried forward in the approved 2008 Price FO RMP and therefore is not being managed for LWC. Alternative A would not remove any acreage from this unit.

There would be direct long-term impacts to wilderness values, including apparent naturalness, outstanding opportunities for solitude, and supplemental values, within the Labyrinth Canyon Unit A LWC from the disturbance of approximately 18.7 acres of land in this LWC. The proposed Project would therefore remove approximately 18.7 acres of inventoried lands within the Labyrinth Canyon Unit A LWC. This unit was not carried forward in the approved 2008 Price FO RMP and therefore is not being managed for LWC.

There would be indirect long-term impacts to naturalness and to outstanding opportunities for solitude along the boundary of the Sweetwater Reef Unit A LWC due to the presence of human development from vehicles and equipment traveling along Emery Country Road 1010 to the processing facility on SITLA lands during construction, drilling, and product transportation. Outstanding opportunities for primitive and unconfined recreation within the Labyrinth Canyon Unit A LWC and Sweetwater Reef Unit A LWC would not be affected by the proposed activities. Access along on Spur Road 1025 and Emery Country Road 1025 would be maintained and improved, possibly increasing levels of visitation and impacting the experience of solitude. The proposed Project would be located outside the boundaries of the Sweetwater Reef Unit A LWC; therefore, there would be no direct impacts to supplemental values.

3.9.2.1.3 MOAB FIELD OFFICE LABYRINTH ADDITIONS

The Moab FO Labyrinth is located approximately 1.3 miles east of the proposed Project, east of the Green River. All construction, operations, and maintenance would occur outside of the Labyrinth Additions. Alternative A would not remove any acreage from this non-WSA land with wilderness characteristics.

There would be no direct long-term impacts to wilderness values, including apparent naturalness, outstanding opportunities for solitude, and supplemental values, within the Labyrinth Additions because the proposed Project is located outside of the Labyrinth Additions.

There would be indirect long-term impacts to naturalness and to outstanding opportunities for solitude along the western boundary Labyrinth Additions due to the presence of human development from vehicles and equipment that may be visible from the western boundary of the Labyrinth Additions while traveling along Emery Country Road 1010 to the processing facility on SITLA lands during construction, drilling, and product transportation. Outstanding opportunities for primitive and unconfined recreation within the Labyrinth Additions would not be affected by the proposed activities. There would be no impacts to recreation access or visitation. The proposed Project would be located outside the boundaries of the Labyrinth Additions; therefore, there would be no direct impacts to supplemental values.

3.9.2.2 *Environmental Impacts – Alternative B*

The land surrounding the proposed pipeline ROW and access road improvements are within the 200-foot-wide area surrounding Emery County Road 1026 that is not included in the Labyrinth Canyon Wilderness Area. Emery County Road 1026 is currently a well-established two-track vehicle route that travels over portions of slickrock sandstone and gravely soil with minimal impediments to regular motor vehicles. A portion of the proposed well-pad would be located in the Labyrinth Canyon Wilderness Area.

Additionally, a portion of the proposed Project would be located in the Labyrinth Canyon Unit A and Sweetwater Reef Unit A LWCs, outside their 20-foot-wide areas excluded from the LWCs adjacent to Emery County Roads 1010 and 1026. The proposed pipeline ROW and road improvements would be located along approximately 4.0 miles of road along the Labyrinth Canyon Wilderness Area boundary. Approximately 23.3 acres are within the Labyrinth Canyon Unit B LWC. Adjacent to Emery County Road 1010, the proposed pipeline ROW would occupy approximately 2.0 acres in the Sweetwater Reef Unit A LWC. Before any road improvements, the Labyrinth Canyon Wilderness Area boundary would be marked for avoidance.

3.9.2.2.1 LABYRINTH CANYON WILDERNESS AREA

Under Alternative B, the proposed pipeline ROW and upgrades to the road development would occur outside the Labyrinth Canyon Wilderness Area. Construction of the 7.3-acre well pad would be within an undisturbed area of the Labyrinth Canyon Wilderness Area. The proposed well pad would create 7.3 acres of long-term disturbance and would reduce the size of the wilderness characteristics within the Labyrinth Canyon Wilderness Area by 7.3 acres.

The boundaries of the Labyrinth Canyon Wilderness Area would be fenced off to prevent any disturbance outside the proposed areas of disturbance. The lease for the parcel where the proposed Project would be located predates the designation of the Labyrinth Canyon Wilderness; the Dingell Act, signed March 12, 2019, designated the Labyrinth Canyon Wilderness, and the Lease Sale EA was signed February 8, 2019. Because a valid existing right in the form of a mineral lease was issued before the wilderness designation, the terms and conditions of the lease provide the leaseholder the right to develop the lease. Section 4(d) of the Wilderness Act covers special provisions that include exceptions to the 4(c) prohibitions, including existing valid lease claims. In addition, Section 1.6.B.3.b of BLM Manual 6340 explains that a commercial enterprise and structures associated with valid existing rights are allowed in wilderness areas as long as the valid rights were in existence before the designation of the wilderness area (BLM 2012b).

The short-term and long-term indirect effects to wilderness characteristics of the Labyrinth Canyon Wilderness Area are detailed below.

Naturalness

Visual impacts from the surface disturbance and introduction of the road improvements, pipeline, well pad, stockpile areas, and side cut and fill slopes to the landscape would directly impact adjacent areas within the viewshed from the Labyrinth Canyon Wilderness area. The proposed well pad would remove approximately 7.3 acres of vegetation from the Labyrinth Canyon Wilderness. Short-term direct impacts to naturalness would be related to the sights and noise associated with activities, vehicles, and equipment related to the construction of the proposed well pad. Long-term direct impacts on naturalness would be associated with the vegetation removal, road improvements, presence of the well pad, associated infrastructure, and the occasional truck accessing the well pad for maintenance or repairs.

The impacts to naturalness from the surface disturbance and new human development along Emery County Road 1026 would be noticeable from the road and immediately adjacent areas of the wilderness to the south and southeast of the proposed Project. However, the new surface disturbance under Alternative B would not be visible to visitors from the Fivehole Arch trailhead, camping area, or trail once they have moved northeast over the crest of the ridge from the well pad location. The Fivehole Arch trail, camping area, the Bowknot Bend, Horseshoe Canyon, and the Green River areas to the east and south are the main visitor destinations in this portion of the Labyrinth Canyon Wilderness area, and would be topographically screened from most of the new surface disturbance and human developments proposed under Alternative B at the Bowknot 5-1 location.

The visibility of the processing plant would have indirect impacts on the Labyrinth Canyon Wilderness Area by introducing infrastructure to the landscape visible from the boundaries of the wilderness area. However, this infrastructure would be outside the Labyrinth Canyon Wilderness Area on lands owned and administered by SITLA. Therefore, there would be no direct impacts to naturalness within the Labyrinth Canyon Wilderness Area.

Outstanding Opportunities for Solitude and Primitive and Unconfined Recreation

Outstanding opportunities for solitude within the Labyrinth Canyon Wilderness Area would have long-term direct impacts from the presence of the well pad, associated infrastructure, and the occasional truck accessing the well pad for maintenance or repairs. The proposed Project may be visible from the rim of the canyons to the east. Short-term visual contrast created by the proposed pipeline ROW would create a weak contrast at the boundary of the wilderness area and would attract attention from areas within the wilderness area. Long-term impacts from the introduction of the processing plant would create moderate contrast and would attract attention from areas within the wilderness area. Long-term impacts from the introduction of the Project would be minimized through reclamation of a portion of the well pad and through other applicant-committed environmental protection measures in order to not attract the attention of the casual observer and not dominate the viewshed. For more detail on visual impacts, see Section 3.10. Direct short-term impacts to solitude and primitive/unconfined recreation would be related to the sights and sounds associated with construction and drilling activities, noise, and dust along approximately 4 miles of the two-track access road, Emery Country Road 1010, and Emery County Road 1026, in addition to potential road access restrictions during construction of the proposed Project for public health and safety. Long-term indirect effects would also occur along the proposed access roads outside and along the boundary of the Labyrinth Canyon Wilderness Area from the occasional truck accessing the well pad for maintenance or repairs. Additionally, improvements along Emery County Road 1026 will improve access and possibly increase visitation to Fivehole Arch and the surrounding parts of the Labyrinth Canyon Wilderness, thereby increasing contact with the sights and sounds of other visitors and decreasing the experience of solitude. Once final reclamation activities are completed, there would be no transportation truck traffic noise or visual impacts within or along the boundary of the Labyrinth Canyon Wilderness Area.

Supplemental Values/Special Features

The Labyrinth Canyon Wilderness Area provides suitable habitat for several federally listed threatened and endangered plant and animal species (and BLM sensitive species), including Jones cycladenia, Navajo sedge, Trotter's oreoxis, flat-top buckwheat, Utah spurge, entrada rushpink, and Mexican spotted owl. These species were not observed during the June 2020 biological surveys; therefore, no direct impacts to listed species are anticipated. However, there may be indirect impacts from the removal of 7.3 acres of potential habitat. In addition, the proposed well pad would directly impact scenic values, including the extensive views of red, buff, and purple sandstone canyons within the Labyrinth Canyon Wilderness Area. For more detail on visual impacts, see Section 3.10. However, as previously stated, impacts to scenic values from Alternative B would not be present at the more popular scenic locations of the wilderness area, such as Fivehole Arch trailhead, trail, and camping area, the Bowknot, or the Green River.

3.9.2.2.2 LABYRINTH CANYON UNIT B LWC AND SWEETWATER REEF UNIT A LWC

Alternative B would be located within the Labyrinth Canyon Unit B and Sweetwater Reef Unit A LWCs. Both of these units were not carried forward in the approved 2008 Price FO RMP and therefore are not being managed for LWC. The proposed Project would remove approximately 23.3 acres from the

Labyrinth Canyon Unit B LWC due to the construction of the well-pad, proposed pipeline ROW, and access road improvements. Because the Labyrinth Canyon Unit B LWC overlaps the Labyrinth Canyon Wilderness Area, the direct and indirect impacts to wilderness characteristics associated with Alternative B are expected to be similar.

The proposed Project would remove approximately 2.0 acres from the Sweetwater Reef Unit A LWC due to the construction of the proposed pipeline ROW. The proposed pipeline ROW would remove approximately 2.0 acres of vegetation from this LWC. Short-term direct impacts to naturalness would be related to the sights and noise associated with activities, vehicles, and equipment related to the construction of the proposed pipeline. There may be indirect impacts from the removal of 2.0 acres of potential habitat to the federally listed threatened and endangered plant and animal species discussed above. However, these species were not observed during the June 2020 biological surveys; therefore, no direct impacts to listed species would be anticipated.

There would be indirect long-term impacts to naturalness and to outstanding opportunities for solitude in the Sweetwater Reef Unit A LWC due to the presence of human development from vehicles and equipment traveling along Emery Country Road 1010 to the processing facility on SITLA lands during construction, drilling, and product transportation. Outstanding opportunities for primitive and unconfined recreation within the Sweetwater Reef Unit A LWC would not be affected by the proposed activity. Access on Emery Country Road 1010 and Emery County Road 1026 would be maintained.

3.9.2.2.3 MOAB FIELD OFFICE LABYRINTH ADDITIONS

The Moab FO Labyrinth is located approximately 2.1 miles east of the proposed Project, east of the Green River. All construction, operations, and maintenance would occur outside of the Labyrinth Additions. Alternative A would not remove any acreage from this unit.

There would be no direct long-term impacts to wilderness values, including apparent naturalness, outstanding opportunities for solitude, and supplemental values, within the Labyrinth Additions because the proposed Project is located outside of the Labyrinth Additions.

There would be indirect long-term impacts to naturalness and to outstanding opportunities for solitude along the western boundary Labyrinth Additions due to the presence of human development from vehicles and equipment that may be visible from the western boundary of the Labyrinth Additions while traveling along Emery Country Road 1010 and Emery County Road 1026 to the processing facility on SITLA lands during construction, drilling, and product transportation. Outstanding opportunities for primitive and unconfined recreation within the Labyrinth Additions would not be affected by the proposed activities. There would be no impacts to recreation access or visitation. The proposed Project would be located outside the boundaries of the Labyrinth Additions; therefore, there would be no direct impacts to supplemental values.

3.9.2.3 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, Twin Bridges would not be permitted to construct the well pad and pipeline ROW, nor would it make road improvements. Therefore, no additional activities would be conducted that could diminish wilderness characteristics within the Labyrinth Canyon Wilderness Area, Labyrinth Canyon Unit A and Unit B LWCs, the Sweetwater Reef Unit A LWC, of the Moab FO Labyrinth Additions.

3.9.2.4 *Cumulative Effects*

Impacts from past and present actions in the analysis area, defined as the Labyrinth Canyon Wilderness Area, Labyrinth Canyon Unit A and Unit B LWCs, the Sweetwater Reef Unit A LWC, and Moab FO Labyrinth Additions are captured in the discussion of the affected environment (Section 3.9.1). No RFFAs have been identified in the analysis area. No cumulative effects to wilderness characteristics, including naturalness, opportunities for solitude and primitive and unconfined recreation, and supplemental values, beyond the potential impacts discussed in Section 3.9.2, are expected in the analysis area.

3.10 VISUAL RESOURCES

The following section describes the inventory of visual resource values in proximity to the Project.

3.10.1 Affected Environment

The visual resources analysis area for this EA was determined to be a 5-mile buffer from the Project components, which encompasses the extent of the BLM foreground-middleground distance zone.

3.10.1.1 *Regulatory Framework*

As directed by FLPMA, the BLM is required to consider scenic values of public land as a resource that merits management and preservation, where determined through the land use planning process.

BLM Manual 8410-1, *Visual Resource Inventory* (VRI) (BLM 1986a), was developed to address this requirement. BLM Manual 8410-1 first focuses on developing an inventory of scenic values based on the following factors: 1) diversity of landscape features that define and characterize landscapes in a given planning area (scenic quality rating units [SQRUs]), 2) public concern for the landscapes that make up a planning area (sensitivity level rating units [SLRUs]), and 3) landscape visibility from public viewing locations (distance zones). These factors are collectively described as the VRI and are referred to as the VRI specifically for BLM-administered lands. Combined, these three factors determine VRI classes, which indicate the existing scenic values of BLM-administered lands. The BLM has identified VRI classes for both BLM-administered lands and non-BLM lands within the analysis area. Through the BLM's land use planning process, as described in BLM Manual 8410-1, VRM classes are established to provide management objectives in terms of allowable levels of disturbance (visual contrast) and noticeability. The definitions of the four VRM class objectives from BLM Manual 8410-1 are described in Table D-1 of Appendix D.

Compliance with these objectives is assessed using BLM Form 8400-4 (Visual Contrast Rating Worksheet), as directed by BLM Manual 8431, *Visual Resource Contrast Rating*, from selected key observation points (KOPs), which, in addition to determining compliance with VRM class objectives, also include the identification of additional visual mitigation to further reduce visual contrast (BLM 1986b). BLM Manual 8400 defines KOPs as "one or a series of points on a travel route or at a use area or potential use area, where the view of a management activity would be most revealing" (BLM 1984).

3.10.1.1.1 BLM PRICE FIELD OFFICE RESOURCE MANAGEMENT PLAN VISUAL RESOURCE DIRECTION

The BLM Price FO RMP has the following Project-associated direction regarding the management of visual resources (BLM 2008a:77):

- Use proper design techniques and mitigation measures, future projects and use authorizations under this plan to minimize contrast with the characteristic landscape and not exceed the VRM Management Class Standards.

3.10.1.1.2 COMPLIANCE WITH VISUAL RESOURCE MANAGEMENT CLASS OBJECTIVES

As described in Section 3.10.1.1, the BLM assigns VRM classes through the land use planning process to guide planning and project-level decisions. Compliance with the VRM class objectives and conformance with the BLM Price FO RMP are a FLPMA requirement. To determine compliance with the VRM class objectives, a contrast analysis is conducted from KOP locations as directed by BLM Manual 8431 (BLM 1986b).

3.10.1.2 *Scenery*

Scenery is defined as a continuous unit of land comprising harmonizing features that result in and exhibit a particular character. The BLM Price FO conducted its VRI in 2011 to identify existing scenic values, including the delineation of SQRUs and SLRUs (BLM 2011). The rating of SQRUs is based on the diversity of seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications to assign a scenic quality rating (Class A [most diverse], Class B, and Class C). SLRUs are inventoried to define the level of concern the public would express toward the visible modification of a particular landscape. The BLM assigns either a high, medium, or low sensitivity level that corresponds to the level of public concern. When reviewed together, SQRUs and SLRUs identify a landscape's visual appeal, as well as the public concern to modification of these landscapes.

The Project analysis area is in the Canyon Lands section of the Colorado Plateau physiographic province. This landscape is defined by the tributary rivers and streams of the Colorado River that have created numerous formations of visual interest, including plateaus, mesas, buttes, and canyons. The analysis area is largely undeveloped, with few human-made structures or other developments, and is a mostly natural landscape. The immediate landscape is stippled with smooth, fine-textured shrubland. The topography is characterized as a flat plateau with incised valleys and canyons; buttes and red rock outcrops dot the landscape. Soil colors range from tans to oranges and reds that contrast with the scattered silver and dark green vegetation. The San Rafael River runs to the east of the Project. From the surface of the plateau and elevated areas, many distant peaks—including the La Sal Mountains, which are approximately 45 miles from the area—are visible on clear days. Elevated locations in the vicinity of the Project offer 360-degree views of southeastern Utah.

3.10.1.2.1 ALTERNATIVE A

Project components proposed under Alternative A would be on VRI Class II, III, and IV lands. The proposed processing plant would be located on SITLA land, which was identified as VRI Class IV in the BLM VRI. The proposed well pad would be located on VRI Class II land, and the access road improvements and pipeline ROW would be on VRI Class II, III, and IV lands.

Specifically, Alternative A could potentially influence the SQRUs and associated SLRUs within the analysis area that are listed in Table 3-7 and Table 3-8.

Table 3-7. BLM Scenic Quality Rating Units Potentially Influenced by Alternative A

Unit Name	Class
Horseshoe Canyon	Class A
San Rafael Desert	Class C
San Rafael Desert Transition	Class C

Source: BLM (2011)

Table 3-8. BLM Sensitivity Level Rating Units Potentially Influenced by Alternative A

Unit Name	Sensitivity Level
Horseshoe	High
San Rafael Desert	Low

Source: BLM (2011)

3.10.1.2.2 ALTERNATIVE B

Project components proposed under Alternative B would be on VRI Class III and IV lands. The proposed processing plant would be located on SITLA land, which was identified as VRI Class IV in the BLM VRI. The proposed well pad would be located on VRI Class III land, and the access road improvements and pipeline ROW would be on VRI Class III and IV lands.

Specifically, Alternative B could potentially influence the SQRUs and associated SLRUs within the analysis area that are listed in Table 3-9 and Table 3-10.

Table 3-9. BLM Scenic Quality Rating Units Potentially Influenced by Alternative B

Unit Name	Class
San Rafael Desert	Class C
San Rafael Desert Transition	Class C

Source: BLM (2011)

Table 3-10. BLM Sensitivity Level Rating Units Potentially Influenced by Alternative B

Unit Name	Sensitivity Level
San Rafael Desert	Low

Source: BLM (2011)

3.10.1.3 *Viewing Locations*

Viewing locations represent places where the public would have potential views of the Project. The analysis area receives use from recreational users, including Five Hole Arch, as well as visitors passing through to Canyonlands National Park. This range of individuals defines the casual observer.

In the development of the BLM Price FO VRI, distance zones were identified in accordance with BLM Manual 8410-1, which identify public viewing locations at a broad planning scale. As described in BLM Manual 8431, KOPs are used to assess the level of change (contrast) introduced by a proposed project within a specific viewshed (BLM 1986b).

Five KOP locations were identified to assess both impacts on views and to determine compliance with BLM VRM class objectives (Table 3-11). Maps displaying the location of these KOP locations, in context with BLM VRM class objectives and viewshed analysis, are in Appendix D (Exhibit D-1). The viewshed analysis was run based on the design heights of the different Project components (i.e., well pad with equipment, road improvements, pipelines, and helium processing plant). The resulting analysis identifies the areas in the landscape where the Project would or would not be visible.

Table 3-11. Key Observation Points by Alternatives

KOP Number	KOP Name	Alternative A	Alternative B
1	San Rafael Desert Recreation Destination Route (Emery County Road 1010)	X	
2	Five Hole Arch Trail	X	X
3	Five Hole Arch Trailhead	X	X
4	Five Hole Arch Destination Route (Emery County Road 1026)		X
5	Horseshoe Canyon Recreation Destination Route (Emery County Road 1010)		X

These KOPs were identified through a combination of geographic information system (GIS) analysis and field observation. The KOPs were selected to encompass all major travel routes and observation points and to target specific views from recreational users within the foreground-middleground distance zone. Visual Contrast Rating Worksheets were completed for the KOPs. The findings of the visual contrast rating process are detailed in Appendix D (Exhibit D-2).

3.10.1.4 *Compliance with Visual Resource Management Class Objectives*

Current management objectives for visual resources in the vicinity of the Project are prescribed in the Price FO RMP (BLM 2008a). The proposed Project is located on VRM Class I, II, and III lands. The definitions of the VRM class objectives are detailed in Table D-1 of Appendix D. VRM classes are designated on BLM-administered lands only. To determine Project compliance with these VRM class objectives and conformance with the Price FO RMP, BLM Contrast Rating Worksheets were completed for the five identified KOP locations (Appendix D, Exhibit D-2).

3.10.1.4.1 ALTERNATIVE A

Project components proposed under Alternative A would be on BLM VRM Class II and Class III lands. The proposed processing plant would be located on SITLA land and is therefore not subject to BLM VRM compliance. The proposed well pad would be located on VRM Class II land, and the access road improvements and pipeline ROW would be on VRM Class II and Class III lands.

3.10.1.4.2 ALTERNATIVE B

Project components proposed under Alternative B would be on BLM VRM Class I, II, and III lands. The proposed processing plant is located on SITLA lands and is, therefore, not subject to VRM compliance. The proposed well pad is located in VRM Class I and III, while the access road improvements and pipeline ROW would be located in VRM Class II and III lands.

3.10.2 Environmental Consequences

This section presents potential impacts to visual resources from implementing management actions presented in Chapter 2. Existing conditions concerning visual resources management are described in Section 3.10.1.

3.10.2.1 *Analysis Methods and Assumptions*

As described in Section 3.10.1, the BLM assigns VRM classes through the land use planning process to guide planning and project-level decisions. Compliance with the VRM class objectives and conformance with the Price FO RMP are a FLPMA requirement. To determine compliance with the VRM class objectives, a contrast analysis is conducted from KOP locations, as directed by BLM Manual 8431.

An analysis of visual dominance, scale, and contrast was used in determining to what degree the proposed alternatives would attract attention and in determining the relative change in character compared with the existing characteristic landscape and its inherent scenic quality. The amount of visual contrast created by a project is directly related to the amount of attention that is drawn to a project feature in the landscape. Potential changes in the viewshed from sensitive viewing locations (KOPs) were also evaluated and characterized. Finally, the analysis of visual impacts was used in the determination of conformance of the BLM VRM objectives where the Project would occur on BLM-administered lands.

3.10.2.2 *Environmental Impacts – Alternative A*

3.10.2.2.1 SCENERY

Horseshoe Canyon (Class A)—The Project would begin to dominate the character of the Horseshoe Canyon landscape within the immediate viewshed of the well pad and pipeline ROW. These impacts would occur in a high sensitivity area with limited existing cultural modifications. The portion of the landscape on the canyon rim associated with Keg Spring Canyon would be the area most modified by the introduction of the well pad and associated infrastructure. Because the topography of the steep canyon walls provides screening of Project components, the Project would not dominate the landscape's overall character.

San Rafael Desert (Class C)—The Project would begin to dominate the character of the San Rafael Desert within the immediate viewshed of the processing plant and pipeline ROW. These impacts would occur in an area with limited existing cultural modifications but given the size and low sensitivity of the SRQU, the majority of the San Rafael Desert landscape would not be affected by the Project.

San Rafael Desert Transition (Class C)—The Project would only occupy a small area within this landscape. These impacts would occur in an area with limited existing cultural modifications, but given topographic screening, the low-profile nature of the pipeline ROW, and low sensitivity of the SRQU, the San Rafael Desert Transition landscape would be minimally affected by the Project.

3.10.2.2.2 VIEWING LOCATIONS

KOP 1—San Rafael Desert Recreation Destination Route (Emery County Road 1010). Impacts on views from this location would result from the introduction of vertical and geometric processing plant structures and surface disturbance related to the pipeline ROW. This KOP has an unobstructed view of the Project, with views of the processing plant occurring approximately 0.8 mile away. The processing plant components would introduce elements/patterns not common in the landscape that would be visually prominent and create moderate contrast, compared with other features in the landscape. Weak contrast would be introduced by the proposed pipeline ROW adjacent to Emery County Road 1010.

KOP 2—Five Hole Arch Trail. Impacts on views from this location would result from the introduction of vertical and geometric well-pad structures and surface disturbance related to the road improvements and pipeline ROW clearing. Views of the Project would occur approximately 1.6 miles away. Project components would create a weak contrast, given some topographic screening that would minimize dominance of views of the Project, as well as the application of mitigating measures outlined in the KOP contrast rating worksheet.

KOP 3—Five Hole Arch Trailhead. Impacts on views from this location would result from the introduction of vertical and geometric well-pad structures and surface disturbance related to the road improvements and pipeline clearing. Views of the Project would be approximately 1.9 miles away. Project components would create a weak contrast, given some topographic screening that would minimize dominance of views of the Project, as well as the application of mitigating measures outlined in the KOP contrast rating worksheet. A visual simulation conducted for this trailhead is included in Appendix D (Exhibit D-2).

3.10.2.2.3 COMPLIANCE WITH VISUAL RESOURCE MANAGEMENT CLASS OBJECTIVES

On the basis of the contrast rating analysis conducted from three identified KOP locations, the Project under Alternative A would meet objectives associated with BLM VRM Class II and III lands (see Table D-1 for definitions of BLM VRM class objectives) where these classes are crossed and would therefore be compliant with visual resource direction in the Price FO RMP. A summary of the visual contrast assessed from each KOP follows, with the completed contrast rating worksheets provided in Appendix D (Exhibit D-2).

KOP 1—San Rafael Desert Recreation Destination Route (Emery County Road 1010). Visual contrast introduced by the Project (pipeline ROW) would be weak as the ROW becomes revegetated; it would begin to repeat the form, line, color, and texture found in the existing setting. Therefore, the Project would meet the objectives associated with BLM VRM Class III land. The processing plant would not be located on BLM-managed lands; therefore, VRM compliance is not required.

KOP 2—Five Hole Arch Trail. Visual contrast introduced by the Project on views from this KOP would be weak, given the distance, topographic screening between this viewpoint and the Project, and mitigating measures outlined in the KOP contrast rating worksheet. Therefore, the Project would meet the objectives associated with BLM VRM Class II and Class III lands.

KOP 3—Five Hole Arch Trailhead. Visual contrast introduced by the Project on views from this KOP would be weak, given the distance, topographic screening between this viewpoint and the Project, and mitigating measures outlined in the KOP contrast rating worksheet. Therefore, the Project would meet the objectives associated with BLM VRM Class II and Class III lands.

3.10.2.3 *Environmental Impacts – Alternative B*

3.10.2.3.1 SCENERY

San Rafael Desert (Class C)—The Project would begin to dominate the character of the San Rafael Desert within the immediate viewshed of the processing plant and pipeline ROW. These impacts would occur in an area with limited existing cultural modifications but given the size and low sensitivity of the SRQU, the majority of the San Rafael Desert landscape would not be affected by the Project.

San Rafael Desert Transition (Class C)—The Project would begin to dominate the character of the San Rafael Desert Transition within the immediate viewshed of the well pad, road improvements, and pipeline ROW. These impacts would occur in an area with limited existing cultural modifications. This landscape was identified as a low sensitivity area in the Price FO VRI, with topography that intermittently screens Project components; therefore, the Project would modify the existing character within the immediate viewshed but not dominate the landscape.

3.10.2.3.2 VIEWING LOCATIONS

KOP 2—Five Hole Arch Trail. Because the level of topographic screening adjacent to this viewpoint, views of the Project would be mostly screened from this location.

KOP 3—Five Hole Arch Trailhead. Because of the level of topographic screening adjacent to this viewpoint, views of the Project would be screened from this location.

KOP 4—Five Hole Arch Destination Route (Emery County Road 1026). Impacts on views from this location would result from the surface disturbance related to the road improvements and pipeline ROW clearing. This view toward Keg Knoll is adjacent to the proposed location of Project components. Through the application of mitigating measures, the proposed surface disturbance and road improvements would repeat the form, line, color, and texture associated with the existing road. Some intermittent topographic screening would minimize the dominance of views of the Project and would create a weak contrast in the existing setting.

KOP 5—Horseshoe Canyon Recreation Destination Route (Emery County Road 1010). Impacts on views from this location would result from the introduction of vertical and geometric processing plant structures and surface disturbance related to the road improvements and pipeline ROW clearing. This KOP has an unobstructed view of the proposed processing plant location that is approximately 1.2 miles away. The processing plant components would introduce elements/patterns not common in the landscape that would be visually prominent and create moderate contrast, compared with other features in the landscape. Weak contrast would be introduced by the proposed pipeline ROW adjacent to Emery County Road 1010.

3.10.2.3.3 COMPLIANCE WITH VISUAL RESOURCE MANAGEMENT CLASS OBJECTIVES

On the basis of the contrast rating analysis conducted from four identified KOP locations, the Project under Alternative B would meet objectives associated with BLM VRM Classes I, II, and III lands (see Table D-1 for definitions of BLM VRM class objectives) where these classes are crossed and would therefore be compliant with visual resource direction in the Price FO RMP. A summary of the visual contrast assessed from each KOP follows, with the completed contrast rating worksheets provided in Exhibit D-2 of Appendix D.

KOP 2—Five Hole Arch Trail. Given the level of topographic screening adjacent to this viewpoint, views of the Project would be mostly screened from this location; therefore, the Project would meet the objectives associated with BLM VRM Class I and Class III lands.

KOP 3—Five Hole Arch Trailhead. Given the level of topographic screening adjacent to this viewpoint, views of the Project would be screened from this location; therefore, the Project would meet the objectives associated with BLM VRM Class I and Class III lands.

KOP 4—Five Hole Arch Destination Route (Emery County Road 1026). The Project, where visible, would repeat the form, line, color, and texture associated with the existing road after application of mitigating measures as outlined in the KOP worksheet. Because of partial intermittent topographic screening of the Project, located adjacent to the KOP, the overall visual contrast was identified as weak. Therefore, the Project would meet the objectives associated with BLM VRM Class II land.

KOP 5—Horseshoe Canyon Recreation Destination Route (Emery County Road 1010). Visual contrast introduced by the Project (pipeline ROW) would be weak as the ROW becomes revegetated; it would begin to repeat the form, line, color, and texture found in the existing setting. Therefore, the Project would meet the objectives associated with BLM VRM Class III land. The processing plant would not be located on BLM-managed lands; therefore, VRM compliance is not required.

3.10.2.4 *Environmental Impacts – Alternative C: No Action Alternative*

Under the No Action Alternative, Twin Bridges would not be permitted to construct the well pad and pipeline ROW, nor would it make road improvements. Therefore, impacts on scenery and views would be avoided, and because there would be no noticeable change introduced by the No Action Alternative on BLM-administered lands, this alternative would be compliant with BLM VRM class objectives.

3.10.2.5 *Cumulative Effects*

Impacts from the past and present actions in the analysis area, defined as a 5-mile buffer from Project components, are captured in the discussion of the affected environment (Section 3.10.1). No RFFAs have been identified in the analysis area. No cumulative effects to visual resources, beyond the potential impacts discussed in Section 3.10.2, are expected in the analysis area.

CHAPTER 4. CONSULTATION AND COORDINATION AND LIST OF PREPARERS

4.1 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

Table 4-1 lists the agencies and other entities that have been consulted or coordinated with regarding the development of this EA for the proposed Project.

Table 4-1. Coordination and Consultation

Name	Purpose & Authorities for Consultation or Coordination	Findings and Conclusions
Utah State Historic Preservation Office (SHPO)	Consultation for undertakings, as required by the National Historic Preservation Act (NHPA) (16 USC 470)	The Bowknot #5-1 well pad location, gathering facility, associated pipeline, and access were surveyed on July 26 and August 13, 2019 (U19MQ0464). The BLM determined the proposed undertaking to result in No Historic Properties Affected, pursuant to 36 CFR 800.4(d). The Utah State Historic Preservation Office (SHPO) concurred with these findings on September 12, 2019. The second cultural resources Class III intensive field survey was required for the proposed Bowknot 36-1 well pad, pipeline, access road, and helium plant to identify any historic properties that may be affected by the undertaking. The survey was conducted on May 22 and 23, 2020, by Montgomery Archaeological Consultants, Inc. There were six sites recorded in the APE, none of which are eligible for inclusion in the National Register of Historic Places. A second BLM determination of No Historic Properties Affected has been made for this undertaking. SITLA reviewed and approved the Class III results August 27, 2020, and Utah SHPO concurred with the eligibilities and undertaking effect determination on September 17, 2020.
Native American Tribes	Consultation as required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and NHPA (16 USC 1531) EO 13007	Tribal letters were sent on August 26, 2020, to 16 tribal governments to initiate tribal consultation. The Navajo Nation responded on September 8, 2020, saying there are no Navajo Nation TCPs in the area and the BLM may proceed with the Project without further consultation. The Paiute Indian Tribe of Utah responded on September 8, 2020, saying they are currently not aware of any tribal locations of religious or cultural significance and they have no objections to the Project. The Santa Clara Pueblo responded on September 25, 2020, with a request for Section 106 information. The Price FO archaeologist responded on September 28, 2020, with the results of the Class III surveys, determinations of No Historic Properties Affected, and SHPO concurrence dates.
U.S. Fish and Wildlife Service (USFWS)	Consult with USFWS as the agency with expertise on impacts.	Informal Section 7 consultation with the USFWS and BLM is ongoing.

4.2 LIST OF PREPARERS

Table 4-2 identifies BLM and non-BLM staff who prepared and reviewed this EA.

Table 4-2. List of BLM and Non-BLM Preparers and Reviewers

Name	Title	EA Document Responsibility
BLM Preparers and Reviewers		
David Gordon	Natural Resource Specialist	Project management, document review
Joseph Rodarme	Planning and Environmental Specialist	NEPA compliance, document review
Gerald Kenczka	Assistant Field Office Manager	Document review
Rebecca Anderson	Natural Resource Specialist	Water resources
Blake Baker	Outdoor Recreation Planner	Recreation, visual resources, wilderness
Stephanie Bauer	Rangeland Management Specialist	Soils
Robin Naeve	Wildlife Biologist	General wildlife, special status plants and wildlife
Natalie Fewings	Archaeologist	Cultural resources
Veronica Kratman	Lands and Realty Specialist	Lands and Access
Mike Tweddell	Rangeland Management Specialist	Vegetation
Erik Vernon	Air Quality Specialist, Utah State Office	Air quality and GHG emissions
Non-BLM Preparers and Reviewers		
SWCA		
Kevin Rauhe	Environmental Planner	Project management and Chapters 1 and 2
Reid Persing	Natural Resources Director	Quality assurance/quality control
Jeff Stovall	Regional Air Quality Manager	Air quality and GHG emissions
Carlos M. Ituarte-Villarreal	Air Quality Specialist	Air quality and GHG emissions
KayLee Lavery	Environmental Planner	Soils and vegetation
Chad Incorvia	Ecologist	Special status plants
Jennifer Clayton	Environmental Planner and Scientist	General wildlife, special status plants and wildlife
Kelly Beck	Principal Investigator	Cultural resources
Jeremy Eyre	Environmental Planner	Recreation, lands, and access
Alex Simons	Environmental Planner	Wilderness and LWCs
Laren Cyphers	Environmental Planner	Visual resources
Kerri Flanagan	Technical Editor	Technical editing
Debbi Smith	Desktop Publisher	Formatting and Section 508 Accessibility
Kimberly Proa	Document Formatter	Formatting

APPENDIX A

Federal, State, and Local Approvals

Table A-1. Federal, State, and Local Approvals

Issuing Agency	Nature and Nature of Permit and Approval	Regulatory Authority (if appropriate)	Applicable Project Component
Federal Agencies			
BLM	Permit to Drill, Deepen, or Plug Back; Plugging and Abandonment; Venting; or Flaring. Controls drilling for helium on federal onshore lands.	MLA (30 USC 181 et seq.); 43 CFR 3162; National Mining and Minerals Policy Act of 1970; Federal Onshore Oil and Gas Leasing Reform Act of 1987 (Onshore Oil and Gas Order Nos.1 and 2 (43 CFR 3164))	Well drilling, flaring, and abandonment
	ROW grant and temporary-use permit.	FLPMA (Public Law 94-579); 43 USC 1761 et seq.; 43 CFR 2800	Off-lease well pad, pipeline ROW, and access road
	Antiquities, Cultural, and Historic Resource Permits. Antiquities and cultural resources use permits to inventory, excavate, or remove cultural or historic resources from federal lands.	Antiquities Act of 1906 (16 USC 431–433); Archaeological Resources Protection Act of 1979 (16 USC 470aa–47011); 43 CFR 3; National Historic Preservation Act (NHPA) of 1966, Section 106	All surface-disturbing activities
	Approval to dispose of produced water; controls disposal of produced water from federal leases.	MLA (30 USC 181 et seq.); 43 CFR 3164; Onshore Oil and Gas Order No. 7	All surface-disturbing activities
	Pesticide Use Permit and Daily Pesticide Application Record.	BLM Authorization for Herbicide Applications on Federal Lands	Well, pipeline ROW, and access road
	Federal Noxious Weed Act compliance. Control of noxious weeds.	Plant Protection Act of 2000 (Public Law 106-224, 7 USC 7701); Federal Noxious Weed Act of 1974, as amended (7 USC 2801–2814); EO 13112 (February 3, 1999)	Any occurrence of noxious weeds on or near Project components
	Initiation of ESA Section 7 consultation.	ESA of 1973, Section 7, as amended (16 USC 1531 et seq.)	Potential impacts to federally listed threatened and endangered species
	Paleontological Resource Use Permit. Approval for surveys and potential data collection at well pad, pipeline ROW, and access road.	FLPMA (Section 302(b))	All surface-disturbing activities

Issuing Agency	Nature and Nature of Permit and Approval	Regulatory Authority (if appropriate)	Applicable Project Component
USFWS	ESA Section 7 consultation.	ESA, Section 7, as amended (16 USC 1531 et seq.)	Potential Project-related impacts to federally listed threatened and endangered species
	MBTA.	MBTA of 1918, as amended (15 USC 703–712); EO 13186	Potential Project-related impacts to migratory birds
	BGEPA.	BGEPA of 1940, as amended (16 USC 668–668d)	Potential Project-related impacts to bald and golden eagles
Advisory Council on Historic Preservation	Cultural resources compliance (Section 106); coordinated with the Utah State Historic Preservation Office (SHPO).	NHPA, Section 106	Potential Project-related impacts to prehistoric and historic archaeological resources
State of Utah			
Utah Division of State History, Utah SHPO	Consult on Section 106 compliance process; approve cultural resource clearances; provide for protection of cultural resources.	NHPA, Section 106	All surface-disturbing activities with potential to affect archaeological resources
UDOGM	Regulates activities associated with drilling of helium wells in state, well spacing, and flaring or venting of gas.	Permitting of Wells, Utah R649-3-4 et seq.	Well drilling, flaring, and abandonment
Utah Division of Water Rights	Approval to Appropriate Water or Change in Nature of Use Application. Grants permit to appropriate water; authorization of change of use on water rights.	Utah Code 73-3-2	Nonconsumptive and consumptive water uses
Utah Division of Water Resources	Determination of adequate water supply and cumulative impacts on water supply. Clean Water Act (CWA) Section 401, Water Quality Certification.	CWA, as it pertains to state government (Section 401)	Nonconsumptive and consumptive water uses
Utah Division of Wildlife Resources	Protection and management of state wildlife and fish resources. Consultation and input on fish and wildlife habitat.	Utah Code 23-13 through 23-21	All surface-disturbing activities

Issuing Agency	**Nature and Nature of Permit and Approval**	**Regulatory Authority (if appropriate)**	**Applicable Project Component**
Utah Division of Air Quality	Fugitive Dust Control.	Fugitive Dust Rules, Utah R307-205	All surface-disturbing activities
	Air Quality Permit.	Permit: New and Modified Sources, Utah R307-401	Helium gas processing plant
	Oil and Gas Well permit by rule.	Oil and natural gas exploration and production operations, Utah R307-501 to R307-511	Exploration, production, and transmission operations
SITLA	Special Use Lease.	Utah Code R850-30	Processing plant
	Easement.	Utah Code R850-40	Pipeline ROW and plant access road
Utah Department of Transportation	Transport Permit. Authorizes oversize, over length, and overweight load transportation on state highways.	Motor Carrier Rules, Utah R909-1	Transportation of equipment and materials on state highways
Local Government			
Emery County	County zoning/land use plan consultation.	Emery County Code; Emery County General Plan (revised 2016)	Well, pipeline ROW, and access road
	Road use permit.	Emery County Code	Transportation of equipment and materials on county roads
	Noxious Weed Act enforcement.	Emery County Code	All surface-disturbing activities
	Solid waste disposal permits.	Emery County Code	Disposal of waste materials

APPENDIX B

BLM Interdisciplinary Team Checklist

INTERDISCIPLINARY TEAM CHECKLIST

RESOURCES AND ISSUES CONSIDERED (INCLUDES SUPPLEMENTAL AUTHORITIES APPENDIX 1 H-1790-1)

Project Title: Bowknot Helium Project
NEPA Log Number:
File/Serial Number:
Project Leader: Marc Johnson

Determination of Staff: (Choose one of the following abbreviated options for the left column)
NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for relevant impact that need to be analyzed in detail in the EA
NC = (DNAs only) actions and impacts not changed from those disclosed in the existing NEPA documents cited in Section D of the DNA form. The Rationale column may include NI and NP discussions.

Determination	Resource/Issue	Rationale for Determination	Signature	Date
PI	Air Quality and GHG Emissions	Dust and vehicle emissions would be generated during the Project. Emissions from earth-moving equipment, vehicle traffic, drilling and completion activities, separators, flaring, oil storage tanks, dehydration units, and daily tailpipe and fugitive dust emissions could adversely affect air quality and contribute to GHG emissions. Stipulations would be similar to those for oil and gas wells (Tier II, dust suppression, VOC controls, etc.).	Joseph Rodarme	7/24/2020
NP	BLM Natural Areas	There are no BLM natural areas within the proposed Project area, per GIS and RMP review.	Blake Baker	7/1/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NP	Cultural: Archaeological Resources	Pursuant to Section 106 of the National Historic Preservation Act and its guiding regulations at 36 CFR 800, two Class III cultural resource surveys were conducted by Montgomery Archaeological Consultants, Inc. for this undertaking. The **Bowknot #5-1** well pad location, gathering facility, associated pipeline, and access were surveyed on July 26 and August 13, 2019 (U19MQ0464) . The BLM determined the proposed undertaking to result in No Historic Properties Affected, pursuant to 36 CFR 800.4(d). The Utah State Historic Preservation Office (SHPO) concurred with these findings on September 12, 2019. The second cultural resources Class III intensive field survey was required for the proposed **Bowknot 5-2 & 36-1 well pad, pipeline, access road, and helium plant** to identify any historic properties that may be affected by the undertaking. The survey was conducted on May 22 and 23, 2020, by Montgomery Archaeological Consultants, Inc. There were six sites recorded in the APE, none of which are eligible for inclusion in the National Register of Historic Places. A second BLM determination of No Historic Properties Affected has been made for this undertaking. SITLA reviewed and approved the Class III results August 27, 2020, and UT SHPO concurred with the eligibilities and undertaking effect determination on September 17, 2020.	Natalie Fewings	9/17/2020
NP	Cultural: Native American Religious Concerns	Pursuant to 36 CFR 800.3(c)(1) and BLM Manual 1780, consultation letters (for both Bowknot 5-1 & 5-2) were mailed on August 26, 2020, to 16 tribal governments who have identified themselves as culturally affiliated with the area. Consulted tribes have 30 calendar days to respond, pursuant to 36 CFR 800.3(c)(4); the consultation period ended September 25, 2020. The Navajo Nation responded on September 8, 2020, saying there are no Navajo Nation TCPs in the project area and the BLM may proceed with the project without further consultation. The Paiute Indian Tribe of Utah responded on September 8, 2020, saying they are currently not aware of any tribal locations of religious or cultural significance and they have no objections to the project. The Santa Clara Pueblo responded on September 25, 2020, with a request for Section 106 information. The PFO archaeologist responded on September 28, 2020, with the results of the Class III surveys, determinations of No Historic Properties Affected, and SHPO concurrence dates.	Natalie Fewings	9/28/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NP	Designated Areas: National Historic Trails	There are no national historic trails within the proposed Project area, per GIS and RMP review.	Blake Baker	7/1/2020
NP	Designated Areas: Areas of Critical Environmental Concern	There are no areas of critical environmental concern within the proposed Project area, per GIS and RMP review.	Blake Baker	7/1/2020
NI	Designated Areas: Wild and Scenic Rivers	Portions of the Green River that were designated as wild and scenic rivers in the John D. Dingell Jr. Conservation, Management, and Recreation Act are within the three-mile buffer that was used to analyze recreation impacts. BLM administers the designated wild and scenic river corridor a ¼ mile from the high-water mark on either side of the river per the Wild and Scenic River Act. The river corridor below the high-water mark is managed by Utah Division of Forestry, Fire, and State Lands. **Alternative A, well pad 36-1**: The proposed action would occur over 2 miles from the Green River. The proposed developments would be within 0.5 mile of Keg Spring, which is a tributary to the Green River. **Alternative** B**, well pad 5-1**: The proposed action would occur over 2 miles away from and approximately 670 feet above the Green River.	Blake Baker David Gordon	7/1/2020 10/8/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
PI	Designated Areas: Wilderness/ Wilderness Study Areas	**5-1**: The lease sale of the parcel occurring in the NW1/4 NE1/4 of Section 7, T26S, R17E, Emery County, Utah, predates the designation of the Labyrinth Canyon Wilderness. The Dingell Act, signed March 12, 2019, designated the Labyrinth Canyon Wilderness. The Lease Sale EA was signed February 8, 2019. Technical requirements of the well pad may require it to be larger than the size of the cherry stem. A valid existing right in the form of a mineral lease issued prior to wilderness designation exists. The terms and conditions of the lease provide the leaseholder the right to develop the lease. Section 4(c) of the Wilderness Act describes how valid existing rights are to be managed in wilderness areas. **36-1**: The proposed action would occur entirely within the cherry stem adjacent to the Labyrinth Canyon Wilderness Area. Prior to the passing of the Dingell Act in March 2019, there were no wilderness areas in the Price FO, including the area of the proposed action. The Dingell Act created the Labyrinth Wilderness Area, which is adjacent to or near the proposed developments. The wilderness boundary and proposed disturbance boundary were closely reviewed. It has been determined that they do not overlap. Consideration was then given to impacts within the wilderness area from the proposed activity because they are adjacent to each other. The Dingell Act states: "Congress does not intend for the designation of the wilderness areas to create a protective perimeter or buffer zones around the wilderness areas. The fact that non-wilderness activities or uses can be seen or heard from within a wilderness area shall not preclude the conduct of those activities outside the boundary of the wilderness area" (Part II, Subpart B, Section 1232). This makes it clear that the activity as proposed does not impact wilderness even if it may be considered present.	Blake Baker	7/1/2020
NI	Environmental Justice	No minority or economically disadvantaged communities or populations would be disproportionately adversely affected (physically or economically) by the proposed action or alternatives because none are present in or adjacent to the Project area.	Marc Johnson	5/4/2020
NP	Farmlands (prime/unique)	According to the NRCS soil survey and knowledge of the area, there are no prime/unique farmlands within the Project area.	Stephanie Bauer	6/12/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NI	Fuels/Fire Management	Implementation of the proposed action would have no significant impact on fuels/fire management because the Project is small in scope and fuels and vegetation are sparse. In the event of a wildland fire, the area would not support an active fire.	Blaine Tarbell	7/20/2020
NP	Geology/Minerals/ Energy Production	Based on existing GIS data, there are no locatable claims or salable minerals located within the Project area. These locations are also stratigraphically well below any recoverable coal resources.	Rebecca Anderson	5/19/2020
NI	Invasive Plants/ Noxious Weeds	Surface-disturbing activities have the potential to introduce/spread invasive species/noxious weeds. There are noxious weeds within the Project area along the main county road. Russian thistle, halogeton, and cheatgrass are invasive species that are present within the Project area along roads and in disturbed areas. Best management practices like washing vehicles to remove mud and vegetative material before entering BLM-administered lands will be part of the permit. Applicant will be responsible for any noxious weed infestations due to Project implementation.	Stephanie Bauer	6/12/2020
NI	Lands/Access	A review of the Master Title Plat and LR2000 showed that the proposed action is compatible with the existing land use and authorized ROWs. There are no conflicts with other land use authorizations. A ROW would need to be obtained for the pipeline and road access.	Veronica Kratman	9/2/2020
PI	Lands with Wilderness Characteristics	**5-1**: The proposed action is within the UT-020-SRD-Labyrinth Canyon B LWC unit that was determined to possess wilderness character prior to the Labyrinth Canyon Wilderness designation in March 2019. The area of the proposed action is located partially within designated wilderness, with the remainder within the designated route, which was cherry stemmed from the LWC inventory unit and therefore outside the inventoried lands with wilderness character. **36-1**: The proposed action is within the UT-020-SRD-Labyrinth Canyon A and UT-020-SRD-Sweetwater Reef A LWC units. These units were determined to possess wilderness character prior to the Labyrinth Canyon Wilderness designation in March 2019. The Labyrinth Canyon A and Sweetwater Reef A LWC units were not carried forward in the approved RMP and therefore are not being managed for LWC. However, analysis will be completed to identify the number of acres that will no longer qualify as LWC if the proposed developments are implemented.	Blake Baker	7/22/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NI	Livestock Grazing	The proposed action is within the Saucer Basin grazing allotment, but should not affect livestock grazing, because the Project is small compared to the allotment. Any disturbance of existing range facilities (pipelines, troughs, corrals) will be rebuilt/repaired by the applicant to the same condition or better than as found.	Mike Tweddell	7/23/2020
NI	Paleontology	Based on GIS data, the Project area lies within Class 2 and Class 3 areas of the Potential Fossil Yield Classification System. Class 2 has a low probability of impacting paleontological resources, and further assessment is unnecessary. Class 3 has a moderate likelihood of containing paleontological resources, but these occurrences are widely scattered, and potential for an authorized land use to impact a significant paleontological resource is known to be low to moderate. Operations could uncover vertebrate fossils, and if this happens, work should immediately halt in that location and the Price FO should be notified.	Rebecca Anderson	5/19/2020
PI	Plants: BLM Sensitive	Based on analysis of geology, soils, elevation, surrounding plant communities, and occurrence data, suitable or occupied habitat is recorded, modeled, or expected to be within the Project Area for: • *Eriogonum corymbosum smithii* • *Euphorbia nephradenia* • *Lygodesmia grandiflora* var. *entrada* • *Oreoxis trotteri* Because surface disturbance has the potential to affect the habitat and recorded individuals of these species, impacts will need to be analyzed in detail.	Kegen Benson	7/10/2020
NP	Plants: Threatened, Endangered, Proposed, or Candidate	The USFWS Information for Planning and Conservation (IPaC) official species list indicates potential occurrence for: • Jones cycladenia • Navajo sedge Analysis of geology, soils, elevation, surrounding plant communities, occurrence data, and a 2020 site visit indicated that neither habitat nor individuals are present at the proposed Project locations, and further analysis is not required.	Kegen Benson	7/10/2020
NI	Rangeland Health Standards	No impact to rangeland health standards are expected due to the proposed Project's small size in relation to ongoing development within the Price FO.	Mike Tweddell	7/23/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
PI	Recreation	**5-1**: Dispersed recreation, such as camping and hiking, currently occurs throughout the year within and around the proposed Project area. The current use would not be considered intensive. However, the existing access road would be improved, likely leading to additional vehicle travel and recreation activity within the area. Visitors would be forced to drive past the proposed developments to access the Five Hole Arch. During production, the developments would only be seen for a short while, as they would only be 6 feet above the landscape. The elevation of the road drops shortly before and after the proposed well-pad location, limiting the viewshed of the proposed action. The proposed developments would not be seen from the Five Hole Arch trailhead, the arch itself, or the dispersed camping areas. **36-1**: Dispersed recreation, such as camping and hiking, currently occurs throughout the year within and around the proposed Project area. The current use would not be considered intensive. However, the existing access road would be improved, likely leading to additional vehicle travel and recreation activity within the area. The majority of recreation activity occurs 2 miles southeast across the canyon at the Five Hole Arch trailhead, and from the trailhead location, the proposed developments would likely be seen by the casual observer.	Blake Baker	7/1/2020
NI	Socioeconomics	No impact to the social or economic status of the county or nearby communities would occur from this Project due to its small size in relation to the ongoing development throughout the Price FO.	Marc Johnson	5/4/2020
PI	Soils: Physical/ Biological	The soils within the Project area are fairly uniform on a sand sheet landscape called surficial eolian deposits. This is considered sand deposits from parent material and is erodible under high-wind conditions. This soil does not hold water, so all holding pits need to be lined to prevent contamination of the water table. The Project area has some exposed outcrops of bedrock. Mixing of soil in this area is not a concern; however, reclamation of the area will be an issue due to the topsoil being mostly sand, and the area is unlikely to be reclaimed.	Stephanie Bauer	6/12/2020
PI	Vegetation	There is relatively minimal vegetation in the Project area due to the type of soil present. The Project will displace vegetation over the long term, and reclamation success is unlikely due to the soil type.	Mike Tweddell	7/23/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
PI	Visual Resources	**5-1**: The proposed action is found to be located within VRM Class I and VRM Class III. Based on the level of development proposed at the site, impacts to visual resources are expected. For this Project, a visual contrast rating analysis would be completed. Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors to make the infrastructure less noticeable. Additional mitigation measures would be needed for the developments to remain in conformance with the VRM class objectives. Potential impacts to visual resources will be analyzed in detail in the EA. **36-1**: The proposed action is found to be located within VRM Class II and VRM Class III. Based on the level of development proposed at the site, impacts to visual resources are expected. For this Project, a visual contrast rating analysis would be completed. Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors to make the infrastructure less noticeable. Additional mitigation measures may be needed for the developments to remain in conformance with the VRM class objectives. Potential impacts to visual resources will be analyzed in detail in the EA.	Blake Baker	7/20/2020
NI	Wastes (hazardous/solid)	No chemicals subject to Superfund Amendments and Reauthorization Act (SARA) Title III in amounts greater than 10,000 pounds would be used. No hazardous substances defined in 40 CFR 355 and threshold planning quantities should be used. Trash containers and portable toilets would be located on construction sites during drilling and pipeline installation.	Marc Johnson	5/4/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NI	Water: Groundwater Quality	Maintenance and refueling of equipment could impact water quality. However, standard protocols would minimize possibility of releases. Drill holes will be cased to an elevation below 5,800 feet or when groundwater is encountered. No surface disturbance or occupancy would be maintained within 660 feet of any natural springs to protect the water quality of the spring. No new disturbance will be allowed in areas equal to the 100-year floodplain or 100 meters on either side of the center line of any stream, stream reach, or riparian area. At the time of development, drilling operators will conform to the provisions of the operational regulations and Onshore Oil and Gas Order No. 2, which requires the protection and isolation of all usable quality waters. High-country watershed areas would be closed seasonally from December 1 to April 15 to surface-disturbing activity at elevations above 7,000 feet. All soils with high erosion potential need care to prevent accelerated erosion that could be transported to streams that are already listed on the 303d list. This will be accomplished by careful placement of drill pads and access routes. Regular maintenance on roads and pads in highly erosive soils will be required.	Rebecca Anderson	5/19/2020
NI	Water: Hydrologic Conditions (stormwater)	There are intermittent streams near the Project area. The proposed Project area will drain into these zones. The applicant will apply the mitigation measures, construction methods, and stabilization/reclamation measures outlined in the plan of development for the proposed action and best management practices. Hydrologic conditions are not expected to be impacted as a result of the proposed action; therefore, detailed analysis is not required. The proposed action is exempt from stormwater requirements under the Clean Water Act (CWA) Section 402(l). It states that the Environmental Protection Agency shall not require, nor force a state to require, a CWA Section 402 permit for discharges of stormwater runoff from oil and gas exploration, production, processing, or treatment operations. This includes well sites, drill pads, access, and maintenance roads.	Rebecca Anderson	5/19/2020
NI	Water: Municipal Watershed/ Drinking Water Source Protection	There are no municipal watersheds or drinking water source protection zones within or near the Project area, per GIS review.	Rebecca Anderson	5/19/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NI	Water: Streams, Riparian Wetlands, Floodplains	Due to the limited surface disturbance and following best management practices outlined in proposed plan of development, the proposed action is not expected to significantly impact these resources lower in the watershed; therefore, detailed analysis is not required.	Rebecca Anderson	5/19/2020
NI	Water: Surface Water Quality	Intermittent streams are present just north of the Project area. Due to the limited surface disturbance and following best management practices outlined in proposed plan of development, the proposed action is not expected to significantly impact surface water quality; therefore, detailed analysis is not required.	Rebecca Anderson	5/19/2020
NI	Water: Water Rights	Changes in water quality or quantity in the watershed can affect the ability to use and develop water rights. Due to the limited surface disturbance and following best management practices outlined in the proposed plan of development, the proposed action is not expected to significantly impact water quality or quantity, therefore no significant impacts to water rights is expected and detailed analysis is not required.	Rebecca Anderson	5/19/2020
NI	Water: Waters of the U.S.	Waters of the U.S. include tributaries to navigable waters. There are intermittent streams near the Project area that flow into the Green River. Due to the limited new surface disturbance, and if the applicant applies the mitigation measures, construction methods, and stabilization/reclamation measures outlined in the plan of development for the proposed action and follows the best management practices outlined in the BLM Goldbook, the proposed action is not expected to significantly impact this resource; therefore, detailed analysis is not required.	Rebecca Anderson	5/19/2020
NP	Wild Horses and Burros	The proposed Project is not within a wild horse or burro herd management area.	Mike Tweddell	7/23/2020
PI	Wildlife: Migratory Birds (including raptors)	Based on review of observation records, habitat requirements, GIS, modeled habitat and 2020 site visit, Project area and nearby canyon contain suitable foraging and nesting habitat for raptor species, and high-value migratory bird habitat is mapped along the canyon bottom, within 0.25 mile of the Project site. Because the proposed Project will necessitate increased vehicle traffic, construction, increased noise, and increased human presence in the area, all of which has the potential to impact these species, detailed analysis is required. Surveys would be required within 0.5 mile of Project area; depending on results, “PI” could change to “NP.”	Kegen Benson	7/10/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
NI	Wildlife: Fish (designated or non-designated)	Designated: Water used for this Project is considered historical, as the water right was put into use prior to 1988. In 1988, the Upper Colorado River Endangered Fish Recovery Program (UCRRP) was created. In 1993, the UCRRP participants implemented a Section 7 agreement. This agreement established the UCRRP and its activities as the reasonable and prudent alternative to avoid jeopardy for the endangered fishes from impacts caused by depletions from the Upper Colorado River Basin. No impacts beyond what was analyzed in the 1993 Section 7 agreement are expected; therefore, detailed analysis is not required. All Fish Species: No fish are within or near the Project area. Due to the limited surface disturbance and following best management practices outlined in the proposed plan of development, the Project is not expected to significantly impact downstream populations; therefore, detailed analysis is not required. Impacts to habitat are addressed in the streams, floodplains portion of this document.	Jerrad Goodell	7/28/2020
PI	Wildlife: Non-USFWS Designated	Based on review of observation records, habitat requirements, GIS, and modeled habitat, there is potential for the following habitats: • Desert bighorn sheep – year-long crucial • Pronghorn – year-long crucial Because proposed Project will necessitate increased vehicle traffic, construction, increased noise, and increased human presence in the area, all of which has the potential to impact these species, detailed analysis is required.	Kegen Benson	7/10/2020

Determination	Resource/Issue	Rationale for Determination	Signature	Date
PI	Wildlife: BLM Sensitive	Based on review of observation records, habitat requirements, GIS, and modeled habitat, there is potential for several BLM sensitive species' habitats to occur in or around the Project area: • Kit fox • Great Plains toad • Monarch butterfly • Western bumblebee • Great Plains rat snake Bats: Townsend's big-eared bat, spotted bat, fringed myotis, and western red bat Because the habitat most suitable for the non-volant species (excluding kit fox) is primarily separated from direct disturbance, being within the adjacent canyon, detailed analysis for these species is not required. Because of increased construction, increased traffic, increased human presence, and uncertainties regarding the proposed action (i.e., location and description of route upgrades, possible gas flaring, etc.), the extent of disturbance cannot be determined so, without more information, detailed analysis is required for: • Kit fox • Bat species	Kegen Benson	7/10/2020
PI	Wildlife: Threatened, Endangered, Proposed, or Candidate	The USFWS IPaC official species list indicates potential occurrence for: • Mexican spotted owl • Southwestern willow flycatcher • Yellow-billed cuckoo Based on review of observation records, habitat requirements, modeled habitat, and 2020 site visit, canyon habitat adjacent to the Project area contains the necessary habitat elements to support Mexican spotted owl and southwestern willow flycatcher. Biological surveys are ongoing, and "PI" could be changed to "NP" depending on the results.	Kegen Benson	7/10/2020
NP	Woodlands/ Forestry	There are no woodland/forestry products within the Project area.	Stephanie Bauer	6/12/2020

FINAL REVIEW:

Reviewer Title	**Signature**	**Date**	**Comments**
Environmental Coordinator			
Authorized Officer			

APPENDIX C

BLM-Recommended Seed Mixture

Table C-1. Proposed BLM-Recommended Seed Mixture

Species Type	Species Scientific Name	Species Common Name	Pounds per Acre (PLS)
Shrub	*Sphaeralcea coccinea*	Scarlet globemallow	3
Shrub	*Atriplex nuttallii*	Nuttall's saltbush	3
Shrub	*Atriplex corrugata*	Mat saltbush	2
Perennial grass	*Achnatherum hymenoides*	Indian ricegrass	2
Perennial grass	*Hilaria jamesii*	Galleta grass	3

APPENDIX D

Visual Resources Supporting Information

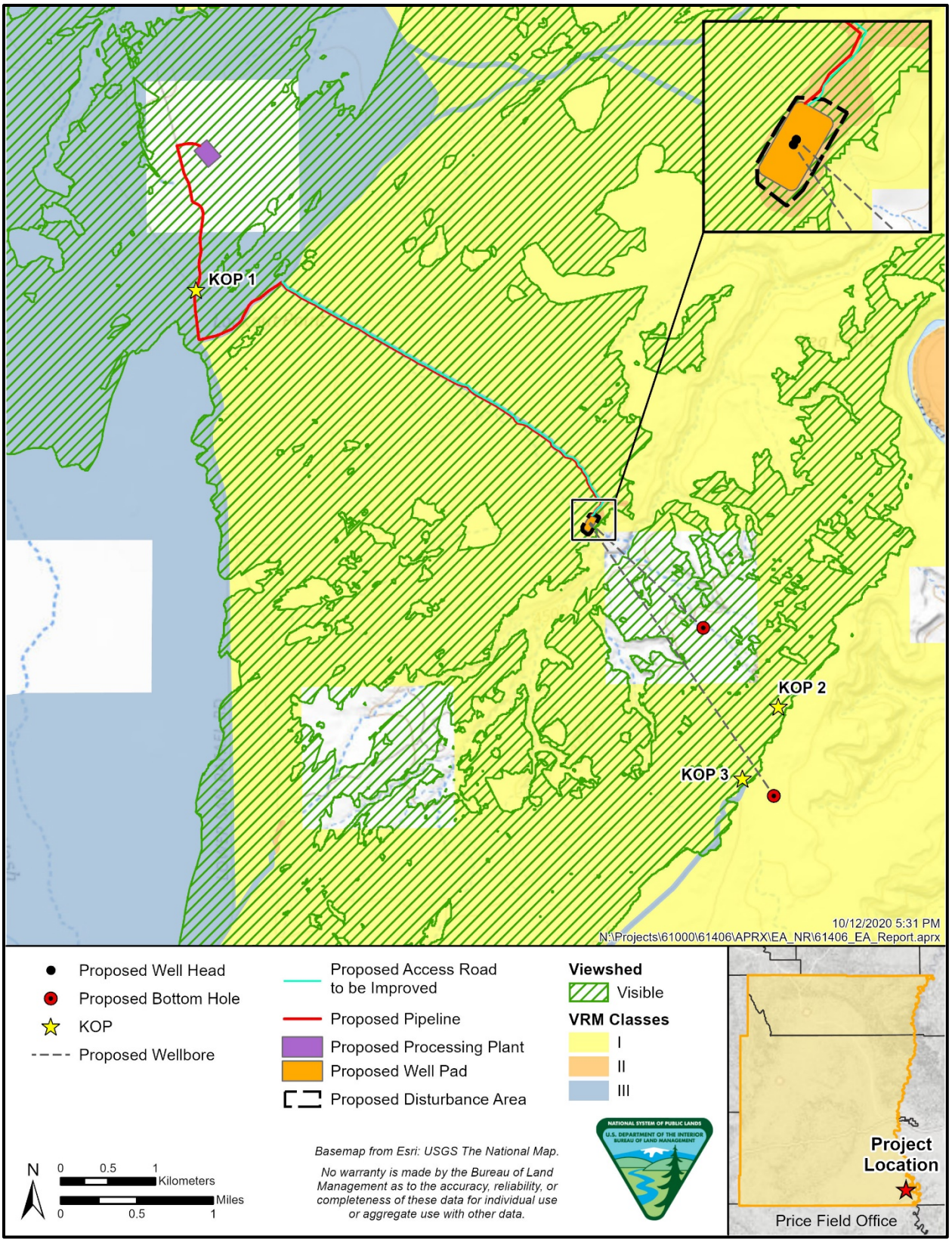
Table D-1. BLM Visual Resource Management Classes

VRM Class	Objective
Class I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it 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 existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract 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 existing 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 existing character of the landscape. 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 repeating the basic elements.

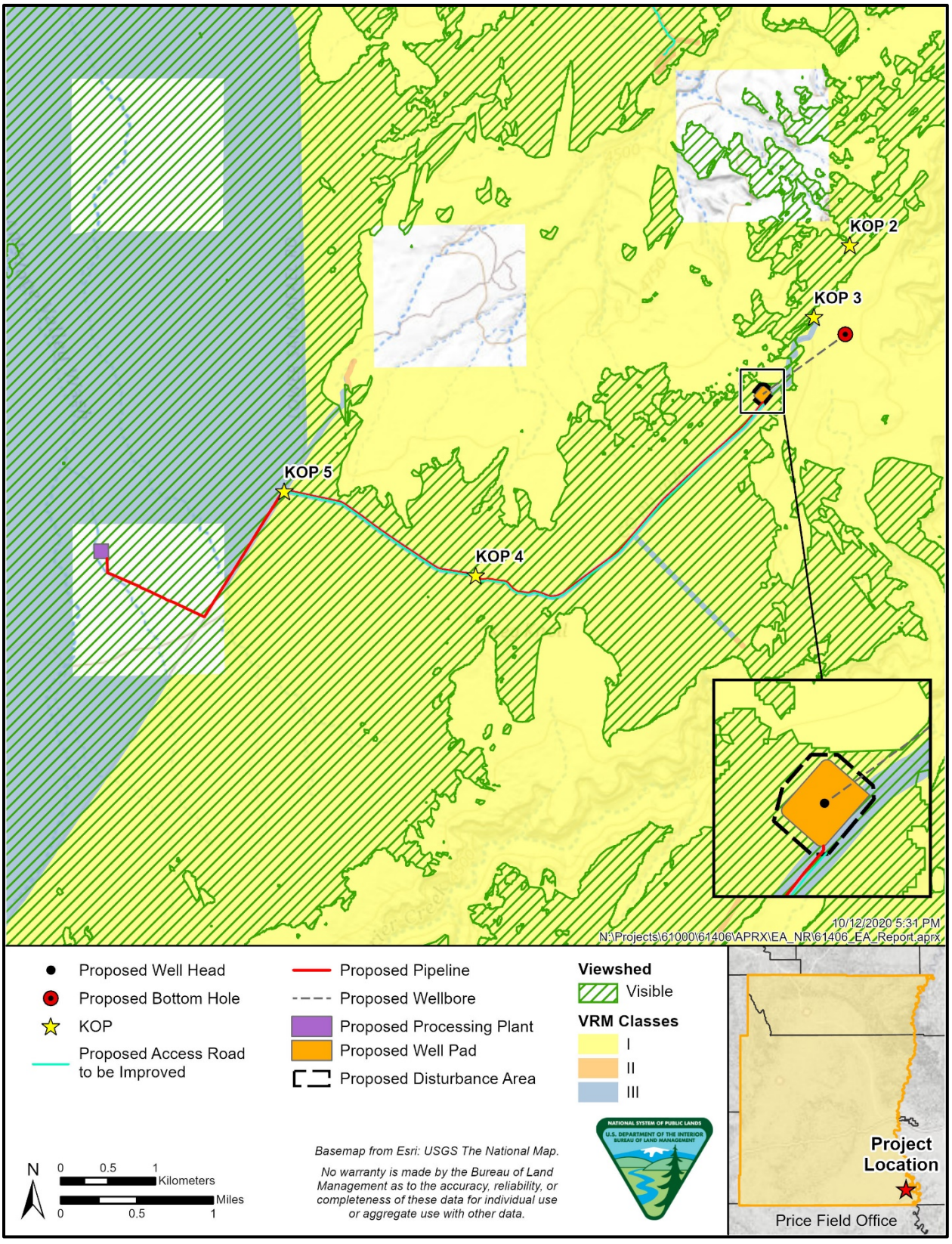
Source: BLM (1986a)

EXHIBIT D-1

Visual Resources Maps



Map D-1. Visual Resources Map: Alternative A.



Map D-2. Visual Resources Map: Alternative B.

EXHIBIT D-2

Key Observation Point Worksheets and Simulation

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #1 – San Rafael Desert Recreation Destination Route

3. VRM Class: III (pipeline only), N/A (processing plant)

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-1

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat foreground with subtle undulation; rounded hills in background	Low shrubs cover the landscape	None present
LINE	Flat, linear foreground; curvilinear road and cuts	Amorphic lines created by a dense covering of the land with shrubs	None present
COLOR	Light reds and brown-tan soil and exposed rock	Brown, yellow-green, and gray-green shrubs	None present
TEXTURE	Mostly uniform with a distinct road cut	Uniform, fine vegetation	None present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No perceived change	No perceived change	Geometric, industrial towers, tanks, and other components of the processing plant
LINE	No perceived change	Distinct and continuous line between surface disturbance and existing vegetation.	Tall, vertical, fine lines of towers
COLOR	No perceived change	No perceived change	Silver, industrial components
TEXTURE	No perceived change	Fine, scattered vegetation	Organized, vertical elements creating rough texture

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST

	FEATURES											
	LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
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 ☒ N/A (Explain on reverse side)

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

Evaluator's Names Date

Comments from item 2.

No structures in this view would be located on BLM VRM Class III lands. Compliance with VRM Class III objectives was based on landform and vegetation contrast from the introduction of the pipeline ROW.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors (like shadow gray) to make the infrastructure less noticeable.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

View facing north toward processing plant and pipeline ROW

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #2 – Five Hole Arch Trail (Alternative A)

3. VRM Class: II and III

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-1

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Rounded, undulating rocky top giving way to lower flat valley	Irregular, sparse, low shrubs	Not present
LINE	Distinct horizontal horizon in distance and landform break in foreground	Amorphic lines created by inconsistent vegetation	Not present
COLOR	Light red to tan sandstone	Gray-green sage; green to light green shrubs	Not present
TEXTURE	Smooth, fine sandstone	Fine, low, inconsistent vegetation	Not present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat access road and pipeline disturbance	No perceived change	Conical pumps; geometric well-pad components
LINE	Linear pipeline and road improvements extending from well pad	No perceived change	Vertical, rigid components of well pad (pumps and tanks)
COLOR	Darker red exposed rock and soil	No perceived change	Shadow gray well-pad components
TEXTURE	Linear continuous smooth surface disturbance from pipeline and access road	No perceived change	Organized, rough texture of well-pad components

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST

		FEATURES											
		LANDWATER 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

Comments from item 2.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors (like shadow gray) to make the infrastructure less noticeable. Storage tanks would be low profile at 10 feet tall. The edge of the well pad facing this view would be regraded and revegetated.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

View facing northwest toward Alternative A

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #2 – Five Hole Arch Trail (Alternative B)

3. VRM Class: I and III

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-2

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat foreground to rounded hill in middleground; exposed roadway	Irregular, sparse, low shrubs	Not present
LINE	Distinct linear horizon; curvilinear indistinct roadway	Amorphic lines created by inconsistent vegetation type and density	Not present
COLOR	Light red to tan to dark red sandstone and exposed soil	Yellow-green to green shrubs; gray to brown vegetation	Not present
TEXTURE	Smooth, fine sandstone and soil; small course band of rock in foreground	Fine, low, inconsistent vegetation	Not present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No perceived change	No perceived change	No perceived change
LINE	No perceived change	No perceived change	No perceived change
COLOR	No perceived change	No perceived change	No perceived change
TEXTURE	No perceived change	No perceived change	No perceived change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST		FEATURES: LANDWATER 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

Comments from item 2.

Views would be mostly screened, with no perceivable change in landform, vegetation, or structures.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors (like shadow gray) to make the infrastructure less noticeable. Storage tanks would be low profile at 10 feet tall. Edges of the well pad would be regraded and revegetated.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

View facing southwest toward Alternative B

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #3 – Five Hole Arch Trailhead (Alternative A)

3. VRM Class: II and III

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-1

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Rounded, undulating rocky top gives way to lower flat valley	Irregular, sparse, low shrubs	Not present
LINE	Distinct horizontal horizon in distance and landform break in foreground	Amorphic lines created by inconsistent vegetation	Not present
COLOR	Light red to tan sandstone	Gray-green sage; green to light green shrubs	Not present
TEXTURE	Smooth, fine sandstone	Fine, low, inconsistent vegetation	Not present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat access road and pipeline disturbance	No perceived change	Conical pumps; geometric well-pad components
LINE	Linear pipeline and road improvements extending from well pad	No perceived change	Vertical, rigid components of well pad (pumps and tanks)
COLOR	Darker red exposed rock and soil	No perceived change	Shadow gray well-pad components
TEXTURE	Linear continuous smooth surface disturbance from pipeline and access road	No perceived change	Organized, rough texture of well-pad components

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST

ELEMENTS	FEATURES: LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
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

SECTION D. (Continued)

Comments from item 2.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors (like shadow gray) to make the infrastructure less noticeable. Storage tanks would be low profile at 10 feet tall. The edge of the well pad facing this view would be regraded and revegetated.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

Existing view facing northwest toward Alternative A

Simulated view facing northwest toward Alternative A

Simulation Information

Time of photograph: 2:45 pm	Date of photograph: 7/24/2020
Location: 38.5763°N, 110.0901°W	Camera: Nikon D5000
Lens: AF-S Nikkor 18-105 mm	Focal Length: 24 mm (adjusted for the crop sensor to be 45 mm)

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #3 – Five Hole Arch Trailhead (Alternative B)

3. VRM Class: I and III

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-2

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat foreground transitions abruptly to trapezoidal hill	Irregular, sparse, low shrubs	Not present
LINE	Flat sandstone with distinct angled hill with horizontal top	Amorphic lines created by inconsistent vegetation type and density	Not present
COLOR	Light red to tan sandstone; dark red exposed soil and rock of hill	Yellow-green to green shrubs	Not present
TEXTURE	Smooth, fine sandstone and soil; abrupt, gradational hill	Fine, low, inconsistent vegetation	Not present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No perceived change	No perceived change	No perceived change
LINE	No perceived change	No perceived change	No perceived change
COLOR	No perceived change	No perceived change	No perceived change
TEXTURE	No perceived change	No perceived change	No perceived change

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST

	FEATURES											
	LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
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

Comments from item 2.

Views would be screened with no perceivable change in landform, vegetation, or structures.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors (like shadow gray) to make the infrastructure less noticeable. Storage tanks would be low profile at 10 feet tall. Edges of the well pad would be regraded and revegetated.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

View facing southwest toward Alternative B

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #4 – Five Hole Arch Destination Route

3. VRM Class: II

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-2

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat foreground to rocky outcrop; exposed roadway	Irregular, sparse, low shrubs	Not present
LINE	Distinct linear horizon; curvilinear indistinct roadway; jagged rock outcrop	Amorphic lines created by inconsistent vegetation type and density	Not present
COLOR	Light red to tan sandstone and soil	Yellow-green to green shrubs; gray to brown dead vegetation	Not present
TEXTURE	Smooth, fine sandstone transitions to jagged, course rock outcrop	Fine, low, inconsistent vegetation	Not present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Distinct, abrupt transition from flat roadway and pipeline disturbance to graded rocky outcrop	No perceived change	None
LINE	Curvilinear access road and pipeline; distinct and continuous line between cut slope and flat road and pipeline disturbance	Distinct and continuous line between surface disturbance and existing vegetation	None
COLOR	Darker red exposed soil and rock from surface disturbance	No perceived change	None
TEXTURE	Smooth, continuous dirt road and pipeline disturbance	Abrupt transition from clearing to vegetated ground	None

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST

		FEATURES											
		LANDWATER 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

Comments from item 2.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in siting the pipelines and conduit in the ROW to reduce contrast generated through crossing through an area of exposed sandstone.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

View facing east toward road improvements and pipeline ROW

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Twin Bridges Bowknot Helium EA

2. Key Observation Point: #5 – Horseshoe Canyon Recreation Destination Route

3. VRM Class: III (pipeline only), N/A (processing plant)

4. Location

Township _____

Range _____

Section _____

5. Location Sketch

See Map D-2

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	Flat foreground with exposed roadway; rounded hills in background	Low shrubs covering the landscape; geometric clearing adjacent to the roadway	Not present
LINE	Flat, linear foreground; angular roadway intersection	Distinct line between vegetation and exposed roadway	Not present
COLOR	Light reds and brown-tan soil and exposed rock	Brown, yellow-green; and gray-green shrubs	Not present
TEXTURE	Mostly uniform with a distinct road cut	Uniform, fine vegetation	Not present

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	No perceived change	No perceived change	Geometric, industrial towers, tanks, and other components of the processing plant
LINE	No perceived change	Distinct and continuous line between surface disturbance and existing vegetation	Tall, vertical, fine lines of towers
COLOR	No perceived change	No perceived change	Silver, industrial components
TEXTURE	No perceived change	Fine, scattered vegetation	Organized, vertical elements creating rough texture

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONSTRAST

		FEATURES											
		LANDWATER 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 ☐ N/A (Explain on reverse side)

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

Evaluator's Names Date

Comments from item 2.

No structures in this view would be located on BLM VRM Class III lands. Compliance with VRM Class III objectives was based on landform and vegetation contrast from the introduction of the pipeline ROW.

Additional Mitigating Measures (See item 3)

Design features to reduce visual contrast would be incorporated in the site development. Infrastructure would be painted neutral colors (like shadow gray) to make the infrastructure less noticeable.

U.S. GOVERNMENT PRINTING OFFICE: 1985-461-988/33094

View facing southwest toward processing plant and pipeline ROW

APPENDIX E

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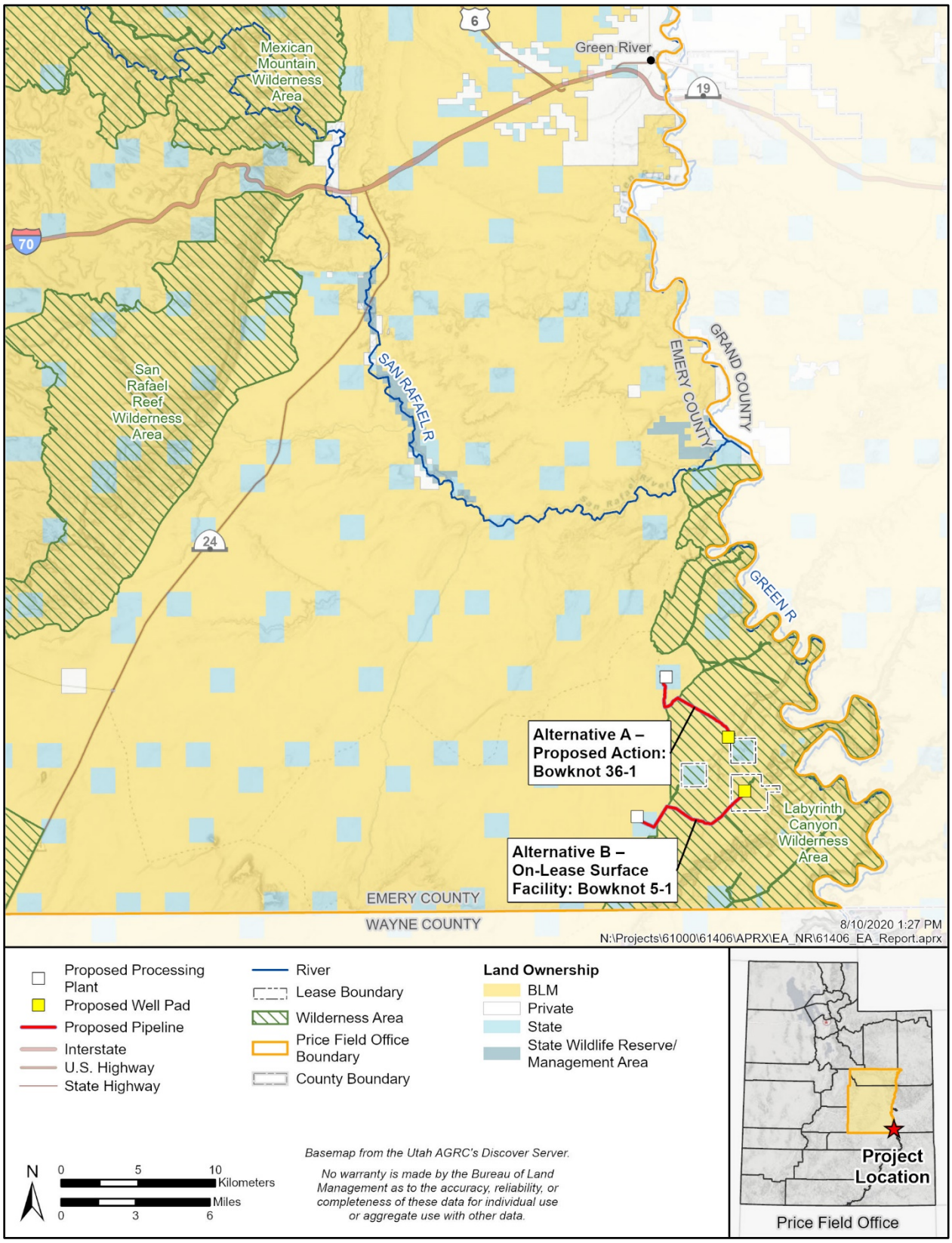
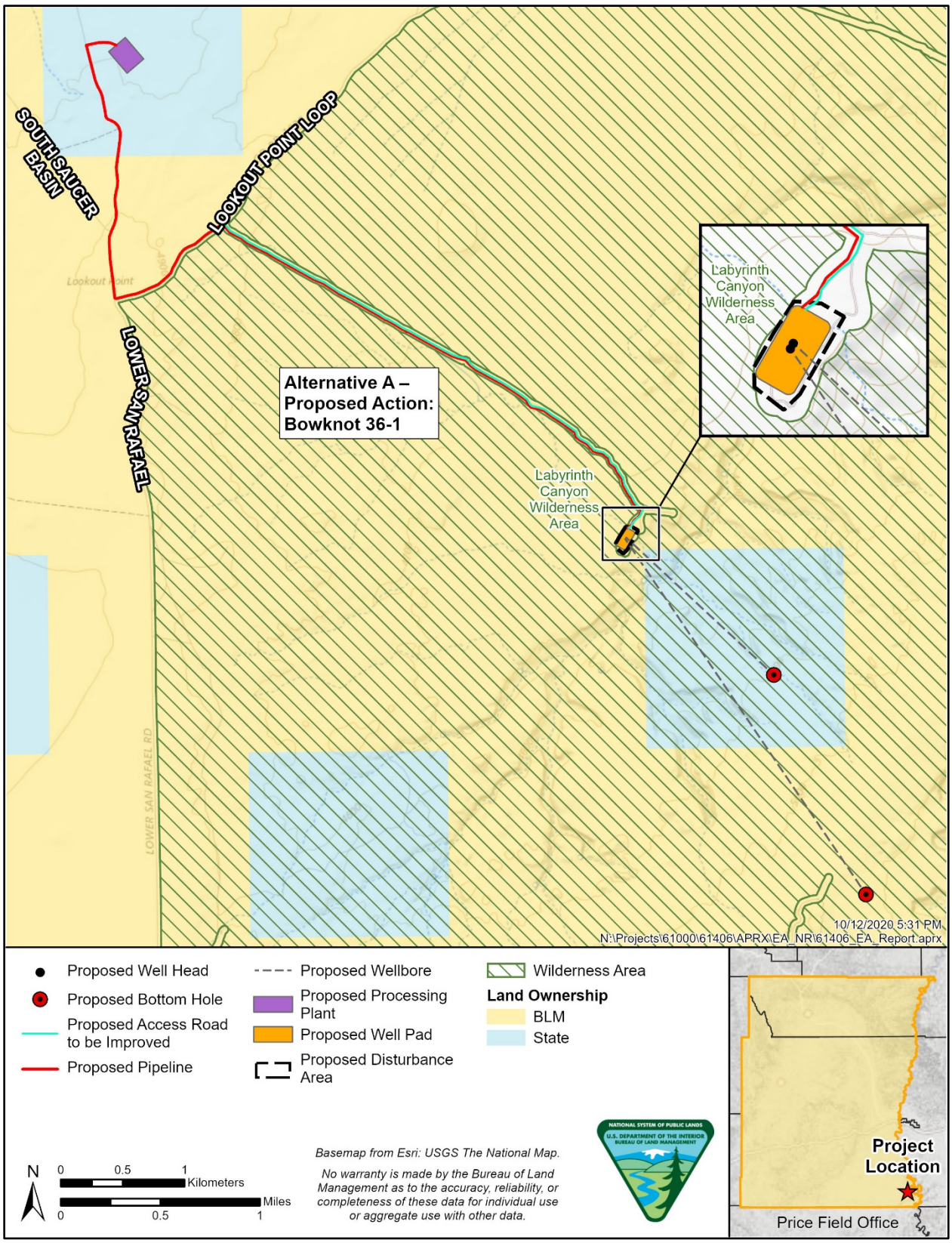
APPENDIX F

Maps and Figures



Map F-1. General Location Map 1.



Map F-2. Alternative A: Proposed Action: Bowknot 36-1.

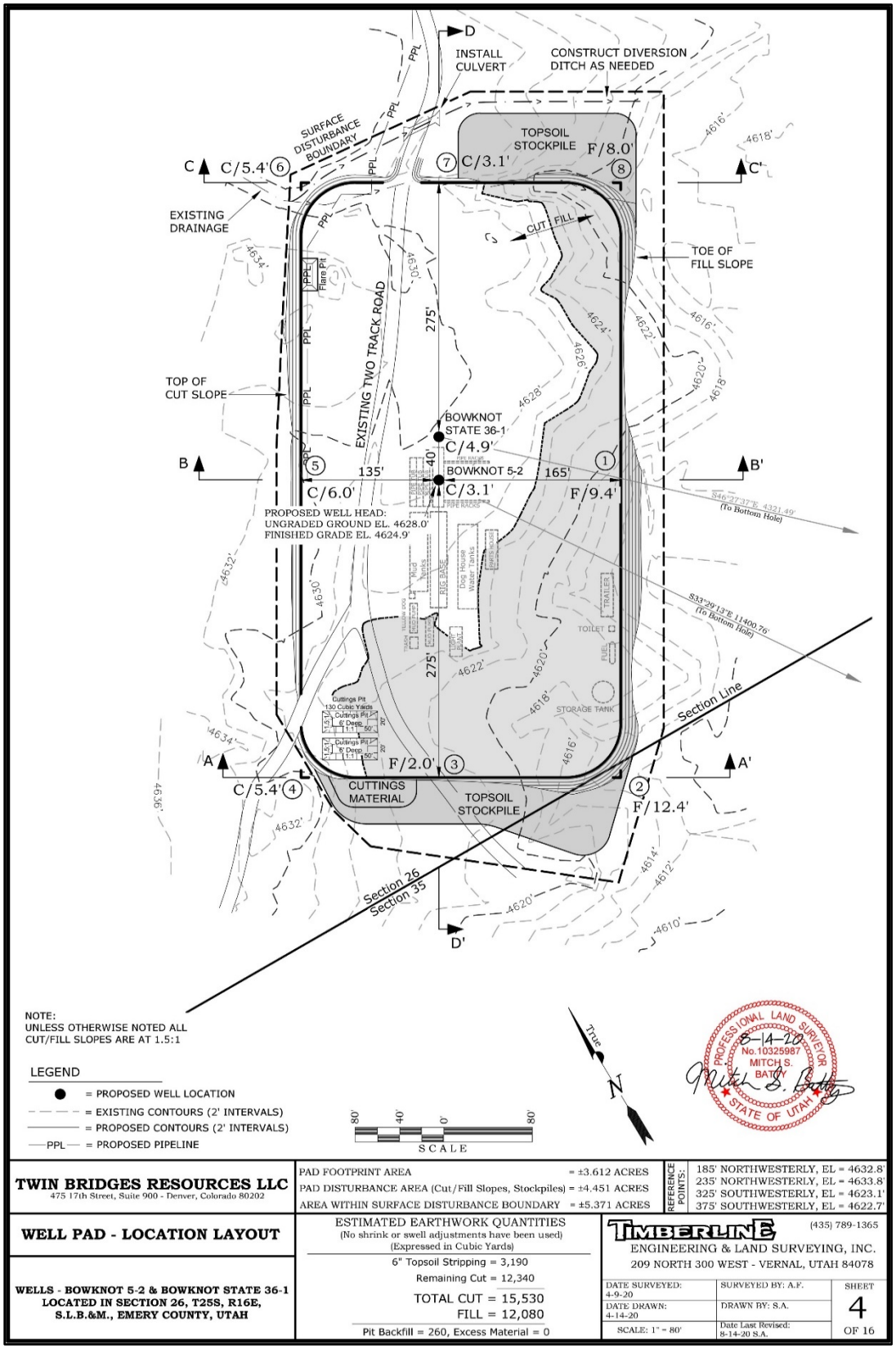


Figure F-3. Bowknot 36-1 Well Pad Layout 1.

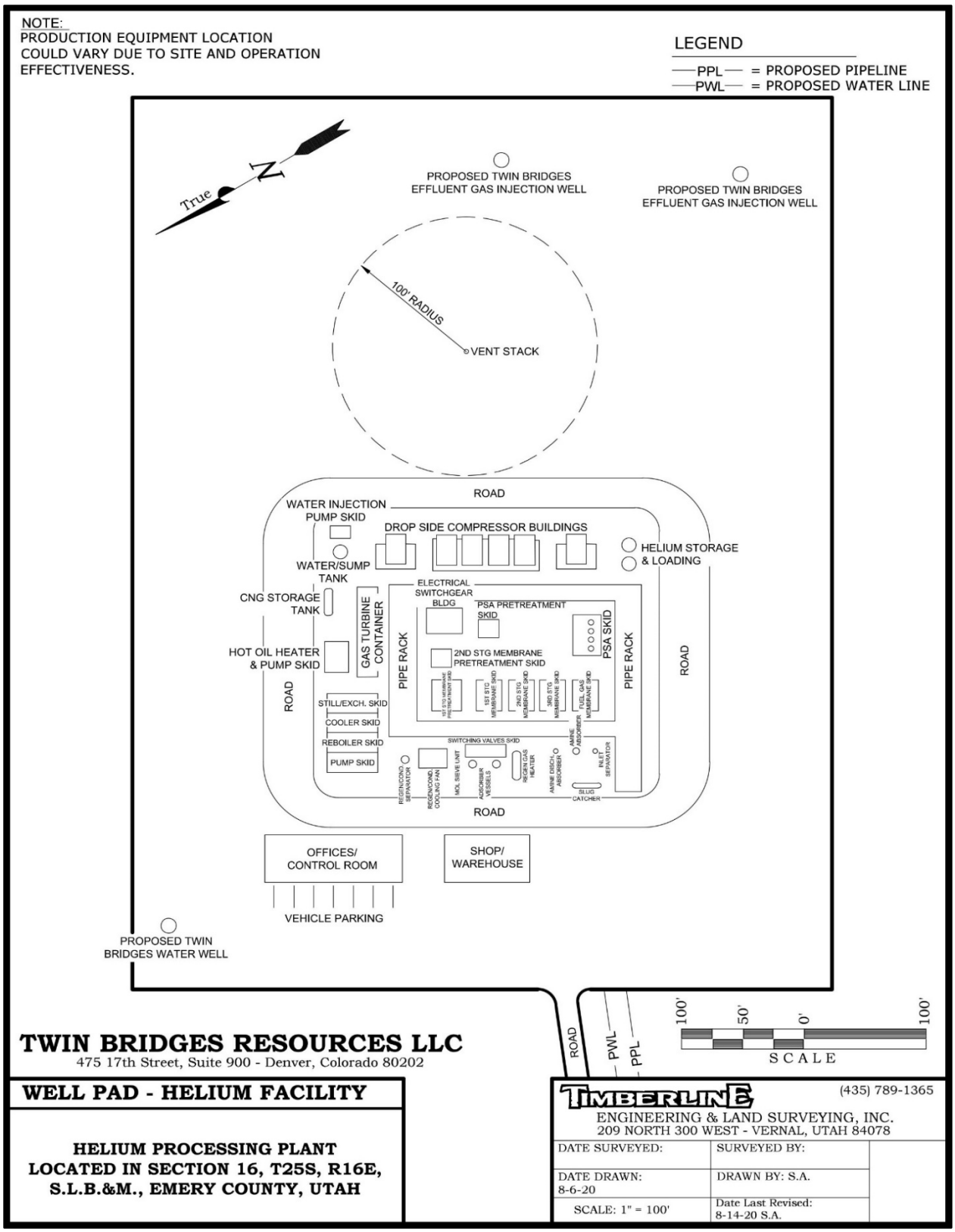


Figure F-4. Helium processing plant layout.

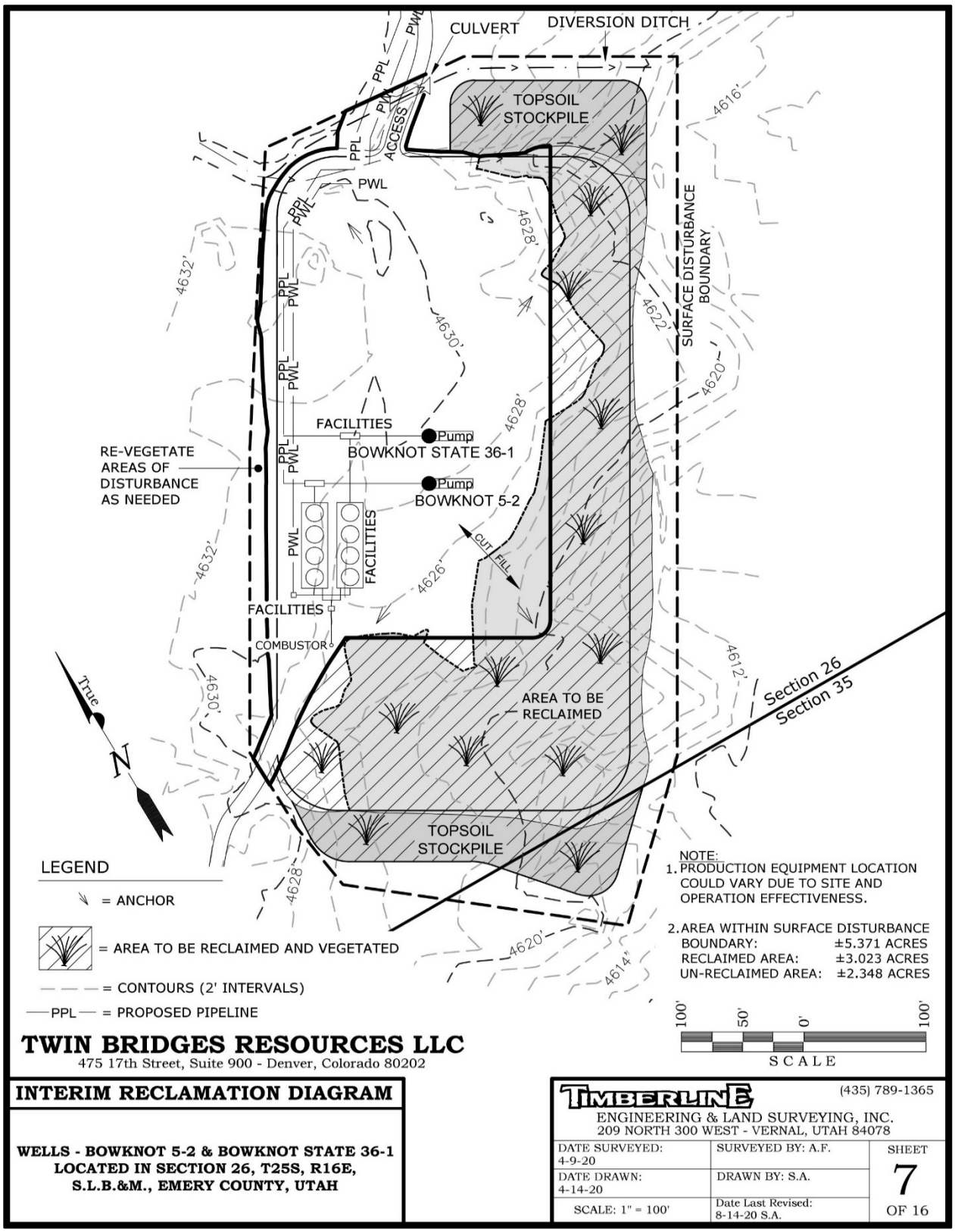


Figure F-5. Bowknot 36-1 well ad interim reclamation diagram.

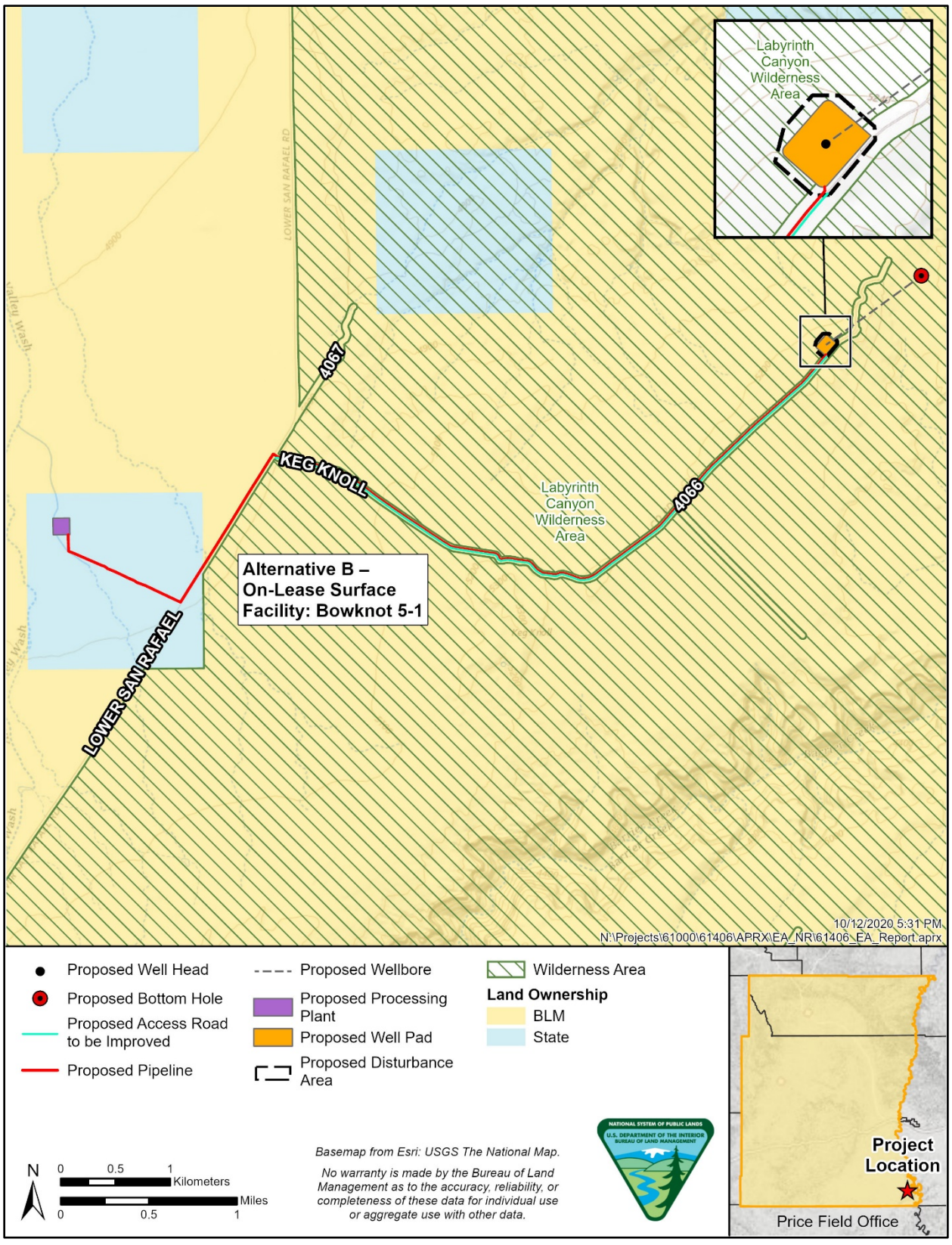


Figure F-6. Alternative B – On-Lease Surface Facility: Bowknot 5-1.

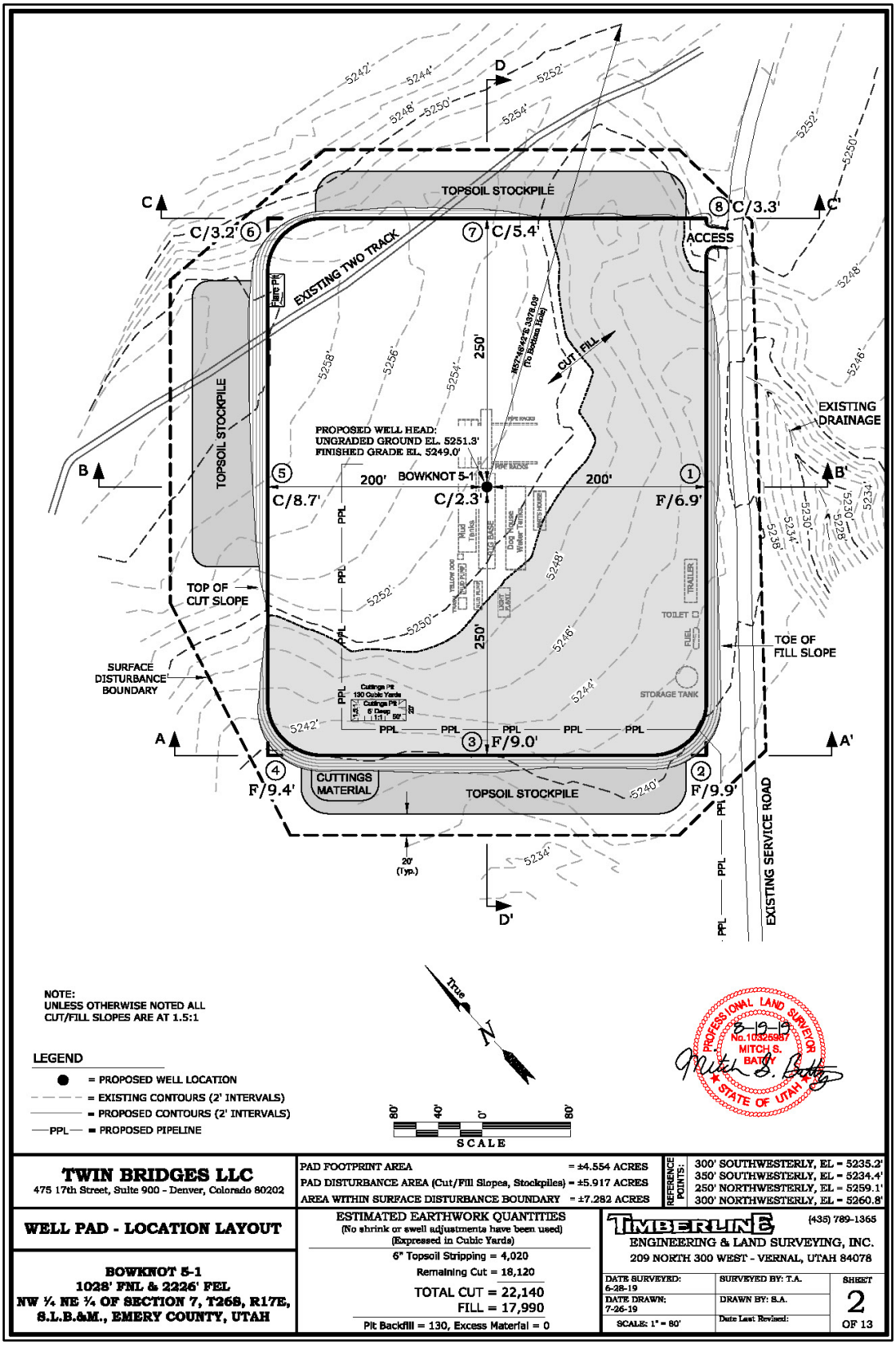


Figure F-7. Bowknot 5-1 Well Pad Layout.

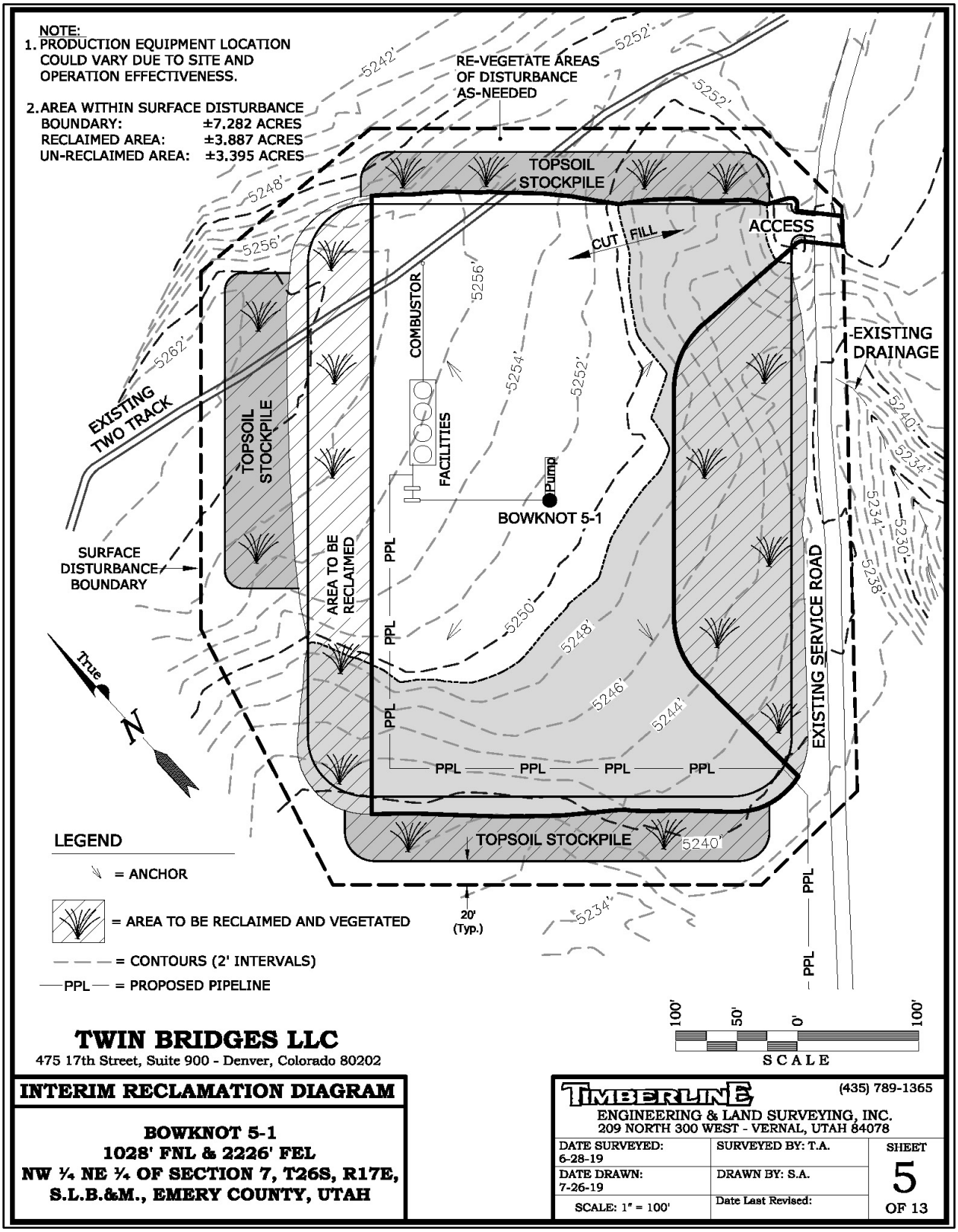


Figure F-8. Bowknot 5-1 Well Pad Interim Reclamation Diagram.

APPENDIX G

Applicant's Detailed Project Description

ALTERNATIVE A – PROPOSED ACTION: BOWKNOT 36-1

Access Road Improvements

General access to the Project area would occur via Emery County Road 1010. Before using the road, Twin Bridges would secure a road use agreement with Emery County. From Emery County Road 1010, Twin Bridges would use existing Emery County Road 1025 and Spur Road 1025 to access the proposed well-pad location. Both roads are currently functional for general vehicle access, however minor improvements would be needed to allow equipment to access the site for well drilling. These improvements for the Bowknot 5-2 and 36-1 wells would require road improvements on approximately 2.7 miles (14,445 feet), which would result in 9.9 acres of surface disturbance. All surface disturbance would occur within the approved road ROW.

To minimize surface disturbance, road construction methodologies would be conducted in two phases. To support the initial drilling and testing of the Bowknot State 36-1, road improvements would be limited to grading, leveling, and curve reduction efforts. During this phase, the road design would allow for natural and existing drainage to occur. Installation of culverts is not anticipated. In the event culverts or diversions are needed, they would be designed to limit any changes to existing drainage patterns and to facilitate reclamation back to natural conditions in the event the well is "dry." No unnecessary side-casting of material would occur on steep slopes, and actions would be taken to minimize visual impacts. A maximum grade of 10% would be maintained throughout the Project, with minimum cuts and fills anticipated, as necessary, to access the well pad. The road would be maintained at an 18-foot-wide travel surface within a 30-foot-wide disturbed area and would include gravel application to provide access over several sandy spots along the road upgrade. The surface would consist of gravel (6-inch cobble to road base equivalent) and would come from a permitted private source, not federal lands. Front-end loaders, graders, and bulldozers would be used to make these improvements using standard cut-and-fill construction techniques. Due to the current condition of the existing access road, blasting is not anticipated. A water hauling and spreading truck would be used to keep dust minimized and support better packing of any fill material. Road upgrades would occur during daylight hours (10 hours per day) and would take 10 to 14 days to complete.

Should the exploratory well prove to be successful, additional base material would be hauled in, leveled, watered, and compacted to provide a long-term stable access road. In addition, road turnouts would be installed as necessary to facilitate safe bi-directional travel along the single lane access road. These turnouts would be 24 feet wide and would be staggered as appropriate depending upon the existing line of site along the access road. Culverts, berms, and ditches would be installed to minimize erosion while not impacting the natural drainage of stormwater. The road would be designed to handle light, medium and heavy-duty loads required for well production. A yearly maintenance program would be implemented to keep the access road in sound operating condition and to ensure proper drainage.

Well Pad Construction

To reduce potential impacts from seeking to gain access to the existing lease surface rights, Twin Bridges proposes to directionally drill from a single proposed well pad located on BLM land in Section 26, T25S, R16E, Emery County, Utah. The well pad would be located at the terminus of

the west prong of Spur Road 1025, 2.7 miles from the intersection of Emery County Road 1025 and Spur Road 1025. The terminus of the western prong contains existing disturbance and measures 1,200 feet long and 400 feet wide. The well pad initially would have as small of a footprint as necessary to drill, complete and test the exploration well. The exact size would be determined following final decisions on rig selection. At its largest dimension, the well pad would be approximately 300 × 590 feet with a total surface disturbance to include cut and fill being approximately 5.4 acres. The entire pad would be constructed within the area of existing disturbance. This size includes the pad surface, stockpile areas, and side cut and fill slopes.

During construction, the proposed well pad would be cleared of vegetation and topsoil (up to a depth of 6 inches, or as specified by the APD conditions of approval). Topsoil would be stockpiled adjacent to the well pad, with cutting materials stockpiled in a separate area adjacent to the well pad (Appendix F, Figure F-3). Construction would require a front-end loader for roadbed improvements and a small bulldozer and a dump truck (large axle) for dirt moving and rock hauling. Some areas of the pad would have native base material set to provide support for the rig footprint and substructure. Use of erosion and sediment (E&S) control measures, including proper grading to minimize slopes, diversion terraces and ditches, mulching, terracing, riprap, fiber matting, temporary sediment traps, broad-based drainage dips, or low-water crossings, would be employed as appropriate to minimize erosion and surface runoff during well-pad construction and operation. Cut and fill slopes would be constructed such that stability would be maintained for the life of the operation. Diversion ditches would be constructed, if necessary, around the pad to prevent surface waters from entering the pad area. Well-pad construction would occur during daylight hours (10 hours per day) and would take 10 to 14 days to complete.

Drilling Activities

Following site clearing and grading of the proposed well pad and improvements to the access route, a drilling rig and associated equipment would be transported to the well site. Wells would be drilled using a conventional, mechanical, or electric-powered mobile drilling rig. The exact type and size of drilling rig would depend on rig availability at the time of Project implementation. Given the depth of the target formation, a 400-ton drilling rig is anticipated, with an estimated derrick height of up to 150 feet. Rig mobilization and demobilization would occur over a 10- to 14-day period. Drilling operations would occur 24 hours per day for approximately 20 days. Temporary housing would be provided on location and would include up to five single-wide mobile homes or fifth-wheel campers/trailers.

The proposed exploratory well would be a directional well targeting intervals within the Leadville Formation, and the anticipated depth of the well would be approximately 6,500 feet. Any shallow water zones encountered during drilling would be isolated by both casing and cement. The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the wellbore and to prohibit pressure communication or fluid migration between zones. The surface section of the wellbore would be drilled using a freshwater-based mud system to clean and lubricate the drilled hole. Surface casing would be installed to protect near-surface aquifers. The intermediate and production intervals of the wellbore would be drilled with an oil-based mud system to aid in drilling torque, stabilization of formations, and protection of reservoir rock properties. A closed-loop drilling fluids system would be used to clean and maintain the mud system during operations. No chromate additives

would be used in the mud system on federal lands without prior agency approval to ensure the protection of freshwater aquifers. All drill cuttings would be removed from the wellbore and contained in a closed-loop drilling system. All cuttings would be centrifuged, dried, and then transported to commercial disposal; there would be no on-site disposal.

Well Completion and Testing

Upon reaching target depth, a series of formation evaluation logging tools would be run in the well to evaluate the potential gas resource. A series of Quad Combo and Formation Micro Imaging tools may be selected to assess the reservoir rock and fluid properties of the target interval. If the evaluation concludes that adequate, quality gas is present in a quantity that is commercially recoverable, production equipment would be put in place in accordance with the well design, as approved in the APD.

This helium reservoir would be developed using conventional completion methods—no hydraulic fracturing (e.g., high-pressure injection of water, chemicals, and proppant) would be used. Completion of a well generally consists of perforating the productive interval if casing is run and cemented, running production tubing and packers, testing the flow to determine productivity, and installing production equipment. Testing of zones from the bottom of the wellbore to the top could be completed to assess the quantity and quality of the bearing reservoir. Well completions would be conducted using a truck-mounted work-over rig and would take approximately 10 days, depending on site-specific conditions.

During flow testing, the well may produce a large volume of gas and water. During well testing, equipment located on the well pad would include a temporary manifold, temporary surface flowline, separator, and an enclosed vapor combustion system. Temporary flaring of gas would be performed as needed at a safe distance from the wellhead via an enclosed portable vapor combustion system.

If the evaluation concludes that adequate gas is present and recoverable, the well would be temporarily abandoned while permanent production facilities are constructed both on the pad and at a plant site. On the pad, production equipment could consist of holding tanks, transfer pumps, separators, vessels, flowlines, and safety equipment if the reservoir performance dictates. Permanent production equipment located on the pad would be painted or buried to blend in with the natural surroundings and would be kept to the lowest visual profile as possible. If the zone is deemed not to be commercially productive, the well would be plugged and abandoned, in accordance with BLM and Utah Division of Oil, Gas, and Mining (UDOGM) requirements. A Well Completion or Recompletion Report and Log, Form 3160-4, would be filed within 30 days after completion of a well for either abandonment or production. Any hole conditions encountered during drilling that may necessitate changes in drilling plans would be submitted to the appropriate authorizing agency for approval via Sundry Notices.

Water Supply

It is estimated that 4 acre-feet of water would be needed to improve the existing disturbed road, to drill the proposed exploratory well, and to suppress dust. If the well is successful and further development is warranted, it is estimated that 3 acre-feet per year would be used for operations,

and 1 acre-foot per year for road maintenance. Water for these activities would be obtained through a direct purchase agreement with Green River City and obtained from a loading facility designated by Green River City. The water rights pursued by the Project proponent include WR 91-336, WR 91-1902, and WR 91-102. If other water sources are found, they would be properly permitted private sources and would not result in the depletion of the Colorado River Watershed (including the San Rafael River). No water wells would be drilled on Twin Bridges leases or in proposed ROWs.

Pipeline

If a sufficient quality and quantity of helium-bearing gas is confirmed through flow testing of the exploratory well, Twin Bridges would use a 30-foot-wide pipeline ROW that would be located directly adjacent to the well-pad access route (Emery County Road 1025 and Spur Road 1025) and adjacent to Emery County Road 1010. This pipeline ROW would be approximately 4.9 miles (25,880 feet) long and would travel from the well pad to a gas processing plant located on lands administered by SITLA in Section 16, T25S, R16E. The ROW would be used to install three pipelines and one conduit: 1) up to 14-inch-diameter steel or fiber-reinforced polyethylene gathering pipeline, 2) up to 8-inch-diameter polyethylene fluid transfer pipeline, 3) an 8-inch diameter polyethylene produced water pipeline, and 4) up to 6-inch-diameter conduit for running control and power cables. Existing roads and the proposed well pad would be used for pipeline construction staging, with no additional staging areas proposed. The pipelines would be buried (3–4 feet) to lower the visual impact and improve safety. Trenching would be done with a Vermeer-type trencher, a percussion drilling/rock hammer where rock is an impediment, and a front-end loader and a Cat-style dozer to remove the rock. Following installation of the pipeline, the disturbed area would be reclaimed/revegetated. Construction along the 4.9-mile-long ROW would result in 17.8 acres of surface disturbance. Pipeline installation activities would occur during daylight hours (10 hours per day) over a 30-day period. It is estimated that it would require 30 trips for personnel to reach the site.

Processing Plant on Non-Federal Lands

The proposed processing plant would be located on lands owned and administered by SITLA in Section 16, T25S, R16E. The plant would occupy a 10-acre footprint, not including the access road. Figure F-4 in Appendix F depicts the expected design and footprint of the processing plant. The purpose of the plant is to remove waste gas to concentrate the helium for trucking to market.

Residual low British thermal unit (BTU) gas from the helium concentration process would be used to run specialized low-BTU generators (approximately 533 BTUs) to power the entire facility. Any unused gas would then be compressed and reinjected at a disposal well located on the constructed site immediately adjacent to the plant facility. Associated water will be reinjected into an authorized disposal zone of a wastewater injection well in compliance with state and federal laws. There would be no flaring or venting of methane during long-term operations, and the equipment would be monitored for leak detection and repair (LDAR). The site would also include storage tanks, an amine system, a compressor for production and processing, and waste gas and water reinjection equipment. Acoustic mitigation and the appropriate use of down lighting would reduce impacts on the auditory environment and night skies. Equipment would be painted to blend in with the natural surroundings to decrease visual impacts.

Product Transport

Once the helium from the pipeline has been processed, specialized semitruck tank trailers would transport the helium to market via Interstate 70. The proposed trucking route uses Emery County Road 1010 to reach Interstate 70. The trucks transporting the helium resource would travel approximately 35 miles to reach Green River and Interstate 70. According to current volumetric estimates of anticipated helium recoveries, one to two industrial gas semitruck trailers would arrive to collect gas from the processing facility every day.

Methods for Handling Waste

A variety of components, including lubricants, and additives would be used to drill and complete the proposed well. Some of these components contain constituents that are hazardous. Hazardous materials that could be used in well drilling and interim reclamation include but are not limited to greases or lubricants, solvents, acids, and herbicides. These materials would be kept in limited quantities on the well pad for short periods of time. Safety Data Sheets (formerly known as Material Safety Data Sheets) would be maintained by Twin Bridges or its contractors for all materials used. The transport, use, storage, and handling of hazardous materials would follow procedures specified by federal and state regulations. Transportation of the materials to the well location is regulated by the U.S. Department of Transportation (USDOT) under 49 CFR 171–180. USDOT regulations pertain to the packing, container handling, labeling, vehicle placarding, and other safety aspects.

Chemicals meeting the criteria for being an acutely hazardous material/substance or meeting the quantities criteria stipulated by BLM Instruction Memorandum No. 93-344 would not be used. In addition, no extremely hazardous substance, as defined in 40 CFR 355, in threshold planning quantities, would be used, produced, stored, transported, or disposed of while drilling and completing the well.

Except for used motor oil and associated oil filters, hazardous waste would not be generated in association with drilling the proposed well. Most wastes that would be generated at the Project site are excluded from regulation by the Resources Conservation and Recovery Act under the exploration and production exemption in Subtitle C (40 CFR 261.4(b)(5)) and are considered solid wastes. These wastes include those generated at the wellhead and through the production stream. Exempt wastes include produced water, production fluids such as drilling mud, and flowback fluids.

Trash containers and portable toilets would be located on the well site during well-pad construction, drilling and completion operations, and site restoration. Toilet holding tanks would be pumped as needed, and their contents would be disposed of at a municipal sewage treatment facility in accordance with applicable rules and regulations regarding sewage treatment and disposal. Garbage, trash, and other nonhazardous waste material would be collected in a portable, self-contained, fully enclosed trash cage during operations. Trash would not be burned on location. The collected material would be hauled to an approved landfill.

Additional Delineation Well

If a sufficient quality and quantity of helium-bearing gas is produced from the original exploratory well, Twin Bridges would drill a subsequent delineation well (Bowknot 5-2) under the terms and stipulations of its federal lease UTU-93713 located in Section 7 and portions of Sections 5, 6, and 8, T26S, R17E, Emery County, Utah. Drilling and completion procedures would be similar to those described above, and no new surface disturbance would occur (the well would be drilled from the existing State 36-1 well pad). Additional surface facilities would be limited to an additional wellhead and flowlines to connect to the existing pipeline network. All other existing infrastructure would be used for the subsequent well.

Interim Reclamation

Assuming the wells are productive, interim reclamation would consist of reclaiming all areas not needed for helium production operations and would occur as soon as possible. This would include recontouring these areas to match existing undisturbed topography, redistributing stockpiled topsoil, and revegetating with a BLM-recommend seed mixture (Appendix C). Approximately 3 acres would be recontoured and reseeded during interim reclamation, leaving a long-term disturbance footprint of 2.4 acres during well operations (Appendix F, Figure F-5).

Following the Green River District Reclamation Guidelines (Instruction Memorandum No. UT-G000-2011-003) (BLM 2014) and in accordance with Onshore Oil and Gas Order No.1, interim reclamation would be completed within 6 months of completion of the well to reestablish vegetation, reduce dust and erosion, and reduce visual impacts. All equipment and debris would be removed from the area proposed for interim reclamation. The well pad would be reduced to the minimum area necessary to safely conduct production operations. All other areas would be subject to interim reclamation, which would include recontouring, spreading of topsoil, seedbed preparation, and seeding.

Recontouring would use excess cut and well-pad fill material to achieve the original contour and grade, or a contour that blends with the surrounding topography. Salvaged topsoil would be spread and seeded with a BLM-recommended seed mixture (Appendix C). Final seedbed preparation would depend on the condition of the soil surface and would include scarifying a crusted soil surface or roller packing an excessively loose soil surface. Seed would be broadcast or drilled after August 15 but before winter freezing of the soil, as outlined in BLM Instruction Memorandum No. UT-G000-2011-003, or at a time specified by the BLM. The BLM-recommended seed mix presented in Appendix C would be used for revegetating the interim (and final) reclamation areas. The seed would be certified pure-live and weed-free. Any trees cleared during site preparation and large rocks excavated during construction would be scattered across the interim reclamation area. Reclaimed areas receiving incidental disturbance during the life of the producing well would be recontoured and reseeded as soon as practical.

Well Abandonment and Final Reclamation

If the exploratory well is not successful, Twin Bridges would return the well site to its current condition, cutting off the casing at the base of the collar or 3 feet below the final graded ground level, whichever is deeper, and capping the casing with a metal plate with a minimum thickness

of 0.25 inch. The cap would be welded in place with the location, lease number, operator name, and well name engraved on the top. The cap would be constructed with a weep hole. All surface facilities associated with the well would be removed from the site, and the remaining disturbed surface would be returned to the approximate original contours of the land before being reseeded. Topsoil would be distributed on the former well location to blend the appearance of the site with its natural surroundings before reseeding with the BLM-recommended seed mix presented in Appendix C. Reclamation activities would be considered complete when vegetation has reached a minimum of 75% of background vegetation (undisturbed areas), or as approved by the authorized officer in accordance with BLM Instruction Memorandum No. UT-G000-2011-003.

Applicant Committed Environmental Protection Measures

Twin Bridges proposes to adhere to the terms, conditions, and stipulations to be outlined by the BLM in its DR. The Project design includes best management practices from the Gold Book (BLM 2007a), BLM Instruction Memorandum No. UT-G000-2011-003, and the Price FO RMP (BLM 2008a). To offset additional impacts resulting from the Proposed Action, Twin Bridges would commit to additional environmental protection measures:

Wildlife

- No drilling, completion, or well testing activities would occur within 0.5 mile of Mexican spotted owl habitat during the nesting season (March 1–October 31). These activities would be conducted between November 1 and February 28 unless and until a complete survey has been conducted, no owls have been documented, and permission is granted by the authorized officer following consultation with the U.S. Fish and Wildlife Service (USFWS).
- During construction and operation activities, noise monitoring would be conducted at the boundary of Keg Spring Canyon (Mexican spotted owl modeled habitat), per agreed upon applicant, BLM and USFWS monitoring protocol to ensure disturbance does not exceed 68 dBA per the Mexican Spotted Owl Recovery Plan. If exceedances above 68 dbA are detected, appropriate measures will be taken to mitigate noise to below 68 dBA. The monitoring protocol would be in effect unless and until the species-specific survey protocol is completed, until no owls have been documented, until and permission is granted by the authorized officer following consultation with the USFWS.

Sensitive Plant Species

- If BLM sensitive plant species are identified within the proposed road and pipeline ROWs, Twin Bridges would alter road expansions and pipeline installation methods to minimize direct impacts.

Noise

- Twin Bridges agrees to use acoustic mitigation on all rotating equipment (gensets, compressors, and recycle pumps) to reduce auditory impacts.

Visual Resources

- Twin Bridges would paint all permanent equipment to blend in with the natural surroundings. Specific colors would be determined in coordination with BLM and SITLA, as appropriate.
- Twin Bridges would minimize the use of lighting and would apply down lighting to reduce visual impacts from the plant site.

Wilderness Areas

- Twin Bridges would clearly mark the wilderness area boundaries with temporary fencing or flagging, and construction activities would be monitored to ensure that all surface disturbance occurs within the approved ROWs.

ALTERNATIVE B – ON-LEASE SURFACE FACILITY: BOWKNOT 5-1

Access Route and Road Improvements

General access to the Project area would occur via Emery County Road 1010. Before using the road, Twin Bridges would a secure a road use agreement with Emery County. From Emery County Road 1010, Twin Bridges would use existing Emery County Road 1026 to access the proposed well pad. Although Emery County Road 1026 is currently used for recreational traffic, portions of this road would require extensive improvement to allow drilling equipment to access the site. Currently approximately 0.6 miles (3,000 feet) of the existing road traverses an expansive rock outcrop and blasting would be required prior to any grading or leveling activities in these areas. Road improvements along this 3,000 foot area would be permanent. Similar to Alternative A, access road upgrades would be conducted in two phases with initial activity focused on road grading, leveling, and curve reduction. Should the Bowknot 5-1 well prove to be successful, additional road improvements would be implemented similar to those described for Alternative A. For Bowknot 5-1, road improvements would occur on approximately 4.0 miles (21,140 feet) of the existing road, which would result in 14.5 acres of surface disturbance. All surface disturbance would occur within the proposed road ROW. Road upgrades would occur during daylight hours (10 hours per day) and would take 21 days to complete.

Well Pad

Under Alternative B, Twin Bridges would construct a new well pad located on BLM land in Section 7, T26S, R17E, Emery County, Utah. The well pad would be constructed immediately adjacent to Emery County Road 1026, and portions of the proposed pad would be developed in an undisturbed area outside the existing road footprint. The initial size of the well pad would be 400 × 500 feet, and total disturbance (cut and fill) of the site would be approximately 7.3 acres. (Appendix F, Figure F-7). This size includes the pad surface, stockpile areas, and side cut and fill slopes. Well-pad construction would occur during daylight hours (10 hours per day) and would take 21 days to complete.

Drilling Activities

All drilling procedures would be similar to those described under the Proposed Action; however, under Alternative B, all portions on the wellbore, including the surface hole and bottom hole, would be on existing federal lease UTU-93713.

Well Completion and Testing

All well completion and testing procedures would be similar to those described under Alternative A.

Water Supply

Water sources would be similar to those described under Alternative A.

Pipeline

If a sufficient quality and quantity of helium-bearing gas is confirmed through flow testing of the exploratory well, Twin Bridges would use a 30-foot-wide pipeline ROW that would be located directly adjacent to the well-pad access route (Emery County Road 1026) and adjacent to Emery County Road 1010. This pipeline ROW would be approximately 5.6 miles (29,780 feet) long and would travel from the well pad to a gas processing plant located on lands administered by SITLA in Section 16, T26S, R16E. The ROW would be used to install three pipelines and one conduit: 1) up to 14-inch-diameter steel or fiber-reinforced polyethylene gathering pipeline, 2) up to 8-inch-diameter polyethylene fluid transfer pipeline, 3) an 8-inch-diameter polyethylene produced water pipeline, and 4) up to 6-inch-diameter conduit for running control and power cables. Existing roads and the proposed well pad would be used for pipeline construction staging, with no additional staging areas proposed. The pipelines would be buried (3–4 feet) to minimize visual impacts and for safety precautions. Trenching would be done with a Vermeer-type trencher, a percussion drilling/rock hammer where rock is an impediment, and a front-end loader and a Cat-style dozer to remove the rock. Following installation of the pipeline, the disturbed area would be reclaimed/revegetated. Construction along the 5.6-mile-long ROW would result in 20.5 acres of surface disturbance, which would all be contained within the existing road footprint. Pipeline installation activities would occur during daylight hours (10 hours per day) over a 40-day period. Pipeline-laying activities would require 40 trips for personnel to reach the site.

Processing Plant on Non-Federal Lands

The parameters, components, and construction procedures for the proposed processing plant would be similar to those described under Alternative A, however, under Alternative B, the plant would be located on lands owned and administered by SITLA in Section 16, T26S, R16E.

Product Transportation

All product transportation procedures would be the same as those described under Alternative A.

Methods for Handling Waste

All waste-handling procedures would be the same as those described under Alternative A.

Interim Reclamation

All interim reclamation procedures would be similar to those described under Alternative A; however, 3.9 acres would be recontoured and reseeded during interim reclamation, leaving a long-term disturbance footprint of 3.4 acres during well operations (Appendix F, Figure F-8).

Well Abandonment and Final Reclamation

All well abandonment and final reclamation procedures would be similar to those described under Alternative A.

Applicant-Committed Environmental Protection Measures

Twin Bridges proposes to adhere to the terms, conditions, and stipulations to be outlined by the BLM in its DR. The Project design includes best management practices from the Gold Book (BLM 2007a), BLM Instruction Memorandum No. UT-G000-2011-003, and the Price FO RMP (BLM 2008a). To offset additional impacts resulting from the Proposed Action, Twin Bridges would commit to the following additional environmental protection measures under Alternative B:

Sensitive Plant Species

- If BLM sensitive plant species are identified within the proposed road and pipeline ROWs, Twin Bridges would alter road expansions and pipeline installation methods to minimize direct impacts.

APPENDIX H

Resource Supporting Information

INTRODUCTION

The following sections contain additional information, such as tables and narratives, to support the Chapter 3 resource inventories and analyses.

Air Quality and Greenhouse Gas Emissions

Regulatory Framework

NATIONAL AMBIENT AIR QUALITY STANDARDS

The U.S. Environmental Protection Agency (EPA) develops and promulgates regulations that implement provisions of the CAA. To implement Section 109 of the CAA, the EPA is charged with establishing National Ambient Air Quality Standards (NAAQS). NAAQS limit the amount of air pollutant emissions considered harmful to public health and the environment. NAAQS are expressed in terms of individual pollutant concentration levels for an associated averaging period. NAAQS standards may also include a reference for the year that the specific standard was promulgated.

There are two types of NAAQS. The "primary" standards are designed to protect human health, including the health of sensitive individuals such as children, the elderly, and those with chronic respiratory problems. The "secondary" standards are designed to protect public welfare, including economic interests, visibility, vegetation, animal species, and other concerns. Primary and secondary standards have been set for the following criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter 2.5 micrometers in diameter or less ($PM_{2.5}$), particulate matter 10 micrometers in diameter or less (PM_{10}), lead (Pb), and sulfur dioxide (SO_2). The NAAQS are summarized in Table H-1.

Under the provisions of the CAA, any state can promulgate ambient air quality standards that are more stringent than those of the national program. The Utah Department of Environmental Quality has adopted the federal primary and secondary NAAQS for the entire state and has not established any state-level standards.

The EPA assigns classifications to geographic areas according to monitored NAAQS concentrations. Areas of the state that are not in compliance with the NAAQS are considered nonattainment areas. A maintenance area is an area that was previously designated as nonattainment but has subsequently demonstrated to the EPA through a state implementation plan that it would improve the air quality to a specific standard. Emery County, Utah, is in unclassifiable/attainment for all criteria air pollutants, according to the EPA Green Book (EPA 2020a).

Table H-1. National Ambient Air Quality Standards

Pollutant	Averaging Period	Primary*		Secondary†		Format of Standard
		(ppm)	(µg/m^3)	(ppm)	(µg/m^3)	
CO	1 hour	35	40,000	–	–	Not to be exceeded more than once per year
	8 hours	9	10,000	–	–	Not to be exceeded more than once per year
NO_2	1 hour	0.1	188	–	–	98th percentile of annual 1-hour daily maximum concentrations, averaged over 3 years
	Annual	0.053	100	0.053	100	Annual mean
O_3	8 hours	0.07	–	0.07	–	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	24 hours	–	35	–	35	Annual 98th percentile of 24-hour maximum concentrations, averaged over 3 years
	Annual	–	12.0	–	15.0	Annual mean averaged over 3 years
PM_{10}	24 hours	–	150	–	150	Not to be exceeded more than once per year on average over 3 years
Pb	Rolling 3-month average	–	0.15	–	0.15	Not to be exceeded
SO_2	1 hour	0.075	196	–	–	99th percentile of annual 1-hour daily maximum concentrations, averaged over 3 years
	3 hours	–	–	0.5	1,300	Not to be exceeded more than once per year

Source: EPA (2018).

ppm = parts per million, µg/m^3 = micrograms per cubic meter.

* Primary standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the EPA.

† Secondary standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

Prevention of Significant Deterioration

The PSD is a permitting program for new major sources or major modifications of existing stationary sources of air pollution located in attainment areas. The program applies to new (or modified) major stationary sources in attainment areas; major sources are defined as those sources that emit 100 tons per year (tpy) or more of any criteria air pollutant for specifically listed source categories in 40 CFR 52.21(b)(1)(i) or that emit 250 tpy of any criteria air pollutant and are not in a specifically listed source category.

If a source is subject to the PSD permitting program, it must perform air quality monitoring and modeling analyses; install best available control technology; allow for public involvement in the permitting process; and consider additional impacts to soils, vegetation, visibility, and associated growth. A proposed source can demonstrate that it does not cause or contribute to a violation of the NAAQS by demonstrating that the ambient air quality impacts resulting from the emissions would be less than the significant deterioration levels.

The proposed Project would not be in a listed source category and does not qualify as a major PSD stationary source based on the emissions inventory in Section 3.2 Air Quality and Greenhouse Gas Emissions.

Class I and Class II Areas

Under PSD regulations, the EPA classifies airsheds as Class I, Class II, or Class III. Class I areas are those areas where the most stringent standards for changes to air quality are in effect. Areas of special national or regional natural, scenic, recreational, or historic value, such as international parks, national parks greater than 6,000 acres, national memorial parks larger than 5,000 acres, and national wilderness areas larger than 5,000 acres, are granted Class I status and the highest level of air quality protections under Section 162(a) of the CAA. Class II areas are allowed more moderate pollution increases. In Class III areas, air quality may be degraded to levels corresponding to the NAAQS. To date, no Class III areas have been designated; therefore, all areas not established as Class I areas are designated as Class II areas.

In conducting an air quality modeling analysis, PSD increment consumption must also be evaluated for the major source. A PSD increment is the maximum allowable increase in ambient concentrations allowed to occur above a designated baseline concentration. Significant deterioration occurs when the amount of new pollution exceeds the applicable PSD increment. The maximum allowable PSD increments over baseline concentrations are presented in Table H-2.

Table H-2. Prevention of Significant Deterioration of Air Quality Increments and Significant Impact Levels

Pollutant	Averaging Period	PSD Increments		Significant Impact Levels	
		Class I ($\mu g/m^3$)	Class II ($\mu g/m^3$)	Class I ($\mu g/m^3$)	Class II ($\mu g/m^3$)
CO	1 hour	–	–	–	2,000
	8 hours	–	–	–	500
NO_2	1 hour	–	–	–	7.52
	Annual	2.5	25	0.1	1
$PM_{2.5}$	24 hours	2	9	0.07	1.2
	Annual	1	4	0.06	0.3
PM_{10}	24 hours	8	30	0.32	5
	Annual	4	17	0.16	1
Pb	Rolling 3-month average	–	–	–	–
SO_2	1 hour	–	–	–	–
	3 hours	25	512	1	25
	24 hours	5	91	0.2	5
	Annual	2	20	0.08	1

Source: 40 CFR 52.21(c); 61 *Federal Register* 38249; 40 CFR 51.165(b)(2); 40 CFR 52.21(i)(5)(i)

$\mu g/m^3$ = micrograms per cubic meter

Areas presently under the protection of Class I designations in Utah are Arches National Park, Bryce Canyon National Park, Canyonlands National Park, Capitol Reef National Park, and Zion National Park. The nearest Class I area to the Project is Canyonlands National Park, which is approximately 6.1 miles (9.8 kilometer [km]) southeast of the proposed Project (under Alternative B).

PSD regulations would not be triggered because the stationary source associated with development would not have the potential to emit 250 tpy of any air pollutant.

Air Quality–Related Values

The requirement to assess impacts to AQRVs is established in the PSD rules. A federal land manager is required under the CAA Amendments of 1977 to "protect the natural and cultural resources of Class I areas from the adverse impacts of air pollution" (40 CFR 51, Appendix W, Section 6.2(a)) To do so, federal land managers must identify or define the AQRVs within their jurisdiction. An AQRV is defined as a resource for one or more Federal areas that may be adversely affected by a change in air quality. The resource may include visibility or a specific scenic, cultural, physical, biological, ecological, or recreational resource identified by a federal land manager for a particular area (Federal Land Managers' Air Quality Related Values Work Group [FLAG] 2010). For each Class I area, the federal land manager has the responsibility to define and protect the AQRVs at such areas and to consider whether new emissions from proposed major facilities (or modifications to major facilities) would have an adverse impact on those values. For this Project, BLM included the analysis of impacts on visibility from emissions associated with the Project, due to its proximity to Canyonlands National Park located approximately 6.1 miles (9.8 km) southeast of the proposed Project (under Alternative B).

New Source Performance Standards

The EPA has also promulgated technology-based standards for specific stationary sources of air pollution, known as NSPS (40 CFR 60). There are no NSPS regulations applicable to the proposed operations of the well pad. Notably, Subpart OOOOa does not apply since the well would not undergo hydraulic fracturing. Therefore, NSPS regulations do not apply to the direct stationary emissions sources of the Project.

National Emissions Standards for Hazardous Air Pollutants

Section 112 of the CAA requires the EPA to promulgate regulations establishing emission standards for each category or subcategory of major sources and area sources of hazardous air pollutants (HAPs); these are known as NESHAPs. HAPs (e.g., benzene, perchloroethylene, mercury) are known or suspected to cause cancer or other serious health effects. There are no NESHAP regulations that are applicable specifically to the proposed HAP emitting sources at the proposed well pad. Therefore, NESHAPs and maximum achievable control technology regulations do not apply to the direct stationary emissions sources of the Project.

Nonroad Engine Standards

The EPA also sets emissions standards for nonroad diesel engines for hydrocarbons (i.e., volatile organic compounds [VOCs]), nitrogen oxides (NO_x), CO, and PM. The emissions standards are implemented in tiers by year, with different standards and start years for various engine power ratings. The new standards do not apply to existing nonroad equipment. Only equipment manufactured after the start date for an engine category (1999–2006, depending on the category) is affected by the rule. Therefore, nonroad engine standards potentially apply to some of the proposed off-road engines (not self-propelled) to be used on the Project.

General Conformity

The General Conformity Rule, established under 40 CFR 51 Subpart W and 40 CFR 93 Subpart B, requires a general conformity analysis for projects that require federal action. The rule applies to emission units or emission-generating activities resulting from a project that are not already covered by permitting and that are in a nonattainment area. Because Emery County is an unclassifiable/attainment area, the General Conformity Rule does not apply to the Project.

Current Permitting

Stationary pollutant sources at the proposed well pad are regulated by the Utah Division of Air Quality and are subject to Utah Administrative Code R307-505, which requires sources in the oil and gas industry to register (i.e., to be authorized under a permit by rule) 30 days before constructing, installing, establishing, operating, or modifying air pollution–producing sources and to meet certain equipment-based requirements under the permit by rule.

Project Area Climate

The Project area is considered an arid climate influenced by mountain ranges and geographic location. The Sierra Nevada and Wasatch Mountains influence the weather and climate of Utah and the Project area. Pacific storms must cross the Sierra Mountains before reaching Utah. Consequently, most of the moist air condenses and falls as precipitation before reaching the state. These mountains also act as a barricade against intensely cold Arctic air masses.

The climate in the Project area is characterized by hot, dry summers and generally cold winters. Temperatures range from an average low of 10 degrees Fahrenheit (°F) (-12.2 degrees Celsius [°C]) in January to an average high of 97.7°F (36.5°C) in July. The average wind speed is 7 miles per hour (3 meters per second) and usually comes from the north-northeast. The Project area has an average annual precipitation of 6.45 inches (16.38 centimeters), with August, September, and October being the wettest months by average precipitation. Like most arid climates, Utah experiences wide ranges in temperature during the course of the day as heat quickly builds during the day and rapidly dissipates at night (Western Regional Climate Center 2020).

Climate data for major airport weather stations across the United States are available from the National Oceanic and Atmospheric Administration's National Centers for Environmental Information (formerly, National Climatic Data Center). Table H-3 summarizes the data collected by the Green River Aviation weather station, located approximately 25 miles (41 km) north of the Project area, that are representative of climatic conditions in the Project area.

Table H-3. Climatic Conditions

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Normal daily max temperature (°F)	38.2	48.4	60.3	70.5	80.7	91.5	97.7	94.8	85.7	71.5	55.0	41.3	69.9
Normal daily min temperature (°F)	10.0	18.8	27.8	36.0	44.9	52.5	60.4	58.2	47.4	35.1	22.4	13.3	35.6
Precipitation (inches)	0.42	0.43	0.49	0.51	0.64	0.33	0.54	0.81	0.70	0.79	0.44	0.36	6.45

Background Air Quality

Background air quality in the Project area is provided in the air technical report for Lila Canyon Mine and was assumed to be representative of the existing conditions in the vicinity of the Project (SWCA 2019). Background levels of criteria air pollutants are provided in Table H-4.

Table H-4. Background Levels of Criteria Air Pollutants

Pollutant*	Averaging Period	Monitoring Station ID	Location	Monitored Concentration		
			City/State	(ppm)	(ppb)	(µg/m³)
CO	1 hour	08-077-0018	Grand Junction, Colorado	1.50	–	–
	8 hours	08-077-0018	Grand Junction, Colorado	1.30	–	–
NO_2	1 hour	49-007-1003	Price, Utah	–	18.00†	–
	Annual	49-007-1003	Price, Utah	–	6.40‡	–
O_3	8 hours	49-007-1003	Price, Utah	0.067	–	–
$PM_{2.5}$	24 hours	49-013-0002	Roosevelt, Utah	–	–	24.00
	Annual	49-013-0002	Roosevelt, Utah	–	–	6.10
PM_{10}	24 hours	49-019-0006	Moab, Utah	–	–	42.00
SO_2	1 hour	49-035-3006	Salt Lake City, Utah	–	7.00	–
	3 hours	49-035-3006	Salt Lake City, Utah	–	6.33	–

Source: SWCA (2019).

ppm = parts per million; ppb = parts per billion; µg/m³ = micrograms per cubic meter.

* CO data from Grand Junction–Pitkin monitor for 2015 to 2017; NO_2 data from monitor on private property in Price, Utah, for 2012 to 2014; O_3 data from monitor on private property in Price, Utah, for 2015 to 2017; $PM_{2.5}$ data from Roosevelt monitor for 2015 to 2017; PM_{10} data from Moab monitor for 2000 to 2003; SO_2 data from Hawthorne monitor for 2015 to 2017.

† Design value from Air Quality System highest eighth high (H8H) modeled concentration for 2015 to 2017.

‡ Two-year average of annual mean (2015 did not have complete data).

Emissions Inventory for Emery County, Utah

Emissions inventories are useful in comparing emission source categories to determine which industries or practices are contributing to the general level of pollution in the country where a project is located. Emissions inventories provide an overview of the types of pollution sources in an area, as well as the

amount of pollution being emitted on an annual basis by those sources. For the purposes of this assessment, the most recent National Emissions Inventory conducted in 2017 (EPA 2020b) was summarized.

The National Emissions Inventory is a detailed annual estimate of criteria air pollutants and HAPs from air emission sources. Data are collected from state, local and tribal air agencies and supplemented with data from the EPA (2020b). The emissions inventory includes estimates of emissions from many sources, including point sources, nonpoint sources, on-road sources, nonroad sources, and event sources. Point sources are sources of air pollutants located at a fixed point. Point sources include facilities such as power plants and airports, as well as commercial sources. Nonpoint sources are those which are too small to pinpoint as point sources. Nonpoint sources include emission sources such as asphalt paving, solvent use, and residential heating. On-road sources are emissions from on-road vehicles. Nonroad sources are mobile sources of emissions that operate off road, such as construction equipment, lawn and garden equipment, trains, and barges, ships, and other marine vessels. Event sources include emissions from sources such as wildfires. This inventory is a good estimate of how much each county and state is contributing to air pollution for a given year.

The 2017 emissions inventory data for Emery County, Utah, are presented in Table H-5.

Table H-5. Emissions Inventory for Emery County, Utah (tons per year)

Category	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs	HAPs	CO_2e*
Agriculture	0	0	487	98	0	10	0	0
Biogenics†	3,602	1,279	0	0	0	14,113	3,602	0
Miscellaneous‡	5	0	3	2	0	143	5	0
Dust	0	0	5,763	665	0	0	0	0
Fires	48	1	6	5	0	10	48	572
Fuel combustion	8,289	15,718	567	416	5,793	198	8,289	0
Industrial processes	0	0	450	271	0	19	0	14,830,387
Mobile	2,733	1,118	58	42	4	239	2,733	340,752
Waste disposal	7	0	3	3	0	8	7	0
Total	**14,686**	**18,117**	**7,336**	**1,504**	**5,797**	**14,740**	**3,339**	**15,171,711**

Source: EPA (2020b).

* Carbon dioxide equivalent (CO_2e) emissions are in metric tons.

† Biogenic emissions are those emissions derived from natural processes (such as vegetation and soil).

‡ Miscellaneous categories include bulk gasoline terminals, commercial cooking, gas stations, miscellaneous nonindustrial (not elsewhere classified), and solvent use.

Table H-5 shows that fuel combustion and biogenic emissions were the biggest contributors to NO_x and CO pollution and that fugitive dust emissions were the biggest contributors to PM pollution in Emery County. Biogenic emissions contributed the most to VOC pollution in Emery County. Industrial processes and mobile sources contributed the most to carbon dioxide equivalent (CO_2e) pollution, but fuel consumption contributed the most to HAP emissions.

Greenhouse Gases

Natural and anthropogenic sources emit GHGs. GHGs allow high-frequency solar radiation to enter the earth's atmosphere and trap outgoing infrared radiation. This phenomenon is known as the greenhouse effect and plays a critical role in regulating the earth's temperature. While natural sources emit GHGs (e.g., forest fires, volcanic activity, decomposition), elevated concentrations of GHGs generated from anthropogenic activities are thought to be linked to global climate change, such as rising surface temperatures, melting icebergs and snowpack, rising sea levels, and the increasing frequency and magnitude of severe weather.

The U.S. Supreme Court ruled in 2007 that the EPA has the authority to regulate GHGs, such as methane (CH_4) and carbon dioxide (CO_2), as air pollutants under the CAA. However, there are currently no ambient air quality standards for GHGs. Therefore, EPA has incorporated regulation of GHGs into the PSD permitting program for sources already subject to regulation thereunder, certain NSPS, and on-road vehicle emission standards.

Primary anthropogenic sources of GHGs include industrial processes, landfills, and the consumption of fossil fuels for power generation, transportation, heating, and cooking. The primary sources of GHGs associated with well pads and gas processing plants are CO_2, CH_4, and nitrous oxide (N_2O) from fuel combustion in construction and maintenance vehicles and equipment, as well as operations emissions of CH_4 and CO_2 from fuel combustion for power generation. CO_2 is the most abundant GHG. Other GHGs are less abundant but have higher global warming potential (GWP) than CO_2. Thus, emissions of other GHGs are frequently expressed in the equivalent mass of CO_2, denoted as CO_2e. Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014), CH_4 has a lifetime of 12.4 years and a GWP of 28 over 100 years. N_2O has a lifetime of 121 years and a GWP of 265 over 100 years.

Global warming refers to the ongoing rise in global average temperature near the earth's surface. It is caused mostly by increasing concentrations of GHGs in the atmosphere, and it is changing global climate patterns. Climate change refers to any substantial change in the measures of climate (e.g., temperature, precipitation, and wind patterns) lasting for an extended period of time (EPA 2017). Because GHGs circulate freely throughout the earth's atmosphere, climate change is a global issue. The largest component of global anthropogenic GHG emissions is CO_2 (EPA 2016). Fossil fuel use is the primary source of global CO_2 (EPA 2016). Overall, U.S. energy-related emissions from the U.S. energy sector (fossil fuel combustion, natural gas systems, coal mining, mobile combustion, waste incineration, and other sources) accounted for a combined 84.0% of total U.S. greenhouse gas emissions in 2017 (EPA 2019).

The Global Change Research Act of 1990 mandates that the U.S. Global Change Research Program (USGCRP) deliver a report to Congress and the president every 4 years that analyzes the effects of global change on the natural environment and other systems, as well as provides current trends in global change. The recently released second volume of the Fourth National Climate Assessment focuses on the human welfare, societal, and environmental elements of climate change and variability for 10 regions of the United States (USGCRP 2018). Global climate is changing rapidly compared with the pace of natural climate variations that have occurred throughout Earth's history. Evidence for these changes consistently points to human activities, especially emission of GHGs, as the dominant cause. Global average temperature has increased by approximately 1.8°F from 1901 to 2016. Without substantial emission reductions, annual average global temperatures could increase by 9°F or more by the end of this century (compared with preindustrial temperatures) (Hayhoe et al. 2018).

A recent study identified climate change issues relevant to resource management in all of Utah and Nevada, a small part of eastern California, a small part of western Colorado, southern Idaho, and western Wyoming (the Intermountain Region) (Halofsky et al. 2018). In the Plateaus subregion of the

Intermountain Region (which covers the southern half of Utah and a small portion of western Colorado and includes the proposed lease modification areas), median maximum temperature and median minimum temperature are projected to rise between 5°F to 10°F and 5°F to 12°F by 2100, respectively, depending on the climate model scenario (Halofsky et al. 2018). The greatest departure from historical temperatures by 2100 is projected to occur in summer.

Median maximum temperatures for winter, spring, and autumn are also projected to move outside of historical ranges by 2100. Precipitation projections in the Plateaus subregion are highly variable with no discernible trend (Halofsky et al. 2018).

Environmental Consequences

Analysis Methods and Assumptions

ISSUE INDICATORS

The following indicators were used to analyze impacts to air quality:

- Emission estimates for regulated pollutants and GHGs
- Comparison of Project emission estimates to county emissions inventories
- Exceedance of FLAG screening-level criteria
- Distance to federal Class I areas

Emissions calculations for the Project were subdivided into construction-related emissions (those emissions that are expected to be temporary in nature) and operations-related emissions (those emissions that are expected to occur throughout the operational lifetime of the Project).

The following assumptions were used to complete the air quality impact analysis for the Project:

- Emissions associated with heavy-duty on-road construction equipment were estimated using South Coast Air Quality Management District (SCAQMD) emission factors for heavy heavy-duty vehicles (with vehicle weights ranging from 33,001 to 60,000 pounds) for the 2019 vehicle fleet (SCAQMD 2007a).
- Emissions from off-road construction equipment and vehicles were estimated using composite off-road emission factors for the 2019 vehicle fleet from the California Air Resource Board's off-road model (SCAQMD 2007b). The type of equipment used for construction and the quantity of each type were based on similar projects. The appropriate emission factor, equipment type, quantity of equipment needed, and duration of use during construction of the Project were used in determining emissions from construction equipment.
- Exhaust emissions from construction worker commute, some on-road construction equipment, and equipment delivery were calculated using SCAQMD emission factors for on-road passenger vehicles and delivery trucks for the 2019 vehicle fleet (SCAQMD 2007a).
- Fugitive dust emissions from vehicle travel on paved and unpaved roads were estimated using emission factors from Sections 3.2.1 and 3.2.2 of the *Compilation of Air Pollutant Emission Factors* (EPA 2006, 2011).
- Fugitive dust emissions from earthmoving were estimated using the Western Regional Air Partnership's (2006) *Fugitive Dust Handbook*.

- Worker commuter vehicles and construction material and equipment delivery vehicles were assumed to travel from Green River, Utah, approximately 35 miles north of Spur Road 1025 (3 miles paved and 32 miles unpaved).
- All compressors and pumps were assumed to have electric motors.
- HAP emissions were assumed to equate to 10% of VOC emissions.
- Exhaust emissions from the operation of the gas turbine power generation would be controlled by a selective catalytic reduction. Emission rates were based on manufacturer's specification sheets and an annual operation of 8,640 hours.
- All waste streams at the processing facility, excluding the exhaust emissions from the power generation equipment and the sump tank emissions, would be reinjected in a gas disposal injection well. The gas stream to be reinjected is a combination of the dry, high-N_2 (dinitrogen) content membrane residue streams after helium recovery and after turbine fuel gas generation, and the wet acid gas (CO_2/hydrogen sulfide [H_2S]) that comes off the top of the amine unit regeneration still. This combined stream contains approximately 82.98% of N_2; 3.04% of CO_2; 2,238 parts per million of H_2S; 11.22% of CH_4; and less than 5.6 pounds of water per million standard cubic feet.

Construction Emissions

- Construction-related emissions would include the following:
- Exhaust from on- and off-road construction vehicles and equipment
- Exhaust from on-road construction worker commuter vehicles
- Exhaust from on-road construction material and equipment delivery vehicles
- Fugitive dust from vehicle travel on paved and unpaved roads
- Emissions from industrial wind erosion
- Fugitive dust from earthmoving and general construction activities

Off-Lease Well Pad

The wells would be located on a new well pad with a total area of disturbance of 5.4 acres for Alternative A. Construction would require a front-end loader for roadbed improvements, a small Cat-style dozer, and a dump truck (large axle) for dirt moving and rock hauling. Well-pad construction would occur during daylight hours (10 hours per day) and would take approximately 10 to 14 days to complete.

The helium reservoir would be developed using conventional drilling and completion methods; no hydraulic fracturing would be used. Given the depth of the target formation, a 400-ton drilling rig is anticipated, with a projected derrick height of up to 150 feet. Drilling operations would occur 24 hours per day for approximately 20 days. Flaring and venting would be required during initial production testing, but no long-term flaring or venting would be required for the Project after the well is found to be productive.

Road Improvements

The road to access the proposed well pad, Spur Road 1025, would need to be improved to allow equipment, including the drill rig, to access the site. Alternative A would require road improvements on approximately 2.7 miles of Spur Road 1025 from Emery Country Road 1025 to the proposed well pad.

Improvements would include erosion control, curve reduction, culvert installation, dust control, and safety signage while minimizing visual impacts where practical. Front-end loaders and bulldozers would be used to make these improvements using standard cut-and-fill construction techniques.

Pipeline

A 30-foot-wide pipeline ROW, connecting the proposed well pad to the proposed helium processing plant, would be located directly adjacent to the well-pad access route. This pipeline corridor would be approximately 4.9 miles long.

Processing Plant on Non-Federal Lands

A plant to remove waste gas to concentrate the helium for trucking to market would be constructed. Impacts associated with the construction of the processing plant have been analyzed as a nonfederal indirect connected action. The plant would occupy a 10-acre footprint, not including the access road. A complete description of the processing plant operation is included in Appendix G. Construction duration for the processing plant is estimated to be approximately 25 weeks.

OPERATIONS EMISSIONS

Operations-related emissions would include the following:

- Emissions from inspection activities, such as exhaust from on-road inspection vehicles, and fugitive dust from travel on paved and unpaved roads
- Emissions from maintenance activities, including exhaust from worker vehicles and any needed equipment, as well as fugitive dust from travel on paved and unpaved roads
- Piping fugitive emissions
- Working and breathing emissions from holding tanks
- Gas turbine power generator exhaust emissions at the processing plant
- Exhaust from on- and off-road construction vehicles and equipment for well recompletions

Off-Lease Well Pad

On the pad, production equipment could consist of holding tanks, transfer pumps, separators, vessels, flowlines, and safety equipment. Emission sources would include exhaust emissions from on-road inspection and maintenance vehicles, piping fugitives, emissions from storage tanks, and emissions associated with well recompletions.

Road Improvements

Criteria pollutant, HAPs, and GHG emissions would occur from activities associated with the maintenance of the access road.

Pipeline

Emissions associated with the operation of the pipeline would include quarterly inspections.

Processing Plant on Non-Federal Lands

Emissions associated with the operation of the processing plant would include the following:

- Emissions from inspection activities, such as exhaust from on-road inspection vehicles, and fugitive dust from travel on paved and unpaved roads
- Emissions from maintenance activities, including exhaust from worker vehicles and any needed equipment, as well as fugitive dust from travel on paved and unpaved roads
- Piping fugitive emissions
- Working emissions from a sump tank
- Gas turbine power generator exhaust emissions

Soil Resources

No additional supporting information identified for Soil Resources.

Vegetation

No additional supporting information identified for Vegetation.

Special-Status Plant Species

Table H-6. Potential Occurrence of Special-Status Plant Species

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Entrada rushpink (Lygodesmia grandiflora var. entrada)	BLM sensitive	Endemic to Emery, Grand, and San Juan Counties, Utah. Species typically occurs on the Entrada Formation in mixed desert shrub communities and piñon-juniper woodlands from 4,400 to 4,800 feet (1,340–1,460 meters [m]) in elevation.	**Known to occur**—species was identified during the 2020 SSPS surveys. Suitable habitat exists in the analysis area. See Section 3.5.2.2 for detailed analysis.	**May occur**—suitable habitat for the species exists in the analysis area, including Entrada formation substrate and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.
Flat-top buckwheat (Eriogonum corymbosum var. smithii)	BLM sensitive	Endemic to the Colorado Plateau in Emery and Wayne Counties, Utah. Occurs on the Entrada Formation and on seleniferous stabilized dunes. Associated with purple sage, Mormon tea–Indian ricegrass, desert shrub, and rabbitbrush communities from 4,500 to 5,600 feet (1,370–1,700 m) in elevation.	**May occur**—suitable habitat for the species exists in the analysis area, including stabilized dunes and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.	**May occur**—suitable habitat for the species exists in the analysis area, including stabilized dunes and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.

Species Common Name (scientific name)	**Conservation Status**	**Habitat and Range Description**	**Potential for Occurrence in the Alternative A Analysis Area**	**Potential for Occurrence in the Alternative B Analysis Area**
Jones cycladenia (Cycladenia humilis var. jonesii)	USFWS T	Known from four general areas in Utah: Joe Hutch complex (along the Green River), San Rafael Swell complex (west of the town of Green River), Castle Valley complex (near Moab), and Grand Staircase-Escalante National Monument. It is located in isolated habitats in central and southern Utah, occurring between 4,390 and 6,000 feet (1,338–1,829 m) in elevation in mixed desert scrub, juniper, or wild buckwheat–Mormon tea communities. It is found on gypsiferous, saline soils of Cutler, Summerville, and Chinle Formations (USFWS 2020a).	**Unlikely to occur**—the species is known from Emery County; however, it is unlikely to occur in the analysis area given its preferred substrate, including gypsiferous saline soils and vegetation community associations. The analysis area is also higher in elevation than this species' known occurrences.	**Unlikely to occur**—The species is known from Emery County; however, it is unlikely to occur in the analysis area given its preferred substrate, including gypsiferous saline soils and vegetation community associations. The analysis area is also higher in elevation than this species known occurrences.
Navajo sedge (Carex specuicola)	USFWS T	A wetland obligate of springs, typically in alcoves associated with eolian sandstone cliffs of varying height and slope (often vertical) from 4,200 to 7,600 feet (1,280–2,300 m) in elevation in piñon-juniper woodland. Adapted to the specialized habitat of seepages on sandstone cliffs in an arid plateau ecoregion it rarely occurs on level terrain. The seep-spring pockets along the Navajo Sandstone Formation bedrock provide this habitat.	**Unlikely to occur**—there is a lack of springs and other wetland habitat, as well as seepages on sandstone cliffs, that are obligate habitat requirements for this species.	**Unlikely to occur** —there is a lack of springs and other wetland habitat, as well as seepages on sandstone cliffs, that are obligate habitat requirements for this species.

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Trotter's oreoxis (Oreoxis trotteri)	BLM sensitive	Endemic to Wayne County, Utah. Found in crevices or in sandy pockets on the Moab Tongue and, less often, on the Slick Rock members of the Entrada Sandstone. Favors open sites (usually with a northern aspect) and, occasionally, alcoves and shaded cliff bases. Associated with warm desert shrub and mixed juniper communities from 4,700 to 6,000 feet (1,430–1,830 m) in elevation.	**May occur**— suitable habitat for the species exists in the analysis area, including stabilized dunes and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.	**May occur**—suitable habitat for the species exists in the analysis area, including stabilized dunes and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.
Utah spurge (Euphorbia nephradenia)	BLM sensitive	Endemic to the Colorado Plateau in Emery, Garfield, Kane, and Wayne Counties in Utah and Colorado. Occurs in dark clay hills, sand, and stabilized dunes primarily from the Tropic Shale and Entrada Formations. Associated with mat-saltbush, blackbrush, Mormon tea, and mixed sandy desert shrub and grassland communities from 3,800 to 4,800 feet (1,160–1,460 m) in elevation.	**May occur**—suitable habitat for the species exists in the analysis area, including stabilized dunes and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.	**May occur**—suitable habitat for the species exists in the analysis area, including stabilized dunes and desert scrub vegetation communities. However, this species was not observed during the 2020 SSPS surveys.

Sources: Except where otherwise noted, range or habitat information for plant species is taken from the NatureServe (2020) website and the USFWS (2020b) Information for Planning and Consultation tool.

* Federal (USFWS) status: T = threatened.

Federal (BLM) status: Sensitive = BLM Price FO–determined priority species (BLM 2018).

General Wildlife

No additional supporting information identified for General Wildlife.

Special-Status Wildlife Species

Table H-7. Potential Occurrence of Special-Status Wildlife Species

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Invertebrates				
Monarch butterfly (*Danaus plexippus*)	BLM sensitive	Widespread in the United States throughout the summer months, wintering in warmer areas in Mexico and California. It inhabits a wide variety of habitat types requiring floral resources for food and milkweed (*Asclepias* sp.) for breeding, because its young will only eat plants from the milkweed family, deriving protection from the cardiac glycosides produced within the milky latex excreted by the plant.	**Unlikely to occur**—flowering plants are sparse in the analysis area and are found in greater abundance in nearby Keg Spring Canyon approximately 416 m southeast of proposed surface disturbance. Additionally, no milkweed or individuals of this butterfly species were identified during the 2020 biological surveys.	**Unlikely to occur**—flowering plants are sparse in the analysis area and are found in greater abundance in nearby Keg Spring Canyon approximately 1,251 m northeast of proposed surface disturbance. Additionally, minimal milkweed and no individuals of this butterfly species were identified during the 2020 biological surveys.
Western bumblebee (*Bombus occidentalis*)	BLM sensitive	Though much reduced in range and number, this species, like most of the 300-plus bee species in the San Rafael Desert, are ground nesting. The western bumble bee has three basic habitat requirements: suitable nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer and fall), and suitable overwintering sites for the queens.	**Unlikely to occur**—flowering plants are sparse in the analysis area and are found in greater abundance in nearby Keg Spring Canyon approximately 416 m southeast of proposed surface disturbance. Additionally, no individuals of this species were identified during the 2020 biological surveys.	**Unlikely to occur**—flowering plants are sparse in the analysis area and are found in greater abundance in nearby Keg Spring Canyon approximately 1,251 m northeast of proposed surface disturbance. Additionally, no individuals of this species were identified during the 2020 biological surveys.
Reptiles				
Great plains toad (*Anaxyrus cognatus*)	BLM sensitive	Occurs throughout the state, where it prefers desert, grassland, and agricultural habitats. In cold winter months, the Great Plains toad burrows underground and becomes inactive.	**Unlikely to occur**—the Project area is outside the Green River corridor, and suitable riparian habitat is not present in and is topographically separated from the Project area.	**Unlikely to occur**—the Project area is outside the Green River corridor, and suitable riparian habitat is not present in and is topographically separated from the Project area.

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Great plains rat snake (cornsnake) (*Elaphe guttata*)	BLM sensitive	This species is found along the Colorado and Green river corridors, generally from Moab, Grand County, and north to Dinosaur National Monument, Uintah County. The distribution of populations in Utah appears to be quite patchy, but this may reflect the secretive behavior of the species. Scarce data are available to describe habitat use in Utah, but collection data imply the importance of riparian habitat.	**Unlikely to occur**—the Project area is outside the Green River corridor, and suitable riparian habitat is not present in and is topographically separated from the Project area.	**Unlikely to occur**—the Project area is outside the Green River corridor, and suitable riparian habitat is not present in and is topographically separated from the Project area.
Birds				
Mexican spotted owl (*Strix occidentalis lucida*)	USFWS T	Found in the southern and eastern parts of Utah on the Colorado Plateau, where it is a rare permanent resident. Prefers mixed coniferous and hardwood forests but occupies a variety of habitats in different parts of its range, including various forest types and steep-walled rocky canyons. The latter habitat is the primary habitat used in Utah. spotted owls are nonmigratory.	**May occur**—given the proximity of suitable cliff nesting habitat in Keg Spring Canyon, this species has the potential to occur or to be impacted by activity in the proposed Project area. See Section 3.7.2.2 for detailed analysis.	**Unlikely to occur**—no suitable nesting or foraging habitat, including forested areas or steep-walled rocky canyons, within 0.5 mile of the proposed Project area. Suitable nesting habitat in Keg Spring Canyon is approximately 1,251 m east-northeast of proposed Project area.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	USFWS E	Inhabits southwestern riparian ecosystems. Breeding in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands, including lakes. Most of these habitats are classified as forested wetlands or scrub-shrub wetlands. Habitat requirements for wintering are not well known but include brushy savanna edges, second growth, shrubby clearings and pastures, and woodlands near water.	**Unlikely to occur**—although some riparian habitat exists in Keg Spring Canyon (416 m southeast of the proposed Project area), the canyon and present vegetation do not meet habitat requirements for this species (BLM 2020d).	**Unlikely to occur**—although some riparian habitat exists in Keg Spring Canyon (416 m southeast of the proposed Project area), the canyon and present vegetation do not meet habitat requirements for this species (BLM 2020d).

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Yellow-billed cuckoo (*Coccyzus americanus*)	USFWS T	Uses lowland riparian areas characterized by a dense subcanopy or shrub layer (regenerating canopy trees, willows, or other riparian shrubs) within 300 feet of water. Overstory in these habitats may be either large, gallery-forming or developing trees, usually cottonwoods. In Utah, nesting habitats are found from 2,500 to 6,000 feet (750–1,820 m) in elevation.	**Unlikely to occur**—although some riparian habitat exists in Keg Spring Canyon (416 m southeast of the proposed Project area), the canyon and present vegetation do not meet habitat requirements for this species (BLM 2020d).	**Unlikely to occur**—although some riparian habitat exists in Keg Spring Canyon (416 m southeast of the proposed Project area), the canyon and present vegetation do not meet habitat requirements for this species (BLM 2020d).
Mammals				
Kit fox *(Vulpes macrotis)*	BLM sensitive	Found in scattered localities throughout Utah but is absent from the higher-elevation, montane portions of the state. Associated with sparsely vegetated arid habitat, primarily greasewood-, shadscale-, or sagebrush-dominated habitat.	**May occur**—suitable habitat, including arid desert habitat, occurs in the analysis area. See Section 3.7.2.2 for detailed analysis.	**May occur**—suitable habitat, including arid desert habitat, occurs in the analysis area. See Section 3.7.2.3 for detailed analysis.
Fringed myotis *(Myotis thysanodes)*	BLM sensitive	The species is widely distributed throughout Utah but occurs primarily in the Colorado Plateau. It inhabits caves, mines, and buildings, most often in desert and woodland areas, but uses varied habitats, including mixed conifer and aspen, desert riparian, and piñon-juniper. Populations tend to be associated with areas having rocky outcroppings, cliffs, and canyons.	**May occur**—this species may occur in the analysis area due to the presence of adjacent suitable roosting habitat. Suitable roosting habitat of cliff walls, canyons, and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (416 m southeast). Due to the proximity of suitable roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.2 for detailed analysis.	**May occur**—this species may occur in the analysis area due to the presence of desertscrub and semidesert shrubland vegetation communities. Suitable roosting habitat of cliff walls and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (470 m east). Due to the proximity of roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.3 for detailed analysis.

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Spotted bat *(Euderma maculatum)*	BLM sensitive	Occurs in various habitats from desert to montane coniferous stands, including open ponderosa pine, piñon-juniper woodland, canyon bottoms, riparian and river corridors, meadows, open pasture, and hayfields. Roosts, including maternity roosts, generally are in cracks and crevices in cliffs, sometimes in caves or in buildings near cliffs.	**May occur**—this species may occur in the analysis area due to the presence of adjacent suitable roosting habitat. Suitable roosting habitat of cliff walls, canyons, and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (416 m southeast). Due to the proximity of suitable roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.2 for detailed analysis.	**May occur**—this species may occur in the analysis area due to the presence of desertscrub and semidesert shrubland vegetation communities. Suitable roosting habitat of cliff walls and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (470 m east). Due to the proximity of roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.3 for detailed analysis.
Townsend's big-eared bat *(Corynorhinus townsendii)*	BLM sensitive	Found in a variety of xeric to mesic habitats: scrub-grassland, desertscrub, semidesert shrublands, chaparral, saxicoline brush, tundra, open montane forests, spruce-fir, mixed hardwood-conifer, and oak woodlands and forests. This species is strongly correlated with the availability of caves or cave-like habitat, but it also uses abandoned buildings and rock crevices on cliffs for roosting.	**May occur**—this species may occur in the analysis area due to the presence of desertscrub and semidesert shrubland vegetation communities. Suitable roosting habitat of cliff walls and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (416 m southeast). Due to the proximity of roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.2 for detailed analysis.	**May occur**—this species may occur in the analysis area due to the presence of desertscrub and semidesert shrubland vegetation communities. Suitable roosting habitat of cliff walls and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (470 m east). Due to the proximity of roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.3 for detailed analysis.

Species Common Name (scientific name)	Conservation Status	Habitat and Range Description	Potential for Occurrence in the Alternative A Analysis Area	Potential for Occurrence in the Alternative B Analysis Area
Western red bat *(Lasiurus blossevillii)*	BLM sensitive	A tree bat, this species is closely associated with well-developed riparian habitats, most often in lowlands, and most often with cottonwoods and willows that provide suitable roosting sites.	**May occur**—this species may occur in the analysis area due to the presence of adjacent suitable roosting habitat. Suitable roosting habitat of cliff walls, canyons, and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (416 m southeast). Due to the proximity of suitable roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.2 for detailed analysis.	**May occur**—this species may occur in the analysis area due to the presence of desertscrub and semidesert shrubland vegetation communities. Suitable roosting habitat of cliff walls and rock crevices are not present in the analysis area but are located proximally in Keg Spring Canyon (470 m east). Due to the proximity of roosting habitat, the analysis area provides suitable foraging habitat. See Section 3.7.2.3 for detailed analysis.

Sources: Except where otherwise noted, range or habitat information for wildlife species is taken from the NatureServe (2020) website and the USFWS (2020a 2020b) Information for Planning and Consultation tool.

* Federal (USFWS) status: E = endangered, T = threatened.

Federal (BLM) status: Sensitive = BLM Price FO–determined priority species (BLM 2018).

Recreation

No additional supporting information identified for Recreation.

Wilderness Areas and Lands with Wilderness Characteristics

Summary of Wilderness Characteristics

LABYRINTH CANYON WILDERNESS AREA AND LABYRINTH CANYON UNITS A AND B LANDS WITH WILDERNESS CHARACTERISTICS

The Labyrinth Canyon Wilderness Area and Labyrinth Canyon LWC units overlap one another (BLM 2020). It is therefore reasonable to assume that the existing environmental and wilderness characteristics are identical. Therefore, the following discussion on the condition of the affected environment is combined.

The Labyrinth Canyon Wilderness totals 54,643 acres and is bounded on the west by Emery County Road 1010, on the north by Road LC-A-001, on the east by the Green River and the Horseshoe Canyon North WSA, and on the south by Road LC-B-018.

The Labyrinth Canyon Unit A LWC totals 20,023 acres and is bounded on the west by Emery County Road 1010, on the north by Road LC-A-001, on the east by the Green River and the Horseshoe Canyon North WSA, and on the south by an unnamed access road approximately 0.22 mile north of Emery County Road 1026. Labyrinth Canyon Unit B LWC totals 11,078 acres and is bounded on the west by Emery County Road 1010, on the north by an unnamed access road approximately 0.22 mile north of Emery County Road 1026, on the east by Horseshoe Canyon North WSA, and on the south by Horseshoe Canyon (Canyonlands National Park).

The Labyrinth Canyon Wilderness Area is composed of sagebrush and blackbrush flats along the upper benches and knolls and the incised canyons of the main chasm of Labyrinth Canyon, as well as riverine-influenced zones along the Green and San Rafael Rivers. Portions of the Labyrinth Canyon Wilderness Area range from gently sloping to rugged, broken landscapes of ridges and escarpments cut by side canyons. Spring Canyon and Horseshoe Canyon provide access to the Green River and are two extensive canyon systems in the area.

The predominantly desert landscapes provide views of diverse geological formations, some of which include high desert plateaus that transition to steep canyons that eventually give way to various washes, where drastic elevation transitions are prevalent. Naturalness is enhanced by topographic screening from deep canyons, rugged terrain, and the natural revegetation of disturbed areas, which obscures most intrusions in the predominantly blackbrush communities. Vegetation includes, but is not limited to, native grasses and shrubs, which are sparse in some areas.

Human impacts are present in the form of reclaiming seismic lines and range improvements. Major current human uses also include recreation-based activities due to the remoteness of this area. Activities such as hunting, hiking, exploring, sightseeing, photography, camping, and river rafting access would be most likely to occur within this area.

Steep and rugged topography, as well as the extensive side canyons, cliffs, and other topographical features maintain the area's natural character and also provide outstanding opportunities for solitude. The Labyrinth Canyon Wilderness is contiguous with the Horseshoe Canyon North WSA and the Canyonlands National Park Horseshoe Canyon unit; both provide and are managed for outstanding

opportunities for solitude. Due to the remoteness and topography, outstanding opportunities for primitive and unconfined recreation are prevalent. Some of these activities may include hiking, canyoneering, mountain biking, rafting, and primitive camping.

Scenic quality is excellent from the extensive views of red, buff, and purple sandstone canyons, domes, alcoves, multiple arches, and sheer cliff faces of spectacular dimensions.

There are several historical features, including sheep access trails to the river. The same types of nationally significant, prehistoric cultural sites and rock art found within the Horseshoe Canyon unit of Canyonlands National Park occur in the Labyrinth Canyon Wilderness.

The Labyrinth Canyon Wilderness provides exceptionally diverse habitats. Most important are the extensive riparian areas found along the river and major side canyons. An expanding herd of desert bighorn sheep inhabits the rims and canyons. The endangered Colorado pikeminnow, humpbacked chub, bonytail chub, and razorbacked sucker are all found in the Green River. Labyrinth Canyon Unit B LWC has an abundant pronghorn population, and one of only a few herds in Utah that was not eliminated by human settlement.

The Price FO RMP established several "special" categories along the Green River through Labyrinth Canyon for the purpose of protecting values and prescribing management direction (BLM 2008a):

The Labyrinth Canyon SRMA recognizes the intensive and special recreation values of the canyon.

The Bowknot Bend Area of Critical Environmental Concern protects the ungrazed vegetation communities on the isolated mesa tops that have remained completely undisturbed.

The Green River through Labyrinth Canyon is suitable as scenic for inclusion in the National Wild and Scenic Rivers System.

SWEETWATER REEF UNIT A LAND WITH WILDERNESS CHARACTERISTICS

The Sweetwater Reef Unit A totals 69,348 acres and is primarily in Emery County, with a portion of the southern boundary in Wayne County. Emery County Road 1010 and Saucer Basin Road border the unit. This unit covers an area of the San Rafael Desert made up of a variety of geographic features ranging from stabilized sand dunes, incised slick rock canyons, and expanses of brush-grasslands to the uplifted Sweetwater Reef. The unit is bordered by bladed natural surface roads and is east of State Route 24 and west of the Horseshoe Canyon unit of Canyonlands National Park.

The unique natural desert ecosystem of dry washes, oak brush–stabilized sand dunes, and endemic blackbrush flats offers exemplary opportunities for primitive and unconfined recreation. Additionally, this area offers opportunities for viewing wildlife in a landscape of huge skies, varied geologic forms, and unique isolated riparian systems.

The unit contains extensive undocumented cultural resources in the form of lithic scatters, which appear and disappear as shifting sands expose and then recover them. The unit also contains isolated rock art and historic cabins and corrals located near springs. Some of the earliest petroleum exploration occurred in this part of the San Rafael Desert in the 1920s. The most substantial human activity observed and noted was the existence of roads and berms from historic seismic activity. Mineral exploration, probably during the 1950s and 1960s, left the unit crisscrossed with long stretches of lines and routes, which are in various stages of natural rehabilitation. In some cases, the lines have naturally reclaimed to the point that they are barely visible and the average visitor would not notice them (BLM 2016).

APPENDIX I

Minimum Requirements Decision Guide

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title: Twin Bridges Bowknot Helium Well Project

MRDG Step 1: Determination

*Determine if Administrative Action is **Necessary***

Description of the Situation
What is the situation that may prompt administrative action?

An oil & gas lease sale for Parcel No. UT 1218-257 located in T26S, R17E, Sec. 5 W2SW, unsurveyed, Sec. 6 S2, unsurveyed, Sec. 7 All, unsurveyed, and Sec. 8 N2NE, W2, unsurveyed, SL Meridian, Emery County, Utah, occurred on Dec. 12, 2018, totaling 1410 acres. Based on successful competitive bidding, Lease No. UTU 93713 was issued to Twin Bridges Resources, LLC, Denver, CO (hereafter referred to as Twin Bridges), on Feb. 8, 2019, with an effective date of lease of March 1, 2019. Additionally, Twin Bridges acquired two helium leases (parcels ML-53189 and ML-53420) from the Utah School and Institutional Trust Lands Administration (SITLA). These SITLA leases are described as Section 2, Township 26 South (T26S), Range 16 East (R16E) (596 acres) and Section 36, Township 25 South (T25S), R16E (640 acres).

The John D. Dingell, Jr. Conservation, Management and Recreation Act (P.L. 116-9) was signed into law on March 12, 2019, and designated the Labyrinth Canyon Wilderness in Emery County, Utah, to be managed in accordance with the provisions of the Wilderness Act. As stated in Section 4(d)(c) of the Wilderness Act, "Subject to valid rights then existing, [effective March 12, 2019], the minerals in lands designated by this Act as wilderness areas are withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral leasing and all amendments thereto.

The Twin Bridges federal lease No. UTU 93713 lies entirely within the new wilderness area with access provided by the cherrystemmed Emery County Road 1026. The leased SITLA sections are also currently excluded from the Labyrinth Canyon Wilderness. Two existing roads (Emery County Road 1025 and Emery County Road 1026) were excluded from the Labyrinth Canyon Wilderness and provide access to the general vicinity of the parcels leased by Twin Bridges. The terminus of Emery County Road 1025 (Spur Road 1025) includes a disturbed circular roundabout that was also excluded from the Labyrinth Canyon Wilderness. Emery County Road 1026 bisects federal lease UTU 93713. The width of the excluded corridor for each road is 100 feet from centerline of the existing disturbance.

The purpose of this analysis is to determine if management action is necessary to provide reasonable access by Twin Bridges to its helium leases within the Labyrinth Canyon Wilderness (Step 1), and, if so, what minimum required actions are necessary to address proposed well site development (Step 2). In addition to potential surface impacts, the proposed alternatives will also address proposed drilling of cased wells through withdrawn mineral estate in order to access potential helium resources within the federal lease and SITLA inholdings.

Options Outside of Wilderness
Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES **STOP – DO NOT TAKE ACTION IN WILDERNESS**

☒ NO **EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

Explain:

Access to the wilderness for well pad placement is necessary in order to develop these valid existing rights. The leased area cannot be accessed from outside the wilderness boundary due to limited distance of long reach horizontal wells. The maximum drilling distance of horizontal wells into this type of reservoir rock is 9,500’ – 10,500’ (depending on cross faulting). The wilderness boundary is

2.47 miles (or 13,050 feet) away from the closest point of contact with Sec. 36. The same distance applies to the Federal Lease making it technically impossible to drill into either of these leases from outside of the Wilderness boundary.

There is an option to put the well pad right on top of the road. However, the technical requirements of the well pad may require it to be larger than the size of the cherrystem. The cherrystem in this case is 200 feet wide, so a part of the pad must be in the wilderness, if the pad must be larger than 200 feet.

Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☒ YES ☐ NO

Explain:

Twin Bridges federal lease no. UTU 93713 constitutes a valid existing right within the Labyrinth Canyon Wilderness. Mineral leases, permits, or licenses existing prior to the date of an area's designation as wilderness, can be operated under the original terms and conditions. Refer to the lease document attached to the Twin Bridges Bowknot Helium Lease EA for terms, conditions, stipulations, and restrictions. In accordance with BLM Manual 6340, the BLM will grant access to valid mineral rights that are wholly within a designated wilderness, as provided for in Section 5(b) of the Wilderness Act of 1964, in a manner consistent with other areas in the National Wilderness Preservation System similarly situated. In most cases, this means such access will be treated in the same way as access to inholdings, but in some instances applying the regulations found at 43 CFR 6305.30 may result in granting mineral lease holders a greater degree of access than would be granted an inholder.

B. Requirements of Other Legislation

*Is action necessary to meet the requirements of **other federal laws**? Cite law and section.*

☒ YES ☐ NO

Explain:

The need for the action is further established by the BLM's responsibilities under the Mineral Leasing Act (MLA) of 1920, as amended by the Federal Land Policy and Management Act (FLPMA) of 1976; the Federal Onshore Oil and Gas Leasing Act of 1987; and the Helium Privatization Act of 1996, which establishes the BLM's authority to enter into agreements with private parties for the recovery and disposal of helium on federal lands.

C. Wilderness Character

Is action necessary to preserve one or more of the five qualities of wilderness character?

UNTRAMMELED

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality. The definition of the Untrammeled quality is the lack of manipulation or control of natural processes by humans, which if allowed to occur, would eventually affect wilderness character. This quality is preserved when no manipulation or control of natural processes occurs.

UNDEVELOPED

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality. Preserving this quality keeps areas free from “expanding settlement and growing mechanization” and “with the imprint of man’s work substantially unnoticeable” and without structures, installations, temporary or permanent roads, or use of motorized equipment, mechanical transport, or landing or aircraft, as required by the Wilderness Act. The Undeveloped quality is preserved when wilderness retains its "primeval character and influence," and is essentially "without permanent improvements" or modern human occupation.

NATURAL

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality. A wilderness area is to be "protected and managed so as to preserve its natural conditions" meaning that wilderness ecological systems are substantially free from the effects of modern civilization.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality. The Wilderness Act defines wilderness as having “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” This quality is preserved when the *opportunity* for people to experience wilderness in terms of the visitor's ability to avoid the sights and sounds of other human activity, and their expectation for an undeveloped environment with minimal restrictions remains unimpaired.

OTHER FEATURES OF VALUE

☐ YES ☒ NO

Explain:

It is not necessary to take action to preserve this quality. The Wilderness Act indicates that areas "may also contain ecological, geological, or other features of scientific, educational, scenic, or historical use" that reflect the character of wilderness.

Step 1 Determination
*Is administrative action **necessary** in wilderness?*

Criteria for Determining Necessity

A. Existing Rights or Special Provisions	☒ YES	☐ NO
B. Requirements of Other Legislation	☒ YES	☐ NO
C. Wilderness Character		
Untrammeled	☐ YES	☒ NO
Undeveloped	☐ YES	☒ NO
Natural	☐ YES	☒ NO
Solitude/Primitive/Unconfined	☐ YES	☒ NO
Other Features of Value	☐ YES	☒ NO

Is administrative action **necessary** in wilderness?

☒ YES **EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

☐ NO **STOP – DO NOT TAKE ACTION IN WILDERNESS**

Explain:

There is a need to take some type of administrative action in order to allow Twin Bridges reasonable access in order to further explore and develop its federal and state helium leases within the Labyrinth Canyon Wilderness.

MRDG Step 2

*Determine the **Minimum** Activity*

Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☐ YES **DESCRIBE OTHER DIRECTION**

☒ NO **SKIP AHEAD TO TIME CONSTRAINTS BELOW**

Describe Other Direction:

No special provisions in legislation or other Congressional direction affecting the Twin Bridges helium leases currently exist. The BLM Price Field Office Resource Management Plan (2008) does not address management of the project area in the case of wilderness designation.

BLM Manual 6340 - Management of Designated Wilderness Areas states on page 1-64, under Analysis of Impacts to Wilderness Character from Activities Outside of Wilderness Areas, "In general, the BLM does not prohibit uses outside a wilderness on public lands solely to protect the wilderness character of the designated lands. When activities on adjacent public lands are proposed, the potential impacts, if any, of those activities upon the wilderness resource and upon public use of the adjacent wilderness area must be analyzed in the applicable NEPA document. In authorizing new uses, as long as the purpose and need can be met, a reasonable effort must be made to protect the character and values of the nearby wilderness."

Impacts from the construction of the gas plant and transportation of helium from the plant to market is not considered under this analysis since the proposed plant locations are entirely outside the Labyrinth Canyon Wilderness boundaries on State land, and the transportation of helium from the plants will occur entirely on Emery County roads.

Time Constraints

What, if any, are the time constraints that may affect the action?

Season of use and high precipitation events may dictate how and when personnel can access the site. Work would likely need to be done outside the winter season and outside the predicted monsoon season.

Components of the Action *What are the discrete components or phases of the action?*	
Component 1:	Access road improvements
Component 2:	Well pad construction
Component 3:	Drilling activities
Component 4:	Well pad facilities
Component 5:	Pipeline construction
Component 6:	Additional wells
Component 7:	Interim Reclamation
Component 8:	Well abandonment; Final reclamation
Component 9:	Road access and visitation

Proceed to the alternatives.

Refer to the **MRDG Instructions** regarding alternatives and the effects to each of the comparison criteria.

MRDG Step 2: Alternatives

Alternative 1: Bowknot 36-1: Construct well pad on Section 26 & 35, T25S R16E

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

- Road improvements on approximately 2.7 miles of Spur Road 1025 from Emery County Road 1025 to the proposed well pad. Upgrades to the road would result in 9.9 acres of surface disturbance.
- Construction of a 5.4-acre well pad located in an area of existing disturbance located in Section 26 & 35, T25S, R16E, Emery County, Utah.
- Drilling and testing of one exploratory helium well (Bowknot State 36-1) on state lease ML-53420 located in Section 36, T25S, R16E, Emery County, Utah.

If a sufficient quality and quantity of helium-bearing gas is confirmed through flow testing of the exploratory well, the following actions would also be constructed:

- Construction of a helium processing plant on SITLA-managed lands in Section 16, T25S, R16E, Emery County, Utah.
- Installation of three pipelines and one conduit: 1) up to 14-inch-diameter steel or fiber-reinforced polyethylene gathering pipeline, 2) up to 8-inch-diameter polyethylene fluid transfer pipeline, 3) an 8-inch diameter polyethylene produced water pipeline, and 4) up to 6-inch-diameter conduit for running control and power cables. All infrastructure would be buried (3–4 feet) within a 30-foot-wide ROW parallel to Spur Road 1025, Emery County Road 1025, and Emery County Road 1010. Approximately 4.9 miles of proposed pipeline ROW would result in 17.8 acres of surface disturbance.
- Drilling, testing and production of a second delineation well (Bowknot 5-2) from the same well pad as the State 36-1 well under the terms and stipulations of Twin Bridges' federal lease UTU-93713 located in Section 7 and portions of Sections 5, 6, and 8, T26S, R17E, Emery County, Utah. The drilling of the second delineation well is under terms within federal helium Contract No. 20-02.
- Drilling and production of up to 5 additional development wells. The number of wells would be determined based upon the results of the initial test well and subsequent delineation well. The number of development wells needed would largely be dictated by the viability of future horizontal drilling. It is possible that the reservoir could be adequately drained with the two initial wellbores, however up to five additional wells could be needed. All future wells would be drilled from the 5.4 acre well pad and no additional disturbance would occur.

Component Activities
How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Access road improvements	Road upgrade; 30-foot-wide ROW for approximately 2.7 miles (14,445 feet), 9.9 acres disturbed; 10-14 day construction period; adjacent to wilderness
2	Well pad construction	Wellpad: 300 × 590 feet, 5.4 acres disturbance (2.4 after initial reclamation); 10-14 days construction period; adjacent to wilderness
3	Drilling activities	Drilling rig, 150 ft derrick height, up to 5 temporary trailers on site; mobilization & drilling period up to 34 days
4	Well pad facilities	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings
5	Pipeline construction	Pipeline; 30-foot-wide ROW for approximately 4.9 miles (25,880 feet); 17.8 acres disturbed; 30-day construction period; adjacent to wilderness
6	Additional wells	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 days drilling period for each
7	Interim Reclamation	Soil recontouring, redistribution & reseeding; 3.0 acres (2.4 acres disturbance after initial reclamation)
8	Well abandonment; Final reclamation	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 43.1 acres total disturbance
9	Road access and visitation	Improved access and increased visitation

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 2.7 miles (14,445 feet), 9.9 acres disturbed; 10-14 day construction period; adjacent to wilderness	☐	☐	☒
2	Wellpad: 300 × 590 feet, 5.4 acres disturbance (2.4 after initial reclamation); 10-14 days construction period; adjacent to wilderness	☐	☒	☐
3	Drilling rig, 150 ft derrick height, up to 5 temporary trailers on site; mobilization & drilling period up to 34 days	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☒	☐
5	Pipeline; 30-foot-wide ROW for approximately 4.9 miles (25,880 feet); 17.8 acres disturbed; 30-day construction period; adjacent to wilderness	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 days drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.0 acres (2.4 acres disturbance after initial reclamation)	☐	☒	☐
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 43.1 acres total disturbance	☐	☒	☐
9	Improved access and increased visitation	☐	☐	☒
Total Number of Effects			8	NE
Untrammeled Total Rating		-8		

Explain:

Untrammeled quality is defined as unhindered and free from modern human control or manipulation. Construction work on Emery County Road 1025 and the well pad, drilling activities, production infrastructure, pipeline construction, drilling additional wells, and any rehabilitation activities will be observable from numerous locations within the surrounding wilderness area, in particular the Fivehole Arch trailhead and trail which the majority of visitors to this area use to experience the wilderness. Although temporary in nature and occurring adjacent to the wilderness boundaries within the 200 foot wide cherrystem corridor, these construction activities will nevertheless be observable to wilderness visitors and have an impact on their impression of human manipulation of the local environment. Drilling and casing of wells under this alternative will create a sub-surface impact to the federal mineral estate located outside the boundary of Twin Bridges' federal lease UTU-93713 and withdrawn from mineral entry in accordance with the designation of the Labyrinth Canyon Wilderness.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 2.7 miles (14,445 feet), 9.9 acres disturbed; 10-14 day construction period; adjacent to wilderness	☐	☒	☐
2	Wellpad: 300 × 590 feet, 5.4 acres disturbance (2.4 after initial reclamation); 10-14 days construction period; adjacent to wilderness	☐	☒	☐
3	Drilling rig, 150 ft derrick height, up to 5 temporary trailers on site; mobilization & drilling period up to 34 days	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 4.9 miles (25,880 feet); 17.8 acres disturbed; 30-day construction period; adjacent to wilderness	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 days drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.0 acres (2.4 acres disturbance after initial reclamation)	☐	☐	☒

8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 43.1 acres total disturbance	☐	☐	☒
9	Improved access and increased visitation	☐	☐	☒
Total Number of Effects			5	NE
Undeveloped Total Rating		-5		

Explain:

Undeveloped quality is defined as retaining its primeval character and influence; without permanent improvement or modern human occupation. Construction of the Emery County Road 1025 upgrades, well pad, and pipeline will cause surface disturbances indicative of human development. Until such time as the pipeline disturbance is sufficiently revegetated, it will continue to be visible to observers. In particular, the road improvements will be visible to visitors as they hike on the Fivehole Arch trail. Although occurring adjacent to the wilderness boundaries within the 200 foot wide cherrystem corridor, these construction activities will nevertheless be observable to wilderness visitors and have an impact on their impression of human development of the local environment. Production facilities on the well pad are not expected to be substantially noticeable to visitors within the wilderness due to measures to bury, hide, or camouflage this infrastructure. Rehabilitation efforts at the well pad are not expected to have substantial effect on the undeveloped quality since the road upgrades will be permanent. Drilling and casing of wells under this alternative will create a sub-surface impact to the federal mineral estate located outside the boundary of Twin Bridges' federal lease UTU-93713 and withdrawn from mineral entry in accordance with the designation of the Labyrinth Canyon Wilderness. Increased impacts from increased access and visitation, such as user-created campsites or trails, are expected to be minimal under this alternative.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 2.7 miles (14,445 feet), 9.9 acres disturbed; 10-14 day construction period; adjacent to wilderness	☐	☐	☒
2	Wellpad: 300 × 590 feet, 5.4 acres disturbance (2.4 after initial reclamation); 10-14 days construction period; adjacent to wilderness	☐	☐	☒

3	Drilling rig, 150 ft derrick height, up to 5 temporary trailers on site; mobilization & drilling period up to 34 days	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 4.9 miles (25,880 feet); 17.8 acres disturbed; 30-day construction period; adjacent to wilderness	☐	☐	☒
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 days drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.0 acres (2.4 acres disturbance after initial reclamation)	☐	☐	☒
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 43.1 acres total disturbance	☐	☐	☒
9	Improved access and increased visitation	☐	☐	☒
Total Number of Effects			2	NE
Natural Total Rating		-2		

Explain:

Natural quality is defined as free from the effects of modern civilization and retaining integrity of the native ecosystem. Under this quality, only disturbance within the boundaries of the wilderness area will be considered. Although this alternative will create new impacts that will disturb existing vegetation and soils, these impacts will occur entirely within the 200 foot wide cherrystem corridor and circular roundabout of Emery County Road 1025 where surface disturbance already exists with the existing road and turnaround. Widening of the existing surface disturbance will occur under this alternative but will likely not be substantially noticeable unless the observer is actually on the road or well pad. Drilling and casing of wells under this alternative will create a sub-surface impact to the federal mineral estate located outside the boundary of Twin Bridges' federal lease UTU-93713 and withdrawn from mineral entry in accordance with the designation of the Labyrinth Canyon Wilderness. Road upgrades will improve access to the Keg Springs Canyon area of the wilderness but are only expected to result in a small increase in visitation due to more attractive destinations nearby. Impacts to natural conditions in the form of user-created campsites and trails may result but are expected to be minimal.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 2.7 miles (14,445 feet), 9.9 acres disturbed; 10-14 day construction period; adjacent to wilderness	☐	☒	☐
2	Wellpad: 300 × 590 feet, 5.4 acres disturbance (2.4 after initial reclamation); 10-14 days construction period; adjacent to wilderness	☐	☒	☐
3	Drilling rig, 150 ft derrick height, up to 5 temporary trailers on site; mobilization & drilling period up to 34 days	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 4.9 miles (25,880 feet); 17.8 acres disturbed; 30-day construction period; adjacent to wilderness	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 days drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.0 acres (2.4 acres disturbance after initial reclamation)	☐	☒	☐
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 43.1 acres total disturbance	☐	☒	☐
9	Improved access and increased visitation	☐	☐	☒
Total Number of Effects			7	NE

Solitude or Primitive & Unconfined Rec. Total Rating	-7

Explain:

Solitude is defined as the state of being alone or remote from habitations or the sights and sounds of other people; the experience of a lonely, unfrequented, or secluded place.

Construction activities under this alternative for the road upgrades, well pad, drilling wells, well pad facilities, pipeline installation, and site rehabilitation will all involve the presence of other humans, motorized vehicles, and heavy equipment that will produce mechanical noise observable from within the wilderness boundaries for the duration of each particular activity. Noise production may be mitigated by required monitoring and the use of mufflers, but the sights of such activities will still be observable. Production facilities on the well pad are not expected to impact visitors experience of solitude or opportunities for primitive, unconfined recreation. Road upgrades will improve access to the Keg Springs Canyon area of the wilderness but are only expected to result in a small increase in visitation due to more attractive destinations nearby. Impacts to solitude due to increased visitation are expected to be minimal.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 2.7 miles (14,445 feet), 9.9 acres disturbed; 10-14 day construction period; adjacent to wilderness	☐	☒	☐
2	Wellpad: 300 × 590 feet, 5.4 acres disturbance (2.4 after initial reclamation); 10-14 days construction period; adjacent to wilderness	☐	☐	☒
3	Drilling rig, 150 ft derrick height, up to 5 temporary trailers on site; mobilization & drilling period up to 34 days	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 4.9 miles (25,880 feet); 17.8 acres disturbed; 30-day construction period; adjacent to wilderness	☐	☐	☒
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 days drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.0 acres (2.4 acres disturbance after initial reclamation)	☐	☐	☒
8	Well capped below ground level; soil recontouring, redistribution & reseeding;	☐	☐	☒

	complete when 75% background cover achieved; 43.1 acres total disturbance			
9	Improved access and increased visitation	☐	☐	☒
Total Number of Effects			3	NE
Other Features of Value Total Rating		-3		

Explain:

The outstanding scenery and visual qualities of the Labyrinth Canyon Wilderness viewshed are some of its most important supplemental features of value that would be impacted by this alternative, especially in the vicinity of the Fivehole Arch trail. In particular, the presence of a 150 foot tall drilling derrick and associated facilities on the well pad would be a temporary but noticeable impact to the visual qualities observed by visitors from within the wilderness. The permanent road upgrades will make Emery County Road 1025 more visibly noticeable for wilderness visitors as a man-made linear disturbance at a lower elevation and roughly perpendicular to the Fivehole Arch dispersed camping area, trailhead, and trail. Production facilities on the well pad are not expected to be substantially noticeable to visitors within the wilderness due to measures to bury, hide, or camouflage this infrastructure. Rehabilitation efforts at the well pad are not expected to have substantial effect on the scenic visual quality since the road upgrades will be remain and the road existed prior to the proposed project.

Summary Ratings for Alternative 1

Wilderness Character	Rating Summary
Untrammeled	-8
Undeveloped	-5
Natural	-2
Solitude or Primitive & Unconfined Recreation	-7
Other Features of Value	-3
Wilderness Character Summary Rating	-25

MRDG Step 2: Alternatives

Alternative 2: Bowknot 5-1: Construct well pad on Section 7, T26S R17E

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

- Road improvements on approximately 4.0 miles of Emery Country Road 1026 to the proposed well pad. Upgrades to the road would result in 14.5 acres of surface disturbance.
- Construction of a 7.3-acre well pad located in a previously undisturbed area of the Labyrinth Canyon Wilderness.
- Drilling and testing of one exploratory helium well (Bowknot 5-1) on federal lease UTU-93713 located in Section 7 and portions of Sections 5, 6, and 8, T26S, R17E, Emery County, Utah. The subsequent action is under terms within federal helium Contract No. 20-02.

If a sufficient quality and quantity of helium-bearing gas is confirmed through flow testing of the exploratory well, the following actions would also be constructed:

- Construction of a helium processing plant located on SITLA-managed lands in Section 16, T26S, R16E, Emery County, Utah.
- Installation of three pipelines and one conduit: 1) up to 14-inch-diameter steel or fiber-reinforced polyethylene gathering pipeline, 2) up to 8-inch-diameter polyethylene fluid transfer pipeline, 3) an 8-inch diameter polyethylene produced water pipeline, and 4) up to 6-inch-diameter conduit for running control and power cables. All infrastructure would be buried (3–4 feet) within a 30-foot-wide ROW parallel to Emery Country Road 1026 and Emery County Road 1010. Construction and installation along the 5.6-mile-long proposed pipeline ROW would result in 20.5 acres of surface disturbance.
- Drilling, testing and production of a second delineation well (Bowknot State 36-1) on state lease ML-53420 located in Section 36, T25S, R16E, Emery County, Utah.
- Drilling and production of up to five additional development wells. The number of wells would be determined based upon the results of the initial test well and subsequent delineation well. The number of development wells needed would largely be dictated by the viability of future horizontal drilling. It is possible that the reservoir could be adequately drained with the two initial wellbores, however up to five additional wells could be needed. All future wells would be drilled from the 7.3 acre well pad and no additional disturbance would occur.

Component Activities
How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Access road improvements	Road upgrade; 30-foot-wide ROW for approximately 4.0 miles (21,140 feet); 21 days construction period
2	Well pad construction	Well pad: 400 × 500 feet; 7.3 acres disturbance within the Labyrinth Canyon Wilderness; 21 days construction period
3	Drilling activities	Drilling rig, 150 ft derrick height, mobilization & drilling period up to 34 days, temporary housing on site
4	Well pad facilities	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings
5	Pipeline construction	Pipeline; 30-foot-wide ROW for approximately 5.6 miles (29,780 feet); 20.5 acres disturbed; 40-day construction period
6	Additional wells	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 day drilling period for each
7	Interim Reclamation	Soil recontouring, redistribution & reseeding; 3.9 acres (3.4 acres disturbance after initial reclamation)
8	Well abandonment; Final reclamation	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 52.3 acres total disturbance
9	Road access and visitation	Improved access and increased visitation

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 4.0 miles (21,140 feet); 21 days construction period	☐	☒	☐
2	Well pad: 400 × 500 feet; 7.3 acres disturbance within the Labyrinth Canyon Wilderness; 21 days construction period	☐	☒	☐
3	Drilling rig, 150 ft derrick height, mobilization & drilling period up to 34 days, temporary housing on site	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 5.6 miles (29,780 feet); 20.5 acres disturbed; 40-day construction period	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 day drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.9 acres (3.4 acres disturbance after initial reclamation)	☐	☒	☐
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 52.3 acres total disturbance	☐	☒	☐
9	Improved access and increased visitation	☐	☐	☒
Total Number of Effects			7	NE
Untrammeled Total Rating		-7		

Explain:

Untrammeled quality is defined as unhindered and free from modern human control or manipulation. Construction work on Emery County Road 1026 and the well pad, drilling activities, production infrastructure, pipeline construction, drilling additional wells, and any rehabilitation activities will be observable to visitors traveling to the Fivehole Arch trailhead and from locations within the wilderness area to the south and east of Emery County Road 1026. Although temporary in nature and occurring largely adjacent to the wilderness boundaries within the 200 foot wide cherrystem corridor, these construction activities will nevertheless be observable to wilderness visitors and have an impact on their impression of human manipulation of the local environment. Drilling and casing of wells under this alternative will create a sub-surface impact to the federal mineral estate located outside the boundary of Twin Bridges' federal lease UTU-93713 and withdrawn from mineral entry in accordance with the designation of the Labyrinth Canyon Wilderness.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 4.0 miles (21,140 feet); 21 days construction period	☐	☒	☐
2	Well pad: 400 × 500 feet; 7.3 acres disturbance within the Labyrinth Canyon Wilderness; 21 days construction period	☐	☒	☐
3	Drilling rig, 150 ft derrick height, mobilization & drilling period up to 34 days, temporary housing on site	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☒	☐
5	Pipeline; 30-foot-wide ROW for approximately 5.6 miles (29,780 feet); 20.5 acres disturbed; 40-day construction period	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 day drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.9 acres (3.4 acres disturbance after initial reclamation)	☐	☐	☒
8	Well capped below ground level; soil recontouring, redistribution & reseeding;	☐	☐	☒

	complete when 75% background cover achieved; 52.3 acres total disturbance			
9	Improved access and increased visitation	☐	☒	☐
Total Number of Effects			7	NE

Undeveloped Total Rating	-7

Explain:

Undeveloped quality is defined as retaining its primeval character and influence; without permanent improvement or modern human occupation. Construction of the Emery County Road 1026 upgrades, well pad, and pipeline will cause surface disturbances indicative of human development. Until such time as the pipeline disturbance is sufficiently revegetated, it will continue to be visible to observers. In particular, the road improvements will be noticeable to visitors traveling out to the Fivehole Arch trailhead. 7.3 acres of the Labyrinth Canyon Wilderness will be disturbed at the well pad location. Although occurring adjacent to the wilderness boundaries within the 200 foot wide cherrystem corridor, these construction activities will nevertheless be observable to wilderness visitors and have an impact on their impression of human development of the local environment. Production facilities on the well pad will be noticeable to visitors traveling to the Fivehole Arch trailhead on Road 1026. Additional well pad infrastructure associated with multiple wells is not expected to substantially alter visitors' impressions of the undeveloped quality of the wilderness. Rehabilitation efforts at the well pad are not expected to have substantial effect on the undeveloped quality since the road upgrades will be permanent. Drilling and casing of wells under this alternative will create a sub-surface impact to the federal mineral estate located outside the boundary of Twin Bridges' federal lease UTU-93713 and withdrawn from mineral entry in accordance with the designation of the Labyrinth Canyon Wilderness. Increased access and visitation to the Fivehole Arch trailhead may increase impacts such as user-created campsites and trails within the wilderness.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 4.0 miles (21,140 feet); 21 days construction period	☐	☐	☒
2	Well pad: 400 × 500 feet; 7.3 acres disturbance within the Labyrinth Canyon Wilderness; 21 days construction period	☐	☒	☐
3	Drilling rig, 150 ft derrick height, mobilization & drilling period up to 34 days, temporary housing on site	☐	☒	☐

4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 5.6 miles (29,780 feet); 20.5 acres disturbed; 40-day construction period	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 day drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.9 acres (3.4 acres disturbance after initial reclamation)	☒	☐	☐
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 52.3 acres total disturbance	☒	☐	☐
9	Improved access and increased visitation	☐	☒	☐
Total Number of Effects		2	5	NE
Natural Total Rating		-3		

Explain:

Natural quality is defined as free from the effects of modern civilization and retaining integrity of the native ecosystem. Under this quality, only disturbance within the boundaries of the wilderness area will be considered. Although this alternative will create new impacts that will disturb existing vegetation and soils, these impacts will occur largely within the 200 foot wide cherrystem corridor of Emery County Road 1026. However. 7.3 acres of surface disturbance will occur at the well pad within the boundary of the wilderness. The well pad disturbance will be improved and reduced to 3.4 acres after interim reclamation. Well abandonment and final reclamation will eventually remove the well pad surface disturbance within the wilderness although it will take many years to re-establish current conditions. Drilling and casing of wells under this alternative will create a sub-surface impact to the federal mineral estate located outside the boundary of Twin Bridges' federal lease UTU-93713 and withdrawn from mineral entry in accordance with the designation of the Labyrinth Canyon Wilderness. Improved access and increased visitation within this portion of the wilderness may result in more human impacts to natural conditions from camping, trash, and user-created trails.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 4.0 miles (21,140 feet); 21 days construction period	☐	☒	☐
2	Well pad: 400 × 500 feet; 7.3 acres disturbance within the Labyrinth Canyon Wilderness; 21 days construction period	☐	☒	☐
3	Drilling rig, 150 ft derrick height, mobilization & drilling period up to 34 days, temporary housing on site	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 5.6 miles (29,780 feet); 20.5 acres disturbed; 40-day construction period	☐	☒	☐
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 day drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.9 acres (3.4 acres disturbance after initial reclamation)	☐	☒	☐
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 52.3 acres total disturbance	☐	☒	☐
9	Improved access and increased visitation	☐	☒	☐
	Total Number of Effects		8	NE

Solitude or Primitive & Unconfined Rec. Total Rating	-8

Explain:

Solitude is defined as the state of being alone or remote from habitations or the sights and sounds of other people; the experience of a lonely, unfrequented, or secluded place. Construction activities for the road upgrades, well pad, drilling wells, well pad facilities, pipeline installation, and site rehabilitation will involve the presence of other humans, motorized vehicles, and heavy equipment that will produce mechanical noise observable from within the wilderness boundaries for the duration of each activity.

Noise production may be mitigated by required monitoring and use of mufflers, but the sights of such activities will still be observable. Construction along Emery County Road 1026 may temporarily obstruct or hinder visitors' ability to access the Fivehole Arch trailhead and camping area for primitive, unconfined recreation. Improvements made to the road may also increase the amount of visitors access the wilderness at the Fivehole Arch trailhead and reduce the quality of solitude that can be experienced. Production facilities on the well pad are not expected to impact visitors experience of solitude or opportunities for primitive, unconfined recreation. Improved road access may increase visitation to this area of the wilderness, negatively impacting the quality of solitude to be experienced by visitors.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	Road upgrade; 30-foot-wide ROW for approximately 4.0 miles (21,140 feet); 21 days construction period	☐	☐	☒
2	Well pad: 400 × 500 feet; 7.3 acres disturbance within the Labyrinth Canyon Wilderness; 21 days construction period	☐	☐	☒
3	Drilling rig, 150 ft derrick height, mobilization & drilling period up to 34 days, temporary housing on site	☐	☒	☐
4	Holding tanks, transfer pumps, separators, vessels, flowlines, safety equipment; painted or buried to blend with surroundings	☐	☐	☒
5	Pipeline; 30-foot-wide ROW for approximately 5.6 miles (29,780 feet); 20.5 acres disturbed; 40-day construction period	☐	☐	☒
6	Drilling additional wellheads, separator, and flow lines to existing well pad facility and pipelines; up to 20 day drilling period for each	☐	☒	☐
7	Soil recontouring, redistribution & reseeding; 3.9 acres (3.4 acres disturbance after initial reclamation)	☐	☐	☒
8	Well capped below ground level; soil recontouring, redistribution & reseeding; complete when 75% background cover achieved; 52.3 acres total disturbance	☐	☐	☒
9	Improved access and increased visitation	☐	☐	☒

Total Number of Effects		2	NE
Other Features of Value Total Rating	-2		

Explain:

The outstanding scenery and visual qualities of the Labyrinth Canyon Wilderness viewshed are some of its most important supplemental features of value that would be impacted by this alternative, especially in the vicinity of the Fivehole Arch trail and Horseshoe Canyon. In particular, the presence of a 150 foot tall drilling derrick and associated facilities on the well pad would be a temporary but noticeable impact to the visual qualities observed by visitors from within the wilderness. The visual impacts from road upgrades, well pad, pipeline, and widening on Emery County Road 1026 are likely to be localized and substantially unnoticeable beyond 1 mile distance due to the roads elevated position and lower visitation within the surrounding viewshed to the east and south. Emery County Road 1026, the pipeline, and the well pad are topographically screened from behind the Fivehole Arch trailhead, trail, and dispersed camping area and from Horseshoe Canyon to the south. Production facilities on the well pad are not expected to be substantially noticeable to visitors within the wilderness due to measures to bury, hide, or camouflage this infrastructure. Rehabilitation efforts at the well pad are not expected to have substantial effect on the scenic visual quality since the road upgrades will remain and the road existed prior to the proposed project.

Summary Ratings for Alternative 2

Wilderness Character	Rating Summary
Untrammeled	-7
Undeveloped	-7
Natural	-3
Solitude or Primitive & Unconfined Recreation	-8
Other Features of Value	-2
Wilderness Character Summary Rating	-27

MRDG Step 2: Alternatives

Alternative 3: No Action

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Under the No Action Alternative, Twin Bridges' ROW applications and APDs would be denied, and the action alternatives would not be developed. Exploration by Twin Bridges to access its UTU-93713 federal lease and ML-53420 state lease would need to be assessed and conducted in a different manner.

Component Activities
How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
1	Access road improvements	N/A
2	Well pad construction	N/A
3	Drilling activities	N/A
4	Well pad facilities	N/A
5	Pipeline construction	N/A
6	Additional wells	N/A
7	Interim Reclamation	N/A
8	Well abandonment; Final reclamation	N/A
9	Road access and visitation	

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	N/A	☐	☐	☒
2	N/A	☐	☐	☒

3	N/A	☐	☐	☒
4	N/A	☐	☐	☒
5	N/A	☐	☐	☒
6	N/A	☐	☐	☒
7	N/A	☐	☐	☒
8	N/A	☐	☐	☒
9		☐	☐	☐
Total Number of Effects			0	NE
Untrammeled Total Rating		0		

Explain:

No actions would occur within the Labyrinth Canyon Wilderness. The existing character and qualities of the wilderness area would remain unchanged.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	N/A	☐	☐	☒
2	N/A	☐	☐	☒
3	N/A	☐	☐	☒
4	N/A	☐	☐	☒
5	N/A	☐	☐	☒
6	N/A	☐	☐	☒
7	N/A	☐	☐	☒
8	N/A	☐	☐	☒
9		☐	☐	☐
Total Number of Effects			0	NE
Undeveloped Total Rating		0		

Explain:

No actions would occur within the Labyrinth Canyon Wilderness. The existing character and qualities of the wilderness area would remain unchanged.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	N/A	☐	☐	☒
2	N/A	☐	☐	☒
3	N/A	☐	☐	☒
4	N/A	☐	☐	☒
5	N/A	☐	☐	☒
6	N/A	☐	☐	☒
7	N/A	☐	☐	☒
8	N/A	☐	☐	☒
9		☐	☐	☐
Total Number of Effects			0	NE
Natural Total Rating		0		

Explain:

No actions would occur within the Labyrinth Canyon Wilderness. The existing character and qualities of the wilderness area would remain unchanged.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	N/A	☐	☐	☒
2	N/A	☐	☐	☒
3	N/A	☐	☐	☒
4	N/A	☐	☐	☒
5	N/A	☐	☐	☒
6	N/A	☐	☐	☒
7	N/A	☐	☐	☒
8	N/A	☐	☐	☒
9		☐	☐	☐
Total Number of Effects			0	NE
Solitude or Primitive & Unconfined Rec. Total Rating		0		

Explain:

No actions would occur within the Labyrinth Canyon Wilderness. The existing character and qualities of the wilderness area would remain unchanged.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
1	N/A	☐	☐	☒
2	N/A	☐	☐	☒
3	N/A	☐	☐	☒
4	N/A	☐	☐	☒
5	N/A	☐	☐	☒
6	N/A	☐	☐	☒
7	N/A	☐	☐	☒
8	N/A	☐	☐	☒
9		☐	☐	☐
Total Number of Effects			0	NE

Other Features of Value Total Rating	0

Explain:

No actions would occur within the Labyrinth Canyon Wilderness. The existing character and qualities of the wilderness area would remain unchanged.

Summary Ratings for Alternative 3

Wilderness Character	**Rating Summary**
Untrammeled	0
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	0

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed
What alternatives were considered but not analyzed? Why were they not analyzed?

No other alternatives were proposed by the applicant for this project.

MRDG Step 2: Alternative Comparison

Alternative 1:	Bowknot 36-1: Construct well pad on section 26 & 35, T25S R16E
Alternative 2:	Bowknot 5-1: Construct well pad on section 7, T26S R17E
Alternative 3:	No Action

	Alternative 1	Alternative 1	Alternative 2	Alternative 2	Alternative 3	Alternative 3
Wilderness Character	+	-	+	-	+	-
Untrammeled	0	8	0	7	0	0
Undeveloped	0	5	0	7	0	0
Natural	0	2	2	5	0	0
Solitude/Primitive/Unconfined	0	7	0	8	0	0
Other Features of Value	0	3	0	2	0	0
Total Number of Effects	0	25	2	29	0	0
Wilderness Character Rating	-25		-27		0	

MRDG Step 2: Determination

Refer to the **MRDG Instructions** before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative

☐	Alternative 1:	Bowknot 36-1: Construct well pad on section 26 & 35, T25S R16E
☐	Alternative 2:	Bowknot 5-1: Construct well pad on section 7, T26S R17E
☐	Alternative 3:	No Action

Explain Rationale for Selection:

Based on the analysis in this document, Alternative 1 is predicted to have slightly fewer negative impacts to wilderness character than Alternative 2. Ground disturbance under Alternative 1 only occurs within the wilderness boundary below the surface from drilling through withdrawn federal mineral estate. Under Alternative 2, surface disturbance at the well pad includes 7.3 acres within the wilderness boundary, in addition to sub-surface drilling through withdrawn federal mineral estate. Alternative 2 would cause less visual impact to the supplemental value of high quality scenery due to its more elevated, topographically-screened position within the wilderness area. Visual impacts from the road upgrades, well pad, and pipeline in Alternative 1 are expected to be more persistent and noticeable to visitors from within the wilderness area, especially in the more frequently visited area of the Fivehole Arch trail. However, under Alternative 2, construction along Emery County Road 1026 will temporarily obstruct or hinder visitors ability to access the Fivehole Arch trailhead and camping area for primitive, unconfined recreation. Improvements made to the road may also increase the amount of visitors who access the wilderness area from the Fivehole Arch trailhead and reduce the overall quality of naturalness and solitude that can be experienced. The road widening, pipeline scar, well pad, and production infrastructure observed by visitors traveling to the Fivehole Arch trailhead may also reduce the overall wilderness experience. Although completely outside the wilderness boundaries, semi-trailer truck traffic to and from the gas plant on state lands would have more impact to visitors under Alternative 2 than Alternative 1 due to the total mileage of Emery County roads that would be affected.

Describe Monitoring & Reporting Requirements:

Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

Approved?	Prohibited Use	Quantity
☐	Mechanical Transport:	Number to be determined by construction and drilling requirements.
☐	Motorized Equipment:	Number to be determined by construction and drilling requirements.
☐	Motor Vehicles:	Number to be determined by construction and drilling requirements.
☐	Motorboats:	No.
☐	Landing of Aircraft:	No.
☐	Temporary Roads:	No.
☐	Structures:	Well pad facilities and road improvements.
☐	Installations:	Pipeline.

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following signature authorities:

Prepared:

Name Ray Kelsey Position Utah NLCS Program Lead

Signature _____ Date _____

Recommended:

Name _____ Position _____

Signature _____ Date _____

Recommended:

Name Position

Signature _____ Date _____

Approved:

Name Position

Signature _____ Date _____