

**United States Department of the Interior  
Bureau of Land Management**

**Colorado River Valley Field Office  
2300 River Frontage Road  
Silt, Colorado 81652  
970-876-9000**

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**Environmental Assessment**

**DOI-BLM-CO-N040-2015-0025-EA**

***Homer Deep Master Development Plan  
Black Hills Plateau Production, LLC  
Laramie Energy, LLC***





**It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.**



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**HOMER DEEP MASTER DEVELOPMENT PLAN**  
**DOI-BLM-CO-N040-2015-0025-EA**

**1. INTRODUCTION**

**1.1 IDENTIFYING INFORMATION**

NUMBER: DOI-BLM-CO-N040-2015-025-EA

APPLICANTS:

Applications for Permit to Drill 16 Federal Horizontal Oil and Gas Wells: Black Hills Plateau Production, LLC (BHPP). Contact Jessica Donahue, 1515 Wynkoop Street, Suite 500, Denver, Colorado 80202.

Operator for Project Implementation: Laramie Energy, LLC (LE). Contact Wayne Bankert, 1401 Seventeenth Street, Suite 1400, Denver, Colorado 80202.

Natural Gas Pipeline and Water Pipeline Rights-of-Way: Red Rock Gathering, LLC (RRG). Contact Tracey Jensen, 707 Wapiti Ave., #202, Rifle, Colorado 81650.

PROJECT NAME: Homer Deep Master Development Plan (HDMDP).

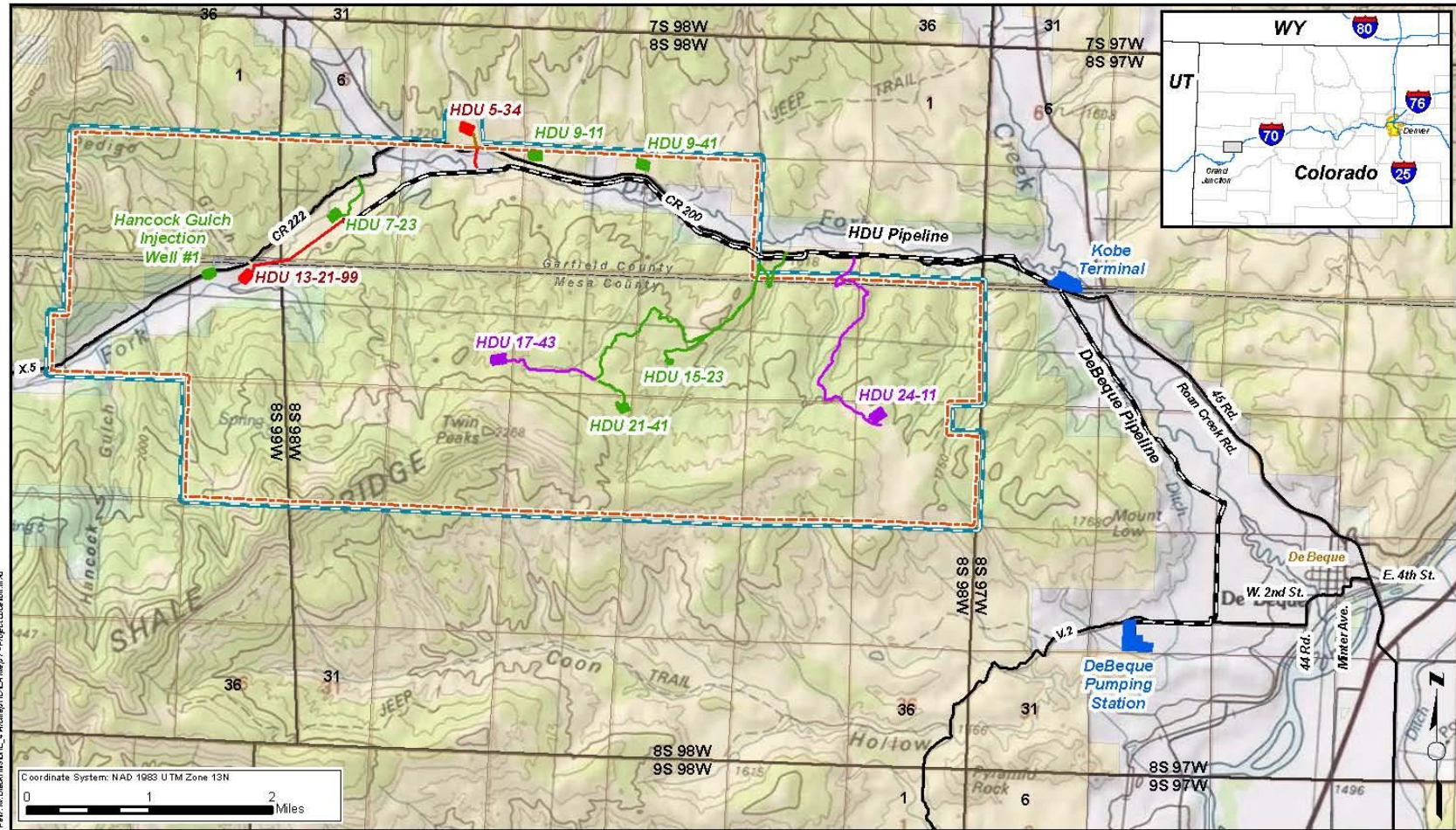
PROJECT LOCATION and LEGAL DESCRIPTION: Black Hills Plateau Production, LLC (BHPP) has proposed to drill, complete, and produce 16 Federal horizontal oil and gas wells from two new well pads within the Homer Deep Unit (HDU). The project area is located approximately 8 to 10 air-miles northwest of De Beque, Colorado, in the Dry Fork of Roan Creek drainage, a tributary to the Colorado River. The project area includes portions of Mesa and Garfield Counties, Colorado, and is located in the Grand Junction Field Office (GJFO) administrative area. The project, if approved, would be implemented by Laramie Energy, LLC (LE), successor in interest for BHPP's leases in the De Beque area.

The HDMDP project area encompasses roughly 12,569 acres of Federal, split-estate (private surface, Federal minerals), and Fee (private surface, private minerals) lands. Proposed well pad locations and surface ownership are shown on **Map 1**. Surface ownership within the HDMDP project area includes 11,260 acres of BLM-administered surface and 1,309 acres of privately owned surface. The HDMDP area includes 18 Federal leases totaling 11,547 acres, of which approximately 287 acres are split-estate lands. The project area falls almost entirely within the HDU boundary, with the exception of approximately 40 acres of unleased BLM acreage in Section 5, Township 8 South, Range 98 West, of the 6<sup>th</sup> Principal Meridian.

Legal descriptions for the HDMDP project area are as follows:

6<sup>th</sup> Principal Meridian, Mesa and Garfield Counties, Colorado  
Township 8 South, Range 98 West, All or parts of Sections 5, 7-10, and 13-24  
Township 8 South, Range 99 West, All or parts of Sections 11-15 and 24

From Interstate 70 (I-70), the access route to the project area follows Mesa County 45 Road (Roan Creek Road) approximately 1.5 miles around the town of De Beque, and another 3 miles to the junction with Mesa County X.5 Road. Turning left (west) onto X.5 Road, the route becomes Garfield County Road (CR) 200 (North Dry Fork Road), at the county line, and proceeds another 3.5 miles into the HDU. One of the proposed well pads, the HDU 13-21-99, would be on split-estate land and accessed by spur roads from CR 222 (South Dry Fork Road). The first section of spur road exists and provides access to the existing HDU 7-23 pad. The remainder of this spur road would be new.



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Coordinate System: NAD 1983 UTM Zone 13N  
 0 1 2 Miles

- Legend**
- Unit Boundary
  - Project Area Boundary
  - County Road
  - Existing Well Pad
  - Existing Resource Road/Gathering Lines
  - Existing Facilities
  - Existing Pipeline
  - Approved Well Pad – BHDEP 2013
  - Approved Resource Road/Gathering Lines
  - Proposed Well Pad
  - Proposed Upgraded Road / Gathering Lines
  - Proposed New Road
  - Proposed New Gathering Lines

Homer Deep Master Development Plan  
 Project Location  
 Map 1



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The other proposed pad, the HDU 5-34, would be located on unleased BLM-administered public land and access by a new spur road across a short section of private surface owned by the High Lonesome Ranch. New natural gas and water pipelines would be located with the spur roads to a tie-in with existing lines along CR 222 (**Map 1**).

## 1.2 BACKGROUND

The HDMDP is an oil and gas exploration and development project proposed to occur over approximately a 4-year period. Most of the HDU lies within Mesa County, with the northernmost portion of the HDU extending into Garfield County. The HDU is a Federal oil and gas unit consisting of lease pooling agreements in which various lease owners share development costs and the revenues generated from the proposed developments. The 16 proposed wells would include on each of the two new well pads, the HDU 5-34 and HDU 13-21-99. The planned locations have been finalized in accordance with site-specific resource surveys and onsite visits to minimize impacts. The proposed wells would access Federal minerals using horizontal drilling. **Map 1** shows the location of proposed new project components and existing infrastructure in the project area.

The HDU 5-34 well pad would be constructed outside the HDU on Federal surface with no underlying leased Federal minerals, and the proposed wellbores would access Federal minerals on adjacent leases within the HDU. A BLM ROW would be required to authorize construction, development, and use of the pad, road, and buried pipelines on unleased BLM land outside the HDU. The HDU 13-21-99 well pad would be built on split-estate land, consisting of private surface with underlying Federal minerals. A BLM ROW would be required to authorize installation and operation of new, collocated pipelines on nearby BLM land for gathering the produced natural gas and transporting water used in well development.

Implementation of the HDMDP would allow for additional production of up to 136 billion cubic feet (bcf) of natural gas over the life of the project, estimated to be 20 years.

The HDMDP project area lies within the administrative boundaries of the BLM Grand Junction Field Office (GJFO) and contains existing oil and gas infrastructure approved by that field office. However, the Federal fluid mineral leases, and existing and proposed oil and gas developments, are managed by the BLM Colorado River Valley Field Office (CRVFO) in Silt, Colorado, as part of an oil and gas consolidation program. The GJFO Field Manager would approve the Decision Record and Finding of No Significant Impact (FONSI) for the Environmental Assessment (EA) of the HDMDP. The CRVFO Field Manager would be the approving official for the APDs for the Federal oil and gas wells.

Initially, the HDMDP proposed four new well pads. Due to constraints associated with sensitive resources, two of the proposed pads were removed from the current proposal but may be developed in the future. This potential future development is addressed as cumulative impacts in the current EA and would be analyzed in a subsequent EA when uncertainties are more fully resolved. A separate project, the De Beque Southwest Master Development Plan (DSMDP), is located south of the HDU and on the opposite side of a high topographic feature known as South Shale Ridge and has a separate access from the town of De Beque. The DSMDP is also addressed as a cumulative impact in the current EA.

Some vertical wells drilled as early as 1978 by operators such as Conquest, Koch, and Celsius targeted the Cameo Coal, Dakota, and Cedar Mountain formations. Within the HDU, BHPP has drilled eleven horizontal wells (two awaiting completion) since 2011 to explore and develop the Mancos and Niobrara formations. Advances in drilling technologies and the geologic information gained from the more recent well developments have led BHPP to focus its future HDU development on use of directional wellbores to access the Mancos and Niobrara formations. It currently is unknown what drilling technology LE would employ for the project.

BHPP currently manages six well pads within the HDMDP area. These pads support ten producing Federal wells, along with two additional Federal wells on the HDU 7-23 pad that were drilled in 2015 but have yet to be completed (**Table 1** and **Map 1**). The HDU 15-23 and HDU 21-41 well pads were approved by the BLM in 2008, with construction occurring in 2008 and 2011, respectively, followed by well drilling, completion, and gas production as early Dakota/Mancos test wells. These and other infrastructure established by BHPP have been transferred to LE as the successor operator.

In 2013, the BLM approved the Black Hills De Beque Exploratory Proposal (BHDEP) (CO-130-2012-0021-EA), which approved five new well pads in the HDU. Three of the well pads (HDU 9-41, HDU 9-11, and HDU 7-23) have been built. These pads currently support 10 of the 12 horizontal wells drilled. The sixth pad location in the HDU supports the Hancock Gulch Disposal Well #1 on private surface.

The BHDEP approved installation of the existing HDU pipelines, which allowed gathering of natural gas and water to a central facility. The HDU pipelines include a 12-inch natural gas line owned and operated by RRG. The 8-inch welded steel water line is owned and operated by BHPP. In 2014, the De Beque Pipeline Project (CO-130-2013-0030-EA), which included the De Beque Pumping Station and 4.12-mile De Beque Pipeline connecting the HDU pipelines to the De Beque Pumping Station were constructed. The De Beque Pipeline Project included an 8-inch welded steel water line owned and operated by BHPP, a 24-inch polyvinyl chloride (PVC) water line owned and operated by Bluestone Water Conservancy, and a 12-inch welded steel natural gas pipeline owned and operated by RRG. BHPP owns and operates the De Beque Pumping Station. The new infrastructure allows water to be stored at the pumping station and transferred to and from the HDU via the HDU pipelines (**Map 1**).

**Table 1. Existing and Approved HDU Development and Infrastructure**

<i>Project Component</i>	<i>Status</i>	<i>NEPA Approval</i>
HDU 15-23 Well Pad	Constructed 2008 – 1 Producing Well	CO-130-2008-0002-EA
Hancock Gulch Disposal Well #1	Converted to Disposal Well – 2010	CO-130-2010-0039-EA
HDU 21-41 Well Pad	Constructed 2011 – 1 Producing H-Well	CO-130-2008-0002-EA
HDU 9-41 Well Pad	Constructed 2013 – 3 Producing H-Wells	CO-130-2012-0021-EA
HDU 9-11 Well Pad	Constructed 2013 – 3 Producing H-Wells	
HDU Pipelines	Constructed 2014	
De Beque Pipeline and De Beque Pumping Station	Constructed 2014	CO-130-2013-0030-EA
HDU 7-23 Pad	Constructed 2015 – 2 Producing Wells; 2 Drilled but Not Completed Wells	CO-130-2012-0021-EA
	Approved for 4 Additional Wells but Not Yet Drilled	DOI-BLM-CO-N040-2018-0032-CX(390)
HDU 17-43	Not Constructed	CO-130-2012-0021-EA
HDU 24-11 Pad	Not Constructed	CO-130-2012-0021-EA

Note in **Table 1** that two additional well pads (HDU 17-43 and HDU 24-11) were approved as part of the BHDEP, but APDs have not been submitted. These pads and wells are not currently being pursued because current economics do not support drilling the shorter lateral lengths required with these locations. Should gas prices increase, these wells may be pursued at the current available length.

Also note in **Table 1** that the BLM has approved the addition of four new wells to the existing HDU 7-23 well pad, which was built and is being operated under the BHDEP. These new wells would not result in any new surface disturbance and therefore qualified for approval under a National Environmental Policy Act (NEPA) Categorical Exclusion pursuant to Section 390 of the Energy Policy Act of 2005.

**Table 2** lists the lease stipulations applicable to the project. **Maps 2 and 3** show the two currently proposed well pads in relation to topography, existing roads, and Federal oil and gas leases.

**Table 2. Project Components and Applicable Lease Stipulations**

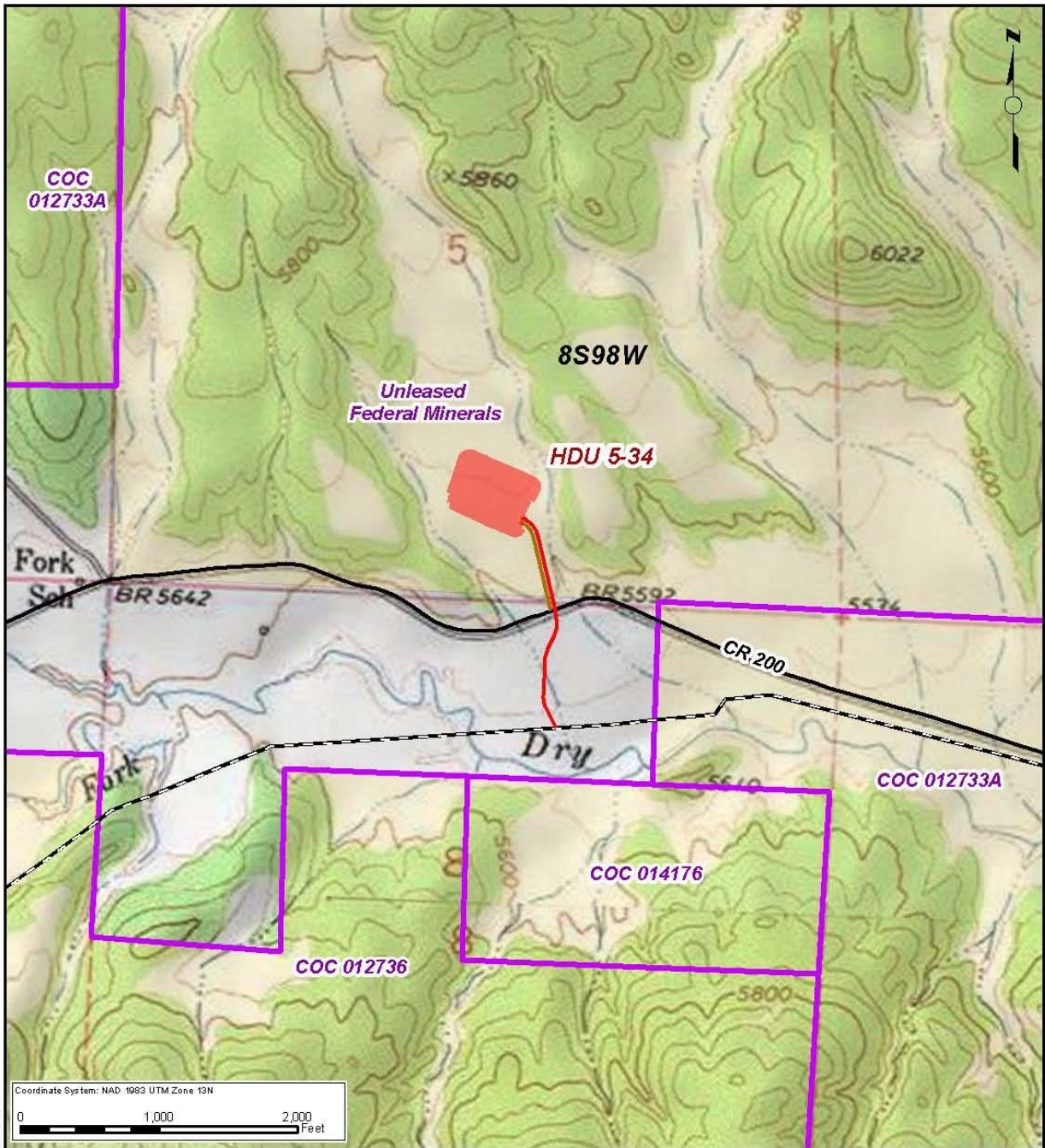
<i>Well Pad/Location</i>	<i>Surface/Mineral Ownership/Date of Issue</i>	<i>Legal Description</i>	<i>Federal Lease Stipulations</i>
HDU 5-34 (New Pad)	Federal Surface/ Unleased Federal Minerals	T8S, R98W Section 5, SE $\frac{1}{4}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ SE $\frac{1}{4}$ , Sixth P.M.	Not applicable because Federal Minerals are currently unleased. Operator shall abide by BLM ROW grant, which would authorize the pad, road, and pipelines to be located on BLM surface. Pertinent stipulations to be included in the ROW grant are identified in GJFO Resource Management Plan (BLM 2015a) including a big game winter timing limitation from 12/1 through 4/30 annually and a raptor nesting TL from December 15 to August 15 annually.
HDU 13-21-99 (New Pad)	Private Surface/ Federal Lease COC52686 (issued 6/1/1971)	T8S, R99W Section 13, Tract 50 (NE $\frac{1}{4}$ NW $\frac{1}{4}$ , NW $\frac{1}{4}$ NE $\frac{1}{4}$ ) Sixth P.M.	The underlying Federal mineral lease carries no special stipulations. Resource protections would be applied as Conditions of Approval (COAs) under BLM's regulatory authority.

It is important to note that for actions approved under BLM ROW grants, stipulations listed in any underlying oil and gas lease are not applied. Instead, stipulations for the proposed ROWs (listed in **Appendix A**) were developed from decisions outlined in *Grand Junction Field Office Record of Decision and Approved Resource Management Plan (ROD/RMP)*, dated August 10, 2015 (BLM 2015a).

### 1.3 PURPOSE AND NEED

The purpose of the action is to enable LE to exercise its valid existing right to develop oil and natural gas within the Homer Deep Federal Unit COC72921X from various Federal leases. Under the provisions of the Federal Land Policy and Management Act of 1976 (FLPMA), the BLM is charged with managing public lands for multiple use, including the processing of land use applications. Proposed actions are reviewed and processed under the National Environmental Policy Act of 1969 (NEPA) to ensure no undue degradation or impacts to public lands. Under the Mineral Leasing Act, the Mining and Minerals Policy Act of 1970, the National Materials and Minerals Policy, Research, and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987, the BLM has been charged specifically with responding to applications to access leased mineral rights. Instead of structuring the development of the lease as a series of individual actions, the current BLM policy specifies the use of multi-well development plan proposals to manage Federal lease development more effectively.





- Legend**
- Proposed Well Pad
  - Existing HDU Pipelines (Gas/Water)
  - Proposed Resource Road
  - Proposed Gathering Lines (Gas/Water)
  - Existing County Road
  - Federal
  - Private
  - Federal Oil & Gas Leases

**Homer Deep Master Development Plan**  
**Location of Well Pad HDU 5-34**  
**Map 2**



T8S, R98W, Section 5 (SW¼ SE¼)

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#### **1.4 CONFORMANCE WITH APPLICABLE LAND USE PLANS**

The Proposed Action and No Action Alternative are subject to and have been reviewed for conformance with (43 Code of Federal Regulations [CFR] § 1610.5 and § 2800, BLM 1617.3) the following plan:

Land Use Plan (LUP) Name: Grand Junction Field Office Record of Decision and Approved Resource Management Plan, approved August 10, 2015; amended by the Northwest Colorado Greater Sage-grouse Approved Resource Management Plan Amendment, approved September 15, 2015.

Decision Language: The 2015 Grand Junction Resource Management Plan (BLM 2015a: page 181) includes the following:

MIN-GOAL-01: Provide opportunities for leasing, exploration, and development of fluid minerals using balanced multiple-use management to meet local and national energy needs.

MIN-OBJ-01: Facilitate orderly, economic, and environmentally sound exploration and development of oil and gas resources (including coalbed natural gas and geothermal), using the best available technology.

Determination: The Proposed Action is in conformance with the LUP cited above because (1) the development of the gas and water gathering pipelines authorized under various BLM ROWs would provide for reliable and safe transportation of natural gas and produced water, and (2) the issuance of APDs and site ROWs on the Federal well pads would facilitate the development of the Federal fluid mineral leases.

#### **1.5 SCOPING AND IDENTIFICATION OF ISSUES**

NEPA regulations (40 CFR § 1500-1508) require the BLM to use a scoping process to identify potential significant issues in preparation for impact analysis. The principal goals of scoping are to allow public participation to identify issues, concerns, and potential impacts that require detailed analysis. The BLM placed information regarding the HDMDP on its public website on March 30, 2015, for a 30-day public scoping review with a comment deadline of April 29, 2015. A legal notice was published in the Glenwood Springs Post Independent on March 30, 2015, April 6, 2015, and April 13, 2015.

One comment was received from the High Lonesome Ranch. Concerns were identified including potential conflicts with ranching operations and potential effects to water resources and wildlife.

**Appendix C** lists issues and concerns identified in the comment letter with BLM responses.

#### **1.6 DECISIONS TO BE MADE**

The primary decision by the BLM upon completion of this EA is whether to (1) authorize the operator to develop and operate 16 wells completed in underlying Federal mineral leases and a private lease, including the development of ancillary roads, pipelines, and production equipment; (2) authorize the operator to install and operate a water pipeline across Sections 5, 7, 12; and (3) authorize RRG to install and operate a gas gathering pipelines across BLM lands in Sections 5, 7, and 12.

Based on the information presented and analyzed in this EA, the BLM may choose to authorize the project as proposed; authorize the project with modifications developed by the BLM in collaboration with the proponent; or not authorize the project at this time. The first two options would include COAs, in addition to lease stipulations, as measure to avoid, minimize, or offset adverse project impacts.

The Decision Record associated with this EA may not constitute the final approval for all actions, such as the issuance of APDs or approval of ROW grants associated with the Proposed Action. However, it

provides the BLM with an analysis on which to base final approval, if warranted, and associated mitigated measures for individual project components.

## 2. PROPOSED ACTION AND ALTERNATIVES

### 2.1 PROPOSED ACTION

The Proposed Action is to drill, complete, produce, and maintain 16 new directional natural gas wells involving Federal fluid mineral leases. One of the wells would extend beyond the targeted Federal lease and terminate in an adjacent private lease (**Table 3**). Success of the proposed development, including any subsequent phases, would depend largely on factors outside the operator's control, such as geologic findings, economics, and viability of commodity markets. The currently anticipated schedule for project implementation consists of the following:

- 2019 – Initiate construction and drill eight wells, but complete only four of the wells.
- 2020 – Complete the remaining four wells drilled in 2019.
- 2021 – Drill four additional wells but without completing them.
- 2022 – Complete the four wells drilled but not completed in 2021; drill and complete four additional wells.

**Table 3. Surface and Bottomhole Locations of Proposed Federal Wells**

<i>Pad Name</i>	<i>Lease</i>	<i>Well Name</i>	<i>Surface Location</i>	<i>Bottomhole Location</i>
<b>HDU 5-34 Pad</b> 8 wells (BLM surface/ new pad)	BLM minerals are currently unleased at proposed pad	HDU 5-34AH	T8S R98W, Section 5, SE $\frac{1}{4}$ SW $\frac{1}{4}$ ,SW $\frac{1}{4}$ SE $\frac{1}{4}$ , Sixth P.M.	NWSW Sec. 6 T8S R98W
		HDU 5-34BH		SWSW Sec. 6 T8S R98W
		HDU 5-34CH		NENE Sec. 14 T8S R99W
		HDU 5-34DH		NESE Sec. 17 T8S R98W
		HDU 5-34EH		NWSW Sec. 16 T8S R98W
		HDU 5-34FH		NWSE Sec. 16 T8S R98W
		HDU 5-34GH		SESW Sec. 3 T8S R98W
		HDU 5-34HH		NESW Sec. 3 T8S R98W
<b>HDU 13-21-99 Pad</b> 8 wells (Fee surface/new pad)	COC52686	HDU 13-21-99AH	T8S R99W, Section 13, Tract 50 (NE $\frac{1}{4}$ NW $\frac{1}{4}$ , NW $\frac{1}{4}$ NE $\frac{1}{4}$ , Sixth P.M.	NWNW Sec. 14 T8S R99W
		HDU 13-21-99BH		NWNW Sec. 15 T8S R99W
		HDU 13-21-99CH		NESE Sec. 15 T8S R99W
		HDU 13-21-99DH		SWSE Sec. 15 T8S R99W
		HDU 13-21-99EH		SWSW Sec. 19 T8S R98W
		HDU 13-21-99FH		SESW Sec. 19 T8S R98W
		HDU 13-21-99GH		SESE Sec. 19 T8S R98W
		HDU 13-21-99HH		SWSW Sec. 20 T8S R98W

A total of 45 days would be needed to drill each well, with an additional 30 days for completion. The rate of drilling would depend largely on factors such as advances in technology and economic factors such as the productivity of the wells, price of natural gas, and cost of services. Drilling and completion activities would not occur simultaneously on a pad.

Water would be required for drilling, well completion (including hydraulic fracturing), dust abatement, and potentially for hydrostatic testing of new gathering lines (the lines may be tested with an inert gas). Fresh water would be used for all development activities, with about 15% of the completion water being recycled for future use. Existing water management facilities (De Beque Pumping Station) and its water line infrastructure (De Beque Pipeline and HDU Pipelines) would deliver water for drilling and completions and would collect frac flowback water and produced water without using truck transports. Water requirements are provided in **Table 4**.

**Table 4. Estimated Water Use during Construction, Drilling, and Completion**

Activity	Volume per Well (bbls)	Annual Use <sup>1, 2</sup>				Total
		2019	2020	2021	2022	
Drilling	10,000 (1.3 ac-ft)	80,000 bbls (10.3 ac-ft)	0	40,000 bbls (5.2 ac-ft)	40,000 bbls (5.2 ac-ft)	160,000 bbls (20.6 ac-ft)
Completion	510,000 (65.7 ac-ft)	2,040,000 bbls (262.9 ac-ft)	2,040,000 bbls (262.9 ac-ft)	0	4,080,000 bbls (525.9 ac-ft)	8,160,000 bbls (1,051.8 ac-ft)
Hydrostatic Testing <sup>3</sup>	NA	1,910 bbls (0.2 ac-ft)	0	0	0	1,910 bbls (0.2 ac-ft)
Dust Control	5,160 bbls (0.7 ac-ft) <sup>4</sup>	41,280 bbls (5.3 ac-ft)	20,640 bbls (2.7)	20,640 bbls (2.7)	20,640 bbls (2.7)	103,200 bbls (13.3 ac-ft)
<b>Total</b>	<b>525,160 bbls (67.7 ac-ft)</b>	<b>2,163,190 bbls (278.8 ac-ft)</b>	<b>2,060,640 bbls (265.6 ac-ft)</b>	<b>60,640 bbls (7.8 ac-ft)</b>	<b>4,140,640 bbls (533.7 ac-ft)</b>	<b>8,425,110 bbls (1,085.9 ac-ft)</b>

<sup>1</sup> One barrel (bbl) = 42 gallons; 1 acre-foot (ac-ft) = 7,758.37 barrels.  
<sup>2</sup> Water use based on eight wells drilled and four wells completed in 2019, four wells completed in 2020, four wells drilled in 2021, and four wells drilled and eight wells completed in 2022.  
<sup>3</sup> A one-time use of 1,910 barrels of fresh water would be required for hydrostatic testing of new gathering lines.  
<sup>4</sup> Assumes 5,160 barrels per well drilled for dust control during construction, drilling, and completion.

**BLM Rights-of-Way Summary.** Because the HDU 5-34 well pad and a portion of the access road and gathering pipelines would be located on BLM surface that currently has unleased Federal minerals and lies outside the HDU, a right-of-way grant from the BLM would be required (**Table 5**). One ROW grant, issued to the operator under the Mineral Leasing Act (MLA), would authorize the HDU 5-34 well pad and its ancillary access road and water gathering line on BLM lands outside the lease and HDU boundaries. A separate ROW grant, issued to RRG under the Mineral Leasing Act (MLA), would authorize the gas gathering pipelines to transport natural gas from both the HDU 5-34 and HDU 13-21-99 wells across BLM lands.

Under the Proposed Action, the operator could implement all or any combination of the following HDMDP developments with the authorization of APDs and ROWs.

**Table 5. Proposed BLM Rights-of-Way for HDMDP Project Area**

<i>Right-of-Way</i>	<i>Type of Right-of-Way</i>	<i>ROW Area</i>	<i>ROW Length</i>
<b>Relating to the HDU 5-34 Well Developments (T8S, R98W, Section 5, Sixth P.M.)</b>			
Site ROW <sup>1</sup>	Well Pad	6.25 acres	N/A
Ancillary to Site ROW	New Access Road	0.52 acre (571 feet x 40 feet)	0.11 mile
Linear ROW <sup>2</sup>	New 12-inch Buried Natural Gas Pipeline	0.50 acre (619 feet x 35 feet)	0.12 mile
Ancillary to Site ROW	New 12-inch Buried Water Pipeline	0.50 acre (619 feet x 35 feet)	0.12 mile
<b>Relating to the HDU 13-21-99 Well Developments (T8S, R99W, Section 13, Sixth P.M.)</b>			
Linear ROW <sup>2</sup>	New 12-inch Buried Gas Pipeline	4.22 acres (3,676 feet x 50 feet)	0.70
<sup>1</sup> ROW would be issued to the operator. Site ROW is required because HDU 5-34 well pad and the BLM portions of access road and water line are proposed on BLM land with no underlying Federal lease. <sup>2</sup> ROW would be issued to RRG.			

**HDU 5-34 Project Components (Map 2):**

- Construct the HDU 5-34 pad to a 6.25-acre footprint on BLM land to drill eight new Federal wells.
- Construct a new 697-foot long access road (571 feet on BLM and 126 feet on private) from CR 200 to the HDU 5-34 pad.
- Install one 12-inch diameter welded steel natural gas gathering pipeline (approximately 1,622 feet, including 619 feet on BLM and 1,003 feet on private) from the HDU Pipeline (natural gas) to the HDU 5-34 pad. The new natural gas pipeline would be collocated with the new water line for its entire length and with the new access road for 619 feet.
- Install one 12-inch diameter water line (approximately 1,622 feet, including 619 feet on BLM and 1,003 feet on private) from the HDU Pipeline (water) to the HDU 5-34 pad. The new water line would be collocated with the new natural gas pipeline for its entire length and with the new access road for 619 feet.

**HDU 13-21-99 Project Components (Map 3):**

- Construct the 13-21-99 pad to a 6.07-acre footprint on private land to drill eight new Federal wells.
- Construct a new 642-foot long access road from CR 222 to the HDU 13-21-99 pad.
- Install one 12-inch diameter welded steel natural gas gathering pipeline (approximately 5,200 feet, including 3,676 feet on BLM and 1,524 feet on private) from the HDU Pipeline (natural gas) to the HDU 13-21-99 pad. The new natural gas pipeline would be collocated with the new water line for its entire length and with the new access road for 322 feet.
- Install one 12-inch diameter water line (approximately 5,200 feet, including 3,676 feet on BLM and 1,524 feet on private) from the HDU Pipeline (water) to the HDU 13-21-99 pad. The new water line would be collocated with the new natural gas pipeline for its entire length and with the new access road for 322 feet.

## **Summary of Project Components**

In summary, the two new well pads would develop 16 wells along with 1,339 feet (0.25 mile) of associated access roads and 5,842 feet (1.1 miles) of collocated natural gas and water pipelines. The Proposed Action would include constructing the pads, drilling and completing the wells, producing natural gas, properly handling and disposing produced water, and implementing interim and final reclamation. Based on recent experience with natural gas wells in the HDMDP vicinity, minimal production of formation water and no production of liquid condensate is anticipated.

The proposed well pads would be constructed from native soil and rock materials present onsite using a bulldozer, grader, front-end loader, and/or backhoe. The pads would be constructed by clearing vegetation, stripping and stockpiling all available topsoil and suitable subsoil to a minimum depth of 12 inches, and leveling the pad area using cut-and-fill construction. The tops of the cut-slopes and pad corners may be rounded to improve their appearance. On well pads with heavy fuel loadings, brush or trees would be hydro-axed to eliminate the mass of material to be cleared.

Construction of pads, roads, and pipelines would follow the guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development* (U.S. Department of the Interior [USDI] and U.S. Department of Agriculture [USDA] 2007). New access roads would be graveled to ensure all-weather accessibility to the pad sites. Existing roads would undergo review for spot-graveling needs. A road maintenance program would be required during the production phase of the wells. This program would include blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing. Roads would be maintained in a safe and usable condition, including periodic addition of gravel where needed to repair or prevent excessive rutting and erosion.

Routine dust abatement would also be a component of road operations. This would consist of applications of freshwater during periods of heavy traffic such as construction, drilling, and completions, or in proximity to surface water and sensitive plants, and of a BLM-approved chemical dust suppressant, such as magnesium chloride, during the long-term production phase.

A closed-loop system would be used during drilling, eliminating the need for fluid-containing reserve pits. In the proposed closed-loop system, a series of storage tanks are used to separate liquids and solids. This equipment minimizes the amount of drilling muds and cuttings that require disposal and maximizes the amount of drilling fluids that are recycled and reused.

For water storage during drilling and completion, BHPP proposed using modular large volume tanks (MLVTs) if approval is obtained from the Colorado Oil and Gas Conservation Commission (COGCC) and the BLM. If LE adopts BHPP's plans, flowback water would not be introduced into the MLVTs; instead, the existing water storage pond at the De Beque Pumping Station would be the repository for frac flowback fluids. An MLVT is a series of interlocking curved steel panels that are engineered to contain the proposed storage volume. The MLVT measures 156 feet in diameter and is 11 feet, 8 inches high, and can hold approximately 40,000 barrels of water. The MLVT provides storage for all the water needed in a 24-hour period, while providing a sole source for recharging the tank to ready the water delivery for the next frac. The MLVT would be filled with water from the De Beque Pumping Station using the existing buried water line infrastructure. With this configuration, there is no need for trucks to deliver the water to the MLVT. A barrier of 1-inch-mesh polyethylene fiber netting would be used to cover the tank. Typical set up time is approximately 3 days to get the site prepared, move in all the pieces and assemble them, and get the tank piped into the water lines. Once the tank is constructed, it would be filled and a 72-hour hydrostatic test will be performed to insure no leaks are occurring before full completions operations begin. Frac operations typically take about 2 weeks to complete. By the end of operations, the tank would be emptied except for a few barrels of water to keep the liner in place. Once flowback operations are finished, the tank would be disassembled and removed, typically requiring 3 days to accomplish.



The proposed 12-inch water line would serve the dual purpose of delivering water to conduct well fracturing operations on the new Mancos formation wells and to return or collect the produced water generated from those new wells. The water transfer would occur via pipeline thereby eliminating trucking. The frac water delivery system is designed to deliver approximately 50,000 bpd (barrels per day). The current pipeline system consists of approximately 12 miles of steel pipeline, rated at 1440 psi MAOP (Maximum Allowable Operating Pressure). The frac water is delivered by a high-pressure 2000 horsepower (hp) pump located at the De Beque Pumping Station. The produced water returns to the storage pond at the De Beque Pumping Station through the same pipeline and is gravity fed. Depending on water quality, corrosion inhibitor may be added at the well site with the produced water. The produced water first enters a skimming chamber before being pumped to the storage pond, and is then treated with a biological treatment and/or aeration to maintain water quality.

Cuttings would exit the well bore and be centrifuged to remove liquids, which would be collected and reused for drilling. Prior to drilling each well, a permanent cuttings trench (94-foot x 20-foot) for the drill cuttings would be excavated with nearly vertical slopes. During drilling, cuttings would be placed in a lined 90-foot x 90-foot temporary cuttings storage area. The cuttings would be mixed with the pit excess material to blend. Prior to disposal in the cuttings trench, the cuttings would be tested to determine that they are within safe limits compared to COGCC Table 910-1 concentration levels immediately following drilling operations. If testing confirms that cuttings are within safe limits compared to COGCC Table 910-1 concentration levels, they would be buried in the cuttings trench. After all wells are drilled, the cuttings trench would be closed and covered. The cuttings trench would only be used to contain cuttings; no other exploration and production waste would be allowed in the trenches. If tested soils do not meet COGCC Table 910-1 concentration levels, the cuttings would be hauled offsite to an approved disposal facility.

Proposed gathering pipelines would be constructed adjacent to proposed roads, generally along the uphill side of the construction corridor. All gathering lines would be buried to a minimum depth of 4 feet from surface to top of pipe. The trench would be excavated mechanically. Topsoil would be windrowed separately from trench spoil and stored alongside until the trench is backfilled. Pipe segments would be fabricated and welded together and X-rayed, lowered into the trench, and covered with excavated material. Testing would occur after the buried line is installed.

All new gathering lines would be hydrostatically tested with fresh water for leaks. After hydrostatic testing, the fresh water would be transported to the operator's water management facility for re-use, or transported to the Hancock Gulch Disposal Well #1. Hydrostatic testing water would not be released onto the ground into drainages.

### **Summary of the Proposed Project Disturbance**

**Table 6** provides estimates of initial and long-term disturbance for the proposed developments. Initial disturbance includes the surface disturbance associated with construction of two new well pads, access roads, and pipelines. Once constructed, the well pads would be stabilized by seeding cut slopes, fill slopes, and topsoil and subsoil piles. When the last well has been drilled and completed on the pad, interim reclamation would be conducted to reduce the working area of the pad and seed or reseed areas outside the working area.

**Table 6. Proposed Disturbance for Project Components**

<i>Well Pad</i>	<i>Surface Ownership</i>	<i>Length (feet) Federal/Private [Total]</i>	<i>Initial Disturbance (acres) Federal/Private [Total]</i>	<i>Long-term Disturbance (acres) Federal/Private [Total]</i>
<b>WELL PADS</b>				
HDU 5-34	Federal	NA	6.25/0.0	2.18/0
HDU 13-21-99	Private	NA	0.0/6.07	0/2.21
<b>Total (Federal/Private)</b>		<b>NA</b>	<b>6.25/6.07 [12.32]</b>	<b>2.18/2.21 [4.39]</b>
<b>ACCESS ROADS <sup>1</sup></b>				
HDU 5-34	Federal/Private	571/126 [697]	0.52/0.12 [0.64]	0.39/0.09 [0.48]
HDU 13-21-99	Private	0/642 [642]	0/0.59	0/0.44
<b>Total (Federal/Private)</b>		<b>571/768 [1,339]</b>	<b>0.52/0.71 [1.23]</b>	<b>0.39/0.53 [0.92]</b>
<b>GATHERING LINES <sup>2</sup></b>				
HDU 5-34	Federal/Private	619/1,003 [1,622]	0.50/1.12 <sup>3</sup> [1.62]	0/0
HDU 13-21-99	Federal/Private	3,676/1,524 [5,200]	4.22/1.64 <sup>4</sup> [5.86]	0/0
<b>Total (Federal/Private)</b>		<b>4,295/2,527 [6,822]</b>	<b>4.72/2.76 [7.48]</b>	<b>0/0</b>
<b>Grand Total (Federal/Private)</b>			<b>11.49/9.54 [21.03]</b>	<b>2.57/2.74 [5.31]</b>
<sup>1</sup> Initial disturbance for access roads is 40 feet; long-term disturbance includes a 20-foot-long running surface with 5 feet on either side for a drainage ditch. <sup>2</sup> Gathering line width is 50 feet for initial disturbance with no long-term disturbance. <sup>3</sup> Gathering line on Federal land is collocated with new access road for 619 feet on Federal land and for 78 feet on private land; disturbance width for collocated gathering line is 35 feet. <sup>4</sup> Gathering line on private land is collocated with new access road for 322 feet; disturbance width for collocated gathering line is 35 feet.				

Long-term disturbance is the portion of the initial disturbance that would remain during production of the wells following interim reclamation. This includes the unreclaimed working area of the well pads needed for production and periodic maintenance activities, and the driving surfaces of access roads. Production would continue as long as economic quantities of natural gas are produced, which could persist over a 20-year life or longer. A portion of access road disturbance and all pipeline disturbance would be reclaimed promptly after construction, weather, and season permitting.

The total project disturbance would be 21.03 acres of initial disturbance, including 11.49 acres occurring on BLM surface lands and 9.54 acres on private surface lands. Following interim reclamation, the long-term disturbed area would be reduced to 5.31 acres, including 2.57 acres on BLM surface lands 2.74 acres on private surface lands.

**Construction of the HDU 5-34 Pad.** The proposed HDU 5-34 pad would be located on BLM surface within basin big sagebrush and greasewood shrublands in the valley bottom of Dry Fork. Because the Federal minerals underlying the pad are currently unleased, the operator would obtain a BLM site ROW that would authorize their use of the well pad, road, and gathering pipelines on the BLM surface in Section 5 for the operating life of the proposed eight horizontal wells to be developed (**Map 2**).

The new 6.25-acre pad, serving eight bottomholes extending into adjacent Federal leases south of the pad, would be constructed with a maximum fill of 9.5 feet at the southwest corner and a maximum cut of 12.9 feet at the northwest corner. Separators, meter boxes, 400-barrel storage tanks, and telemetry towers would be staged near the road entrance on the east side of the pad. The pad would be approximately 700



feet north of CR 200. At the time of pad reshaping and seeding for interim reclamation, the disturbance would be reduced to 2.18 acres for the productive life of the wells.

An existing two-track route would be reconstructed for all-weather use with the initial 125 feet crossing private land and the remainder crossing onto BLM surface. Two new 12-inch diameter welded steel pipelines (a gas gathering line and a produced water line) would be collocated in a buried trench alongside the improved HDU 5-34 road. On the southern side of CR 200, the two lines would be trenched within a 50-foot-wide corridor for 925 feet to connect with existing HDU pipelines currently serving the HDU 7-23 wells (**Map 2**). The estimated initial disturbance for the road and pipeline construction would be 2.26 acres with a long-term disturbance of 0.48 acres (**Table 6**).

The HDU 5-34 development would create 7.27 acres of initial disturbance and 2.57 acres of long-term disturbance on BLM surface in Section 5. The private land portions of the development would cover 1.24 acres of initial disturbance and 0.09 acre of long-term disturbance. When combined, 8.51 acres of initial disturbance and 2.66 acres of long-term disturbance would be attributed to this pad (**Table 6**).

The proposed development on BLM land lies within a visually sensitive area, which resulted in some pad design features including the use of an approximately 6-foot-high, undulating berm and establishing a flatter fill-slope along the entire southern edge of the pad to improve opportunities to re-establish a vegetation buffer. Topsoil, shrubs, and small juniper trees to be cleared during pad construction would be selectively gathered and re-placed in the visual berm. The existing two-track, designated as “closed” (to public use) in the GJFO Travel Management Plan, would be physically closed by the pad construction. The operator would need to gain permission from the surface owner of the road prior to APD approval and subsequent surface disturbance.

The proposed HDU 5-34 well pad is located on Federal surface with underlying unleased Federal minerals. Because the well pad, and a portion of the access road and gathering pipelines are off-lease and outside of the HDU on BLM lands, separate ROW grants would be required from the BLM. One authorization would be required for the well pad, access road, and water gathering line and a separate authorization would be required for the natural gas gathering line.

**Construction of the HDU 13-21-99 Pad.** The proposed HDU 13-21-99 pad and new access road branching off CR 222 would be located on split-estate land (**Map 3**). New gas and water gathering pipelines would be extended west for nearly 1 mile across BLM and private land from the operating gathering lines at the HDU 7-23 pad. The pad, road, and gathering lines would be situated along the valley bottom of South Dry Fork within basin big sagebrush and greasewood shrublands

New pad construction would create 6.07 acres of new initial disturbance, with 2.21 acres remaining as a long-term footprint. To construct the pad, the maximum cut would be 8.4 feet at the northwest corner, and the maximum fill would be 8.1 feet at the southwest corner. Ancillary facilities supporting the new horizontal wellbores would be clustered toward the northeast side of the pad near the road entrance. Pad construction would result in 7.30 acres of new initial disturbance with 1.50 acres being the long-term disturbance for the pad (**Table 6**).

The new spur road would be 642 feet (0.12 mile) in length, with an initial disturbance width of 40 feet, but reclaimed to a 30-foot width for the maintained roadway, including two parallel ditches. When pioneered, the road would represent 0.59 acre of initial impact with 0.44 acre representing the long-term disturbance for the life of the well pad.

The new 12-inch diameter welded steel natural gas and water pipelines would be collocated in the same excavated trenched across BLM surface for 3,676 feet (0.70 mile) and private land for 1,524 feet (0.29 mile) (**Map 3**). The pipelines would be installed within a 50-foot wide corridor, with an initial disturbance totaling 5.86 acres, of which 4.22 acres would be on BLM land.

Total disturbance of the HDU 13-21-99 development would involve 12.52 acres of initial disturbance and 2.65 acres of long-term disturbance. Of these totals, only 4.22 acres of initial disturbance would occur on BLM-administered surface, while 8.30 acres of initial disturbance and the entire 2.65 acres of long-term disturbance would occur on private land (**Table 6**). A ROW issued to RRG would be required for portion of the natural gas pipeline from the HDU Pipelines to the HDU 13-21-99 pad on BLM land.

During BLM's onsite (field inspection) for this location, BHPP was advised to shift the pad 150 feet to the east to avoid the adjacent debris flow channel. Stormwater structures would be emphasized in the pad design to ensure the wells site is protected from future stormflow impacts. Because the pad is staked on private land, is sited per landowner desires, and is surrounded by dense greasewood shrublands, the visual sensitivity for this location would be low. BHPP would be required to obtain permission from the surface owner of the road prior to APD approvals and subsequent surface disturbance.

## **2.2 NO ACTION ALTERNATIVE**

Council on Environmental Quality (CEQ) regulations require the BLM to analyze the No Action Alternative in comparison to the Proposed Action. Because all of the oil and gas wells proposed in this project would be developed in Federal minerals, the No Action Alternative would involve a scenario where none of the 16 new Federal wells would be drilled, completed, or produced. Because no new well development would occur, there would be no need for future pipeline or road upgrades.

**Table 1** lists ten producing Federal wells presently operating on five existing well pads in the Homer Deep Unit. These ten producing wells would continue to operate using the existing road and pipeline infrastructure on BLM and private land, including the related travel, noise, air quality, water quality, and wildlife impacts associated with such operations over the next 20 years.

## **2.3 ALTERNATIVE CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION**

During the initial stages of the HDMDP preparation covering the public scoping period and the onsite reviews, BHPP proposed four well pads to be analyzed. As shown on Project Location Map sent with the initial public scoping letter in March 2015, two pads (HDU 13-43 and HDU 14-23) and their access roads located on the eastern side of the MDP boundary were reviewed (**Appendix C**). A number of field visits were conducted in 2015 and 2016 to review access route alternatives and the option of shifting locations for these two pads, primarily to avoid potential impacts to sensitive plants and wildlife and their habitat, sensitive viewsheds, and cultural resources.

Resource surveys conducted for the two eastern locations revealed the presence of sensitive resource values that could be neither avoided nor feasibly mitigated. After scrutinizing the various road and pad options in the field, it was determined that BHPP must either drop their pursuit of the HDU 13-43 and 14-23 pads or develop entirely new surface locations for their desired downhole targets. Failing to find viable solutions and alternatives, BHPP and BLM determined that the two pads would be deleted from consideration.

As shown on **Map 1**, BHPP had approved pad location (HDU 24-11), analyzed in the De Beque Exploratory Proposal EA, and situated between the HDU 13-43 and HDU 14-23 sites. The HDU 24-11 pad appears readily developed with biological resource survey updates and review of the adequacy of previous impact analysis and associated mitigation (**Table 1**).

## **3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

During its internal scoping process for this EA, pursuant to NEPA, BLM resource specialists identified elements of the natural and human environment as present in the project vicinity and potentially affected by the project. Environmental elements not identified as being present or potentially affected by the project are not analyzed in this EA.

This section provides a description of the human and natural environmental resources that could be affected by the Proposed Action and presents comparative analyses of the direct and indirect effects on the affected environment stemming from the implementation of the actions under the Proposed Action and other alternatives analyzed. This EA draws upon information compiled in the 2015 GJFO ARMP (BLM 2015a). **Table 3** lists the potentially affected resources analyzed in this EA.

**Table 3. Potentially Affected Resources**

<i>Resources</i>	<i>Not Present</i>	<i>Present but Not Affected</i>	<i>Potentially Affected</i>
Access and Transportation			X
Air Quality			X
Cultural Resources			X
Environmental Justice			X
Fossil Resources			X
Geology			X
Invasive Non-Native Plants			X
Mineral Resources		X	
Native American Religious Concerns			X
Noise			X
Prime or Unique Farmlands	X		
Range Management			X
Recreation			X
Rights-of-Way			X
Socioeconomics			X
Soils			X
Special Designations (ACECs, SMAs, NCAs, etc.)	X		
Special Status Plants			X
Special Status Wildlife			X
Vegetation			X
Visual Resources			X
Water Resources			X
Wastes, Hazardous or Solid			X
Wild Horse and Burros	X		
Wild and Scenic Rivers	X		
Wilderness, WSAs, or Wilderness Characteristics	X		

**Elements Not Affected**

Elements identified as Not Present were not brought forward for analysis in this EA. One element (Mineral Resources) was identified as Present but Not Affected (Mineral Resources). This element was also not brought forward for analysis in the EA, using the following rationales:

- Mineral Resources – No commercial deposits of coal, oil shale, uranium, precious metals, limestone, gypsum, or other leasable, locatable, or salable minerals are believed to occur within

or beneath the project area. The South Dry Fork valley floor contains sand and gravel associated with the valley-fill alluvium. However, the size of the stream suggests that these materials are probably not present in commercial quantities. In addition, the small area of facilities associated with the Proposed Action would not preclude future development of sand and gravel.

### Elements Potentially Affected

Subsection 3.1 through 3.22 describe the affected environment (current conditions) and direct and indirect environmental consequences (impacts) of the Proposed Action and No Action Alternative. Potential adverse impacts to the environmental elements addressed in this EA would be avoided, minimized, or offset by design features incorporated into the Proposed Action in collaboration with the BLM, and by COAs included in **Appendix A**. Cumulative impacts are summarized in Section 4.

Within each resource type, and when applicable, definitions of the kinds of impacts are included in the evaluation of potential environmental impacts. Comparison of impacts is intended to provide an impartial assessment to help inform the decision-maker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource might impart a beneficial impact to other resources. In general, adverse impacts described in this chapter are considered important if they result from, or relate to, the implementation of any of the alternatives. These impacts are defined as follows:

- Direct Impacts – Resulting from the action, at the same time, in the same general area.
- Indirect Impacts – Occurring at a different time or location from the action.
- Short-term Impacts – Occurring during or after the action and continuing up to 2 years.
- Long-term Impacts – Extending beyond the first 2 years.

Environmental impact analysis is based on existing data and information available from Federal and State agencies, peer-reviewed scientific literature, and relevant resource studies conducted in the project area in relation to the Proposed Action or other proposed development projects.

### Standards for Public Land Health

In January 1997, the Colorado State Office of the BLM approved the Standards for Public Land Health. These standards, which describe the conditions needed to sustain public land health, apply to all uses of the public land. The HDMDP project area is located within the GJFO's De Beque-Roan Creek Land Health Assessment (LHA) area (BLM 2018a). Specifically, the proposed disturbances related to the HDU 5-34 well pad, road and pipelines proposed on BLM land are entirely within an area determined "not meeting" land health standards. The HDU 5-34 project falls within the West Spears livestock grazing allotment. The proposed disturbances of HDU 13-21-99 pad developments are located on private lands, which are not inventoried for land health by the BLM. However, the new buried gas and water lines to serve the HDU 13-21-99 pad would cross BLM land within an area classed as "not meeting" land health standards.

The LHA summary for the HDU 5-34 project component, classified as "not meeting" standards, is based on an inventory point (DR-015) established approximately 2,400 feet east in similar woodland juniper vegetation habitat. Visual comparison of the inventory photo point shows that the HDU 5-34 site has similar vegetation and topographical characteristics. Poor perennial species composition and vegetation dominated by cheatgrass were the overall conclusions leading to the "not meeting" conclusion. Drought conditions were prevalent at time of the field assessment. Active livestock grazing occurs near the HDU 5-34 well site. The upland soil component of the assessment found that standard was being met. No

riparian systems are present within the project area. Remark on the field sheet reveals that the site possesses desirable habitat for the threatened and endangered plant, Colorado hookless cactus.

The LHA summary for the proposed HDU 13-21-99 pipeline corridor is also defined as “not meeting” standards. Inventory point (DR-018) was established in the field in 2006 and is located in proximity to the proposed pipeline. The photo associated with this point accurately depicts the vegetation and terrain along the planned pipeline corridor. Although the assessments for soils, hydrologic and biotic integrity show those standards being met, the overall low plant diversity within the salt flats range site typified by greasewood vegetation provides the rationale for a land health standard rating of “not meeting.” The presence of cryptogram cover helps augment the lack of litter and provide stability to the site.

The Proposed Action, by removing plant cover and disturbing upland soils and areas adjacent to ephemeral drainages, has the potential to result in conditions unfavorable for the various land health standards. However, the limited amount of surface disturbance, the project location along an existing county road and mitigation measures to be applied by the BLM as COAs (**Appendix A**) would reduce impacts to no more than a negligible effect on achieving land health standards over the short term and, with successful reclamation, meeting the land health standards over the long term. Although there was no specific mention for Standard 5, Water Quality in the LHA point summary, the relatively flat terrain of the HDU 5-34 site and HDU 13-32-99 pipeline corridor and the use of best management practices for weed control, storm water controls, and interim reclamation would be conducive to achievement of this standard.

### 3.1 ACCESS AND TRANSPORTATION

#### Affected Environment

The I-70 De Beque exit (#62) would be the primary interchange used to access the HDMDP project area. The HDU is accessed by travelling north on Mesa County 45 Road (Roan Creek Road) and then west on Garfield CR 200, Garfield CR 222, and Mesa County X.5 Road.

The HDU 5-34 well pad would be accessed off Garfield CR 200. A new 697-foot access road (571 feet on BLM surface and 126 feet on private surface) would be constructed from Garfield CR 200 to the proposed well pad. The new road would result in approximately 0.64 acre of initial disturbance (0.52 acre on BLM) and 0.48 acre of long-term disturbance (0.39 acre on BLM).

The HDU 13-21-99 well pad would be accessed off Garfield CR 222. A new 642-foot access road would be constructed on private surface resulting in 0.59 acre of initial disturbance and 0.44 acre of long-term disturbance.

**Table 7** shows average daily traffic volumes on nearby Mesa County roads. The Garfield County Road and Bridge Department does not maintain traffic counts for CR 200 and CR 222.

**Table 7. Traffic Volumes on Mesa County Roads**

<i>Road</i>	<i>Segment</i>	<i>Year</i>	<i>Average Daily Traffic</i>
45 Road (Roan Creek Road)	1,430 feet northwest of Glenwood Ave in De Beque, Colorado	2016	640
X.5 Road	520 feet west of 45 Road near county line	2016	136
Source: Pobirk 2016.			

Average daily traffic on I-70 between Grand Junction and Rifle ranges from 16,000 to 18,000 vehicles, including 2,280 to 2,970 trucks (Colorado Department of Transportation [CDOT] 2017). The Colorado Department of Transportation maintains I-70 and Mesa and Garfield counties are responsible for maintaining county roads within their borders.

**Environmental Consequences**

*Proposed Action*

The Proposed Action would result in periods of substantial increases in traffic volume on the county roads and the newly constructed roads within the project area. Truck traffic would be greatest during rig-up, drilling, and completion activities. Once each well is producing, traffic would dramatically decrease to occasional visits in pickups for monitoring or maintenance activities. Degradation of field development roads may occur due to travel by heavy equipment, which also results in fugitive dust emissions (**Section 3.2**, Air Quality) and elevated noise levels (**Section 3.11**, Noise). Mitigation measures applied as COAs (**Appendix A**) would ensure adequate dust abatement and road maintenance.

**Table 8** lists average traffic estimates associated with drilling and well completion, which are estimated to require 1,308 vehicle round-trips over approximately 85 days for development of a single well. Additional traffic would occur during rig mobilization and demobilization (approximately 450 vehicle round-trips over 10 days) and interim reclamation (approximately six vehicle roundtrips over 3 days). During operations, traffic would include one light-vehicle roundtrip per day (pumper) and possibly one heavy-vehicle roundtrip per day (maintenance and produced-water trucks).

**Table 8. Average Traffic Associated with Drilling and Well Completion**

<i>Activity</i>	<i>Number Of Days</i>	<i>Light Vehicle Roundtrips</i>	<i>Heavy Vehicle Roundtrips</i>	<i>Total Vehicle Roundtrips</i>
Well Pad, Road, and Gathering Pipeline Construction	10	70	30	100
Drilling	45	405	135	540
Completion	30	210	330	540
Dust Control <sup>1</sup>	43	0	43	43
Deliveries	85	85	0	85
<b>Totals</b>		<b>770</b>	<b>538</b>	<b>1,308</b>

<sup>1</sup> Assumes one 120-barrel water truck for dust control every other day over the drilling and well completion period.

Proposed roads would be constructed with a disturbance with approximately 40 feet wide, reduced to 20 feet of finished road surface (with an addition 5 feet on each side for bar ditches) after interim reclamation. A conventional dozer would be used to clear vegetation and large boulders within the proposed limits of disturbance for the planned roads. Earth-moving equipment would be used to segregate and windrow the topsoil along the edge of the proposed road corridor. The roads would be constructed using standard equipment and techniques as described in the Gold Book (USDI and USDA 2007).

Mitigation measures (**Appendix A**) would be required as COAs for road construction and maintenance including, but not limited to dust abatement, ditching, draining, crowning, surfacing, sloping, and dipping the roadbed as necessary. A minimum 6-inch layer of gravel would be applied to the new roads to provide an all-weather travel way.

Increased traffic on county roads may cause temporary conflicts with normal traffic, including travel delays and increased vehicle collisions. Project traffic would also cause an increase in fugitive dust and noise and an increased risk of collisions with wildlife. Degradation of roads may occur from heavy equipment, resulting in increased maintenance and safety management.

Peak project-related traffic is expected to occur during well completions and would total approximately 20 round-trips per day (18 completion vehicles, one dust control vehicle and 1 delivery vehicle). This traffic peak would increase traffic volumes on segments of I-70 between Grand Junction and Rifle by less than 1%. Peak daytime traffic during completions is estimated to result in a 6% increase on Mesa County 45 Road. Peak project-related traffic during operations would include approximately three round-trips per day and would result in less than a 1% increase in traffic on Mesa County 45 Road.

#### No Action Alternative

Under this alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but existing oil and gas production in the HDU would continue to operate using existing road and pipeline infrastructure on BLM and private lands. Existing oil and gas, ranching, and recreational traffic along Mesa County 45 Road, Garfield CR 200, Garfield CR 222, and Mesa County X.5 Road would continue. Therefore, impacts to access and transportation from continued operation of the existing wells would be expected to continue.

### **3.2 AIR QUALITY**

#### **Affected Environment**

The project area is located in western Colorado, approximately 8 to 10 air-miles northwest of the town of De Beque. The majority of the project area lies within Mesa County with the northernmost portion extending into Garfield County. The project area is within the Western Slope Region for air quality planning (Colorado Department of Public Health and Environment [CDPHE] 2016a). The Western Slope Region includes nine counties on the far western border of Colorado. Air quality concerns in this region are primarily from impacts related to ranching, agriculture, mining, energy development, and tourism.

The nearest meteorological measurements were collected at Altenbern, Colorado (1947 to present), approximately 8 miles north of the project area at an elevation of 5,690 feet above mean sea level (Western Regional Climate Center [WRCC] 2017a). The annual average total precipitation at Altenbern is 16.4 inches, with annual totals ranging from 9.2 inches (2002) to 24.2 inches (1985). Monthly precipitation varies only slightly throughout the year. An average of 59.4 inches of snow falls during the year, with most of the snow distributed from November through March. The region has cool temperatures, with the average daily temperature ranging between 10 degrees Fahrenheit (°F) and 37°F in January and between 51°F and 89°F in July. The frost-free period generally occurs from early June to mid-September. The closest comprehensive wind measurements were collected at the Pine Ridge Colorado Remote Automated Weather Station (RAWS) (WRCC 2017b), located approximately 5 miles south of the project area. The annual mean wind speed at the Pine Ridge site is 6.1 miles per hour.

Air quality impacts from pollutant emissions are limited by regulations, standards, and implementation plans established under the Clean Air Act (CAA), as administered by the CDPHE Air Pollution Control Division (APCD) under authorization of the U.S. Environmental Protection Agency (EPA). The APCD is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made, and those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. Unlike the conceptual “reasonable, but conservative” engineering designs used in NEPA analyses, any APCD air quality preconstruction permitting demonstrations required would be based on very site-specific, detailed engineering values, which would be assessed in the permit application review. Any proposed facility that

meets the requirements set forth under division permit regulations is subject to the Colorado permitting and compliance processes.

Federal air quality regulations adopted and enforced by the CDPHE-APCD limit incremental emission increases to specific levels defined by the classification of air quality in an area. The Prevention of Significant Deterioration (PSD) program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict. All areas of the country are assigned a classification that describes the degree of degradation to the existing air quality allowed to occur within the area under the PSD permitting rules. PSD Class I areas are areas of special national or regional natural, scenic, recreational, or historic value, and very little degradation in air quality is allowed by strictly limiting industrial growth. PSD Class II areas allow for reasonable industrial/economic expansion.

Under the PSD program, Class I areas are protected by Federal Land Managers through management of Air Quality Related Values (AQRVs), such as visibility, aquatic ecosystems, flora, fauna, and others. Areas throughout the region not designated as PSD Class I are classified as Class II. Federal Land Managers can designate specific Class II areas that they manage as “sensitive” Class II areas, based on their own criteria, and request that PSD Class I level air quality analyses be included for these areas.

Regulations and standards that limit permissible levels of air pollutant concentrations and air emissions and are relevant to the project-related air impact analysis include:

- National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) and Colorado Ambient Air Quality Standards (CAAQS) (5 Code of Colorado Regulations [CCR]-1001-14)
- Hazardous Air Pollutants (HAPs)
- PSD (40 CFR Part 51.166)
- New Source Performance Standards (NSPS) (40 CFR Part 60)
- National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 63)
- Non-Road Engine Tier Standards (40 CFR Part 89)
- Colorado Oil and Gas Permitting Guidance

Air pollutants monitored in the region include the criteria pollutants carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), particulate matter less than 10 microns in effective diameter (PM<sub>10</sub>), particulate matter less than 2.5 microns in effective diameter (PM<sub>2.5</sub>), ozone (O<sub>3</sub>), and sulfur dioxide (SO<sub>2</sub>), and HAPs benzene and formaldehyde. The most representative monitored regional background concentrations available for criteria pollutants (CDPHE 2016b) are shown in **Table 9**. Applicable background concentrations for HAPs (benzene and formaldehyde) are from EPA’s Air Quality System Data Mart (EPA 2017a).

**Table 9. Background Ambient Air Quality Concentrations**

<i>Pollutant</i>	<i>Averaging Period</i>	<i>Measured Background Concentration (µg/m<sup>3</sup>)</i>
CO <sup>1</sup>	1-hour	1,145
	8-hour	1,145
NO <sub>2</sub> <sup>1</sup>	1-hour	21
	Annual	1.9
PM <sub>10</sub> <sup>2</sup>	24-hour	27



<i>Pollutant</i>	<i>Averaging Period</i>	<i>Measured Background Concentration (µg/m<sup>3</sup>)</i>
	Annual	16
PM <sub>2.5</sub> <sup>1</sup>	24-hour	14
	Annual	3
Ozone <sup>3</sup>	8-hour	126
SO <sub>2</sub> <sup>1</sup>	1-hour	2.6
	3-hour	2.6
	24-hour	2.6
	Annual	2.6
Benzene <sup>4</sup>	24-hour	1.4
	Annual	2.0
Formaldehyde <sup>4</sup>	24-hour	0.8
	Annual	0.9
Sources: CDPHE 2016b; EPA 2017a. <sup>1</sup> Williams Willow Creek 2012. <sup>2</sup> Greasewood 2009-2010. <sup>3</sup> Palisade 2013-2015. <sup>4</sup> Battlement Mesa, Garfield County 2016.		

The project area is classified as PSD Class II, where less stringent limits on increases in pollutant concentrations apply compared to Class I.

AQRVs have been identified as a concern at several Federal Class I and sensitive Class II areas in the region. The project area is within 200 kilometers (km) of ten Class I areas and four sensitive Class II areas. Class I areas within 200 km of the project area include the Eagles Nest, Flat Tops, La Garita, Maroon Bells – Snowmass, Mount Zirkel, Weminuche, and West Elk wilderness areas, and Arches, Black Canyon of the Gunnison, and Canyonlands national parks. Sensitive Class II areas within 200 km of the project area include the Raggeds and Uncompahgre wilderness areas, and Dinosaur and Colorado national monuments. Dinosaur National Monument is regulated as a Class I area for SO<sub>2</sub> by the CDPHE. Evaluation of potential impacts to AQRVs would be performed during the New Source Review permitting process under the direction of the CDPHE-APCD in consultation with Federal Land Managers.

As part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) program, continuous visibility-related optical background data have been collected in the following Class I areas: Flat Tops Wilderness, White River National Forest (Maroon Bells-Snowmass Wilderness), and Weminuche Wilderness. The average standard visual range (SVR) at each of the three sites is historically greater than 150 km and in the most recent reported years, the average SVR has increased to greater than 200 km (IMPROVE 2017a).

A National Atmospheric Deposition Program (NADP) National Trends Network (NTN) station monitors wet atmospheric deposition and a Clean Air Status and Trends Network (CASTNET) station monitors dry atmospheric deposition at the Gothic site, located east of the project area. The total annual deposition (wet and dry) reported as nitrogen (N) and sulfur (S) deposition for years 2006 through 2015 are shown in **Table 10**.

**Table 10. Gothic Site Nitrogen and Sulfur Deposition Values, 2006 to 2015**

Year of Monitoring	Nitrogen Deposition (kg/ha-yr)			Sulfur Deposition (kg/ha-yr)		
	Wet	Dry	Total	Wet	Dry	Total
2006	1.41	1.33	2.74	0.69	0.28	0.97
2007	1.25	1.46	2.71	0.52	0.31	0.83
2008	1.09	1.36	2.46	0.63	0.32	0.95
2009	1.41	1.28	2.69	0.81	0.28	1.09
2010	1.45	1.20	2.65	0.73	0.25	0.97
2011	1.31	1.32	2.63	0.62	0.26	0.88
2012	1.28	1.22	2.50	0.48	0.22	0.70
2013	2.14	1.25	3.39	0.84	0.24	1.08
2014	1.75	1.15	2.90	0.64	0.21	0.85
2015	1.95	1.12	3.07	0.72	0.18	0.90

Source: EPA 2017b

**Table 11** presents a list of nine lakes in the Flat Tops, Maroon Bells-Snowmass, Raggeds, and West Elk wilderness areas that have been identified as acid sensitive lakes. Analyses for potential changes to lake acidity from atmospheric deposition are based on the acid neutralizing capacity (ANC) of each lake. The most recent lake chemistry background ANC data available from the IMPROVE network “Federal Land Manager Environmental Database” (IMPROVE 2017b) are shown in **Table 11**.

**Table 11. Background ANC Values for Acid Sensitive Lakes**

Wilderness Area	Lake	Latitude (Deg-Min-Sec)	Longitude (Deg-Min-Sec)	10 <sup>th</sup> Percentile Lowest ANC Value (µeq/L) <sup>1</sup>	Number of Samples	Monitoring Period
Flat Tops	Ned Wilson Lake	39°57'41"	107°19'25"	39.0	191	1981-2007
Flat Tops	Upper Ned Wilson Lake	39°57'46"	107°19'25"	12.9	143	1983-2007
Flat Tops	Lower Packtrail Pothole	39°58'5"	107°19'24"	29.7	96	1987-2007
Flat Tops	Upper Packtrail Pothole	39°57'56"	107°19'23"	48.7	96	1987-2007
Maroon Bells-Snowmass	Avalanche Lake	39°8'33"	107°5'53"	158.8	55	1991-2010
Maroon Bells-Snowmass	Capitol Lake	39°9'42"	107°4'50"	154.4	57	1991-2010
Maroon Bells-Snowmass	Moon Lake	39°9'49"	107°3'34"	53.0	54	1991-2010
Raggeds	Deep Creek Lake	39°0'30"	107°14'23"	20.6	24	1995-2009
West Elk	South Golden Lake	38°46'39"	107°10'58"	111.4	25	1995-2008

Source: IMPROVE 2017b  
Note: 10<sup>th</sup> percentile lowest ANC values reported

The ANC values shown are the 10<sup>th</sup> percentile lowest ANC values, which were calculated for each lake following procedures provided from the U.S. Forest Service (Forest Service). The years of monitoring data that were currently available, and the number of samples used in the calculation of the 10<sup>th</sup> percentile lowest ANC values, are provided. Of the nine lakes listed in **Table 11**, Upper Ned Wilson and Deep Creek lakes are considered by the Forest Service as extremely sensitive to atmospheric deposition because the background ANC values are less than 25 microequivalents per liter (µeq/L).

All climate model projections indicate future warming in Colorado (BLM 2015b). The Statewide average annual temperatures are projected to warm by +2.5 °F to +5 °F by 2050 relative to a 1971 to 2000 baseline under Representative Concentration Pathway (RCP) 4.5. Summer temperatures are projected to warm slightly more than winter temperatures, where the maximums would be similar to the hottest summers that have occurred in the past 100 years. Precipitation projections are less clear. Nearly all of the models predict an increase in winter precipitation by 2050, although most projections of snowpack (April 1 snow-water equivalent measurements) show declines by mid-century due to projected warming. Late-summer flows are projected to decrease as the peak shifts earlier in the season, although the changes in the timing of runoff are more certain than changes in the amount of runoff. In general, the majority of published research indicates a tendency towards future decreases in annual streamflow for all of Colorado's river basins. Increased warming, drought, and insect outbreaks, all caused by or linked to climate change, will continue to increase wildfire risks and impacts to people and ecosystems.

## **Environmental Consequences**

### **Proposed Action**

Under the Federal Land Policy and Management Act (FLPMA) and the CAA, the BLM cannot conduct or authorize any activity that does not conform to all applicable local, State, Tribal, or Federal air quality laws, statutes, regulations, standards, or implementation plans. As such, significant impacts to air quality from project-related activities would result if it is demonstrated that:

- NAAQS or CAAQS would be exceeded, or
- AQRVs would be impacted beyond acceptable levels.

Air pollutant emissions would occur as part of development and well production. Sources of emissions during development include vehicle traffic, well pad and road construction, pipeline construction, and well drilling and completion. The primary pollutants emitted during development would be PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, CO, SO<sub>2</sub>, VOCs, and HAPs, including benzene, toluene, ethyl benzene, xylenes, n-hexane, and formaldehyde. These activities would temporarily elevate pollutant levels, but impacts would be localized and would occur only for the short-term duration of development. Fugitive dust emissions (PM<sub>10</sub> and PM<sub>2.5</sub>) would result from work crews commuting to and from the work site and from the transportation and operation of equipment during development. Wind-blown fugitive dust emissions would also occur from open and disturbed land during development.

Emissions from development were quantified using accepted methodologies, including manufacturer's emission factors, EPA emission factors and standards, and engineering estimates. Drill rig and completion engines would be Tier 2 emissions compliant. Maximum annual field-wide criteria pollutant and HAPs emissions resulting from well pad and pipeline construction and from drilling and completion activities are shown in **Table 12**. The development emissions also assume that a maximum of eight wells would be drilled and four wells would be completed in one year. The total HAPs emissions include benzene, toluene, ethyl benzene, xylenes, n-hexane, and formaldehyde emissions of 0.07, 0.02, 0.00001, 0.02, 0.001, and 0.007 tons per year (tpy), respectively.

**Table 12. Estimated Federal Air Emissions from the Proposed HDMDP**

Parameter	Criteria Pollutants or Precursors						
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	CO	SO <sub>2</sub>	VOCs	HAPs
Development Emissions (tpy)	10.3	4.69	166	98.5	0.55	8.30	0.11
Operation Emissions (tpy)	0.89	0.25	3.17	1.76	<0.01	13.5	0.20

During field production operations, the two new well pads would contain 16 new producing wells (eight wells each). Emissions during this phase would occur from vehicle traffic on roads during routine field operations and maintenance, separator and tank heaters, and workover rigs. Fugitive emissions would also result from the well site equipment.

The primary pollutants emitted would be PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, CO, SO<sub>2</sub>, VOCs, and HAPs. These emissions would impact air quality in the project area over the life of the project. Production equipment is subject to current and future CDPHE Best Available Control Technology (BACT) and Reasonably Achievable Control Technology (RACT) guidance and applicable portions of 40 CFR Part 63 Subparts OOOO and OOOOa, Standards of Performance for Crude Oil and Natural Gas Production. Maximum annual production emissions are summarized in **Table 12**. The total HAPs emissions include benzene, toluene, ethyl benzene, xylenes, n-hexane, and formaldehyde emissions of 0.05, 0.05, 0.001, 0.01, 0.06, and 0.04 tpy, respectively.

A near-field assessment of impacts on ambient air quality was performed to evaluate maximum pollutant impacts within and near the project area resulting from development and operation. Air pollutant dispersion modeling was performed to quantify maximum potential PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, CO, SO<sub>2</sub>, and HAP impacts from development and production. AERMOD was used to model the maximum potential emissions of PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, CO, and SO<sub>2</sub> that could occur from the Proposed Action well pad/road construction, drilling/completion, and production sources. Ozone impacts from this project are estimated as part of a regional air modeling study titled the *Colorado Air Resource Management Modeling Study* (CARMMS), discussed in **Section 4**. **Table 13** presents the maximum modeled air pollutant concentrations that could occur from development activities.

**Table 13. Maximum Modeled Pollutant Concentration Impacts from Well Development Activities**

Pollutant	Averaging Period	Direct Modeled (µg/m <sup>3</sup> )	Background (µg/m <sup>3</sup> )	Total Predicted (µg/m <sup>3</sup> )	NAAQS (µg/m <sup>3</sup> )	CAAQS (µg/m <sup>3</sup> )
CO	1-hour	1,520	1,150	2,670	40,000	40,000
	8-hour	775	1,150	1,920	10,000	10,000
NO <sub>2</sub>	1-hour	91	21	112	188	188
	Annual	38.7	1.9	40.6	100	100
SO <sub>2</sub>	1-hour	2.7	2.6	5.3	196	196
	3-hour	2	2.6	4.6	1,300	700
PM <sub>10</sub>	24-hour	87.8	27	115	150	150
PM <sub>2.5</sub>	24-hour	12.1	14	26.1	35	35
	Annual	2.1	3	5.1	12	12

Notes: Modeled highest second-high value shown for all short-term averaging periods, with the following exceptions:

- NO<sub>2</sub> 1-hour value is calculated as the 5-year average of the 8<sup>th</sup> highest daily maximum 1-hour concentrations.
- SO<sub>2</sub> 1-hour value is the maximum 1-hour concentration.
- PM<sub>2.5</sub> 24-hour value is the maximum 8<sup>th</sup> high concentration.

**Table 14** presents the maximum impacts that could occur from well production. When maximum modeled concentrations from the modeled scenarios are added to representative background concentrations, it is demonstrated that the total ambient air concentrations are less than the applicable NAAQS and CAAQS. In addition, direct modeled concentrations resulting from production activities are below the applicable PSD Class II increments. Note that the emissions from well development activities would be temporary and would not consume PSD increment and, as a result, are excluded from increment comparisons.

**Table 14. Maximum Modeled Pollutant Concentration Impacts from Well Production Activities**

<i>Pollutant</i>	<i>Averaging Period</i>	<i>Direct Modeled (<math>\mu\text{g}/\text{m}^3</math>)</i>	<i>PSD Class II Increment (<math>\mu\text{g}/\text{m}^3</math>)</i>	<i>Background (<math>\mu\text{g}/\text{m}^3</math>)</i>	<i>Total Predicted (<math>\mu\text{g}/\text{m}^3</math>)</i>	<i>NAAQS (<math>\mu\text{g}/\text{m}^3</math>)</i>	<i>CAAQS (<math>\mu\text{g}/\text{m}^3</math>)</i>
CO	1-hour	17.9	--	1,145	1,162.90	40,000	40,000
	8-hour	5.6	--	1,145	1,150.60	10,000	10,000
NO <sub>2</sub>	1-hour	21	--	21	42	188	188
	Annual	1.6	25	1.9	3.5	100	100
SO <sub>2</sub>	1-hour	6.5	--	2.6	9.1	196	196
	3-hour	4.6	512	2.6	7.2	1,300	700
	24-hour	1.7	91	--	--	--	--
	Annual	0.4	20	--	--	--	--
PM <sub>10</sub>	24-hour	0.9	30	27	27.9	150	150
	Annual	0.3	17	--	--	--	--
PM <sub>2.5</sub>	24-hour	0.6	9	14	14.6	35	35
	Annual	0.3	4	3	3.3	12	12

Notes: PSD demonstrations are informational only and do not constitute a regulatory increment consumption analysis. Modeled highest second-high value shown for all short-term averaging periods, with the following exceptions:

- NO<sub>2</sub> 1-hour value is calculated as the 5-year average of the 8<sup>th</sup> highest daily maximum 1-hour concentrations.
- SO<sub>2</sub> 1-hour value is the maximum 1-hour concentration.

Although the form of the 1-hour NAAQS is a 3-year average, a 5-year averaging period is used herein following EPA guidance (EPA 2010) for 1-hour NO<sub>2</sub> modeling when using National Weather Service airport meteorological data in the analysis. For the 1-hour NO<sub>2</sub> NAAQS/CAAQS compliance demonstrations for well development activities (**Table 13**), the modeled NO<sub>2</sub> impact presented above represents a 5-year average of the eighth-highest daily maximum 1-hour concentrations from combined well production and well drilling and completion operations. The 5-year average eighth-highest daily maximum 1-hour NO<sub>2</sub> concentration was developed using the maximum eighth-highest daily maximum 1-hour concentrations from two years of drilling and completion operations, and from three years of well production activities at the two well pads.

Near-field HAP (benzene, toluene, ethyl benzene, xylenes, n-hexane, and formaldehyde) emissions from production operations were evaluated for purposes of assessing impacts in the immediate vicinity of the project area for both short-term (acute) exposure assessment and for calculation of long-term human health risk. Modeling was performed to estimate the maximum impacts that could occur from HAP emissions generated by production sources at the two eight-well pads. The maximum predicted acute HAP concentrations are below the threshold levels. The maximum modeled long-term (annual) HAP impacts are below the Reference Concentrations for Chronic Inhalation (RfCs). The long-term risks from benzene, ethyl benzene, and formaldehyde emissions resulting from field production emissions were

modeled. The estimated risk for both the most likely exposure and the maximum exposed individual scenarios are below a one-in-one-million cancer risk level.

Far-field modeling at Class I and sensitive Class II areas within 100 km of the project area was performed using the CALPUFF model to quantify potential air quality impacts to both ambient air concentrations and AQRVs from emissions of NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> expected to result from the Proposed Action. The analyzed Class I and sensitive Class II areas include the Class I Black Canyon of the Gunnison National Park, Flat Tops Wilderness, Maroon Bells-Snowmass Wilderness, and West Elk Wilderness, and the Class II Raggeds Wilderness and Colorado National Monument.

PSD Increment. As previously noted, the direct modeled concentrations of NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> at Class I and sensitive Class II areas are well below the PSD increments.

Visibility. The visibility analysis indicated that there are zero days predicted above the 0.5 delta-deciviews ( $\Delta dv$ ) threshold at any of the Class I and sensitive Class II areas. The maximum predicted visibility impact is 0.20  $\Delta dv$ , occurring at Colorado National Monument.

Deposition. At all Class I and sensitive Class II areas, the maximum direct total (wet and dry) N and S deposition is predicted to be well below the deposition analysis thresholds (DATs) established for both nitrogen and sulfur in western Class I areas (0.005 kg/ha-yr). The maximum predicted deposition impacts are predicted to occur at both the Flat Tops Wilderness Area and at Colorado National Monument, and are 0.0008 kg/ha-yr (N) and 0.000004 kg/ha-yr (S).

ANC. In addition, potential changes in ANC, resulting from potential N and S deposition from Proposed Action source emissions, were calculated for nine sensitive lakes within the Flat Tops, Maroon Bells-Snowmass, Raggeds, and West Elk wilderness areas. For all lakes, the estimated changes in ANC are all predicted to be less than the significance thresholds (Forest Service 2000). The estimated change in ANC is 0.002% at Avalanche Lake, 0.002% at Capitol Lake, 0.007% at Moon Lake, 0.022% at Lower Packtrail Pothole, 0.014% at Upper Packtrail Pothole, 0.017% at Ned Wilson Lake, and 0.002% at South Golden Lake (compared to the 10-percent threshold), and a 0.004  $\mu\text{eq/L}$  change at Deep Creek Lake and 0.007  $\mu\text{eq/L}$  change at Upper Ned Wilson Lake (compared to a 1.0  $\mu\text{eq/L}$  threshold for extremely sensitive lakes).

As part of the development of the project emission inventory, an inventory of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) emissions from field development and production activities was prepared. GHGs were not modeled in either the near-field or far-field impact analyses, but the GHG inventory is presented here for informational purposes. GHG emissions from the Proposed Action are quantitatively assessed and then compared to various scales (County, State, Federal) of GHG emissions from oil and gas production. This establishes a frame of reference for the reader to meaningfully analyze the potential impacts of the local-scale project at the global-scale of climate change.

In the Proposed Action emission inventory, emissions of the greenhouse gases CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O from new and existing sources are quantified in terms of CO<sub>2</sub> equivalents (CO<sub>2</sub>e). Measuring emissions in terms of CO<sub>2</sub>e allows for the comparison of emissions from different greenhouse gases based on their Global Warming Potential (GWP). GWP is defined as the cumulative radiative forcing of a gas over a specified time horizon relative to a reference gas resulting from the emission of a unit mass of gas. The reference gas is taken to be CO<sub>2</sub>. The CO<sub>2</sub>e emissions for a greenhouse gas are derived by multiplying its emissions by the associated GWP. The GWPs for the inventoried greenhouse gases are CO<sub>2</sub>:1, CH<sub>4</sub>:36, N<sub>2</sub>O:298 (Intergovernmental Panel on Climate Change [IPCC] 2013). Development and production emissions of GHGs (provided in units of metric tons per year) are shown in **Table 15**. The table also provides an estimate of the downstream GHG emissions (resulting from combustion of all project-produced natural gas at facilities and by activities not associated with the project and are not foreseeable

future actions). The downstream GHG emissions are estimated assuming an average annual natural gas production rate of 8.5 bcf per year (170 bcf produced over a 20-year LOP).

**Table 15. GHG Emissions**

Pollutant	GWP	Development Emissions (metric tons/year)	Production Emissions (metric tons/year)	Downstream Emissions (metric tons/year)
CO <sub>2</sub>	1	13,239	11,684	430,550
CH <sub>4</sub>	36	1.8	84.8	8.1
N <sub>2</sub> O	298	0.11	0.02	0.81
CO <sub>2</sub> e (total)		13,338	14,744	431,084

According to the U.S. Global Change Research Program (2009), global warming is unequivocal, and the global warming that has occurred over the past 50 years is primarily human-caused. Changes in global temperatures and climate vary significantly with time, and are subject to a wide range of driving factors and complex interrelationships. Research on climate change impacts is an emerging and rapidly evolving area of science but, given the lack of adequate analysis methods, it is not possible to identify specific local, regional, or global climate change impacts based on potential GHG emissions from any specific project's incremental contributions to the global GHG burden. Moreover, specific levels of significance have not yet been established by regulatory agencies. Therefore, climate change analysis for the purpose of this analysis is limited to accounting for GHG emissions that would contribute incrementally to climate change and the potential effects previously discussed in the Affected Environment.

The maximum GHG emissions resulting from the Proposed Action's development and production activities are estimated at approximately 28,082 metric tons per year (0.028 million metric tons [MMT]) of CO<sub>2</sub>e (**Table 15**). To place the project GHG emissions in context, the calculated GHG emissions in year 2015 from oil and gas production in Mesa County and the State of Colorado were approximately 1.77 MMT and 145.2 MMT of CO<sub>2</sub>e, respectively (COGCC 2018, Office of Natural Resources Revenue [ONRR] 2017, EPA 2014c, and IPCC 2013). Thus, the Proposed Action's maximum GHG emissions from development and production would be approximately 1.6% of Mesa County's and 0.02% of Colorado's oil and gas production emissions. In addition, 0.028 MMT is approximately equivalent to 0.001% of the total 2015 U.S. calculated CO<sub>2</sub>e emissions from oil and gas production, 3,284 MMT. Predicting the degree of impact any single emitter of GHGs may have on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. Consequently, the controversy relates to the extent that GHG emissions resulting from continued oil and gas development may contribute to global climate change, as well as the accompanying physical changes to natural systems that cannot be quantified or predicted. The degree to which any observable changes can, or would, be attributable to the Proposed Action cannot be predicted at this time.

As shown in **Table 15**, the maximum annual downstream CO<sub>2</sub>e emissions are estimated at approximately 431,084 metric tons per year (0.431 MMT). These maximum annual downstream CO<sub>2</sub>e emissions would be comparable to the following 2015 oil and gas production emissions: 24% of Mesa County, 0.3% of Colorado, and 0.01% of total U.S. (COGCC 2018, ONRR 2017, EPA 2014c, and IPCC 2013). These downstream GHG emissions effects are included in the analysis described above, along with a discussion on potential climate change impacts at the national, regional, and state levels.

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and gathering pipelines would be approved, but 12 Federal wells currently on the six existing well pads would continue

to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, impacts to air quality from continued operation of the existing wells would be expected to continue.

### **3.3 CULTURAL RESOURCES**

#### **Affected Environment**

The BLM manages cultural resources on public land in accordance with the Antiquities Act of 1906, National Historic Preservation Act (NHPA) of 1966, Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, the Archaeological Resources Protection Act of 1979, and various other laws and Executive Orders (EOs). The management process is also governed by the Colorado BLM's Protocol with the State Historic Preservation Officer (SHPO), implementing BLM's National Programmatic Agreement with the Advisory Council on Historic Preservation. Section 106 of the NHPA applies to consideration of the presence of and effect to cultural resources on both public and private land in the area of potential effect (APE).

In June 2016, Grand River Institute (GRI) completed a literature review and Class III (intensive) cultural resources inventory of four proposed well pads (two well pads have been dropped from the proposal) and related linear routes for the HDMDP under BLM Antiquities Permit No. C-52775 (Connor 2016). The inventory project consisted of 40-acre blocks for the proposed well pads, although due to project revisions, larger areas were ultimately inventoried (295 block acres), and 200 foot-wide corridors for approximately 3.85 miles of linear routes (93 acres) for a total of 388 acres (347 acres on BLM surface land and 41 acres on private surface land).

Due to the on-going revisions, pre-field meetings and files searches occurred on December 7, 2014; January 8, 2015; May 2, 2016. Fieldwork was performed variously between the February 7 and March 26, 2015, and then again on May 4, 2016. Literature reviews of known cultural resources in the project area were made through the BLM GJFO and the Colorado Historical Society's Office of Archaeology and Historic Preservation (OAHP).

The files searches indicated that three sites (5ME1216, 5ME6484, and 5ME6485) were previously recorded within the study areas and were reevaluated as part of this inventory. Of these, the latter two are field evaluated as eligible and the former is evaluated as not eligible. In addition, four sites (5GF5109, 5GF5110, 5GF5111, and 5ME21166) and six isolated finds (5GF5118, 5ME21167, 5ME21168, 5ME21169, 5ME21175, and 5ME21176) were newly recorded.

Because two of the initially proposed four well pads have been dropped from the proposal at this time, only sites 5GF5109, 5GF5110, and 5GF5111 are located in the vicinity of the Proposed Action, near proposed well pad HDU 5-34. Newly recorded site 5GF5109 is field evaluated as eligible and sites 5GF5110 and 5GF5111 are evaluated as not eligible, because they are isolated finds.

#### **Environmental Consequences**

##### **Proposed Action**

The site recommended as eligible (Site 5GF5109) is located outside of the proposed disturbance area for HDU 5-34 by 300 meters and therefore, no further work is recommended. The site would be preserved and protected through avoidance. No further work is recommended for those evaluated as not eligible (sites 5GF5110 and 5GF5111).

An informational letter was sent to the SHPO on March 29, 2017, with a "no adverse effect" recommendation. The SHPO agreed to the "no adverse effect" recommendation.



### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and gathering pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. In addition, existing impacts related to unauthorized collection or damage from other activities or resource uses would continue.

## **3.4 ENVIRONMENTAL JUSTICE**

### Affected Environment

Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of programs, policies, and activities on minority and low-income populations. The EPA, which has lead responsibility for implementing the executive order, identifies minority populations as being members of one of the following racial groups: Black/African-American, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islanders, “other” races, or multi-racial (EPA 1998). The Census Bureau defines low-income populations as individuals whose income during the previous 12 months fell below the poverty level (Census Bureau 2017a).

The project area straddles the border between Mesa and Garfield counties, and is located in Mesa County’s De Beque Census County Division (CCD) and Garfield County’s West Garfield CCD. According to the Census Bureau’s 2012 – 2016 American Community Survey, in 2016 racial minorities comprised 16% of Colorado’s population, 13% of Garfield County’s population, 6% of Mesa County’s population, 8% of West Garfield CCD’s population, and 2% of De Beque CCD’s population. As a portion of the total population, persons of Hispanic origin, who may be of any race, comprised 21% in Colorado, 28% in Garfield County and the West Garfield CCD, 14% in Mesa County, and 6% in the De Beque CCD (Census Bureau 2017b).

According to the Census Bureau’s Small Area Income and Poverty Estimates (SAIPE) program, in 2016 low-income individuals accounted for 12% of Colorado’s population, 10% of Garfield County’s population, and 14% of Mesa County’s population. Data on low-income populations are not available for the De Beque or West Garfield CCDs (Census Bureau 2017a).

### Environmental Consequences

#### Proposed Action

The EPA recommends that the potential for environmental justice effects be determined by 1) identifying the presence of minority and/or low-income populations in the affected community, and 2) evaluating the likelihood that the environmental impacts will fall disproportionately on minority and/or low-income members of the community (EPA 1998). Because the project area contains lower portions of racial and ethnic minorities than state and county reference populations, the Proposed Action is not expected to result in disproportionately high and adverse human health or environmental impacts on minority populations.

Compared to the state, low-income individuals comprise a lower portion of Garfield County’s population and a higher portion of Mesa County’s population. Although the Census Bureau does not estimate low-income populations at the CCD level for the relevant timeframe, the SAIPE program estimates children in poverty by school district. The project area is in De Beque School District (SD) 49-JT. In 2016 the% of children aged 5 to 17 in families in poverty was estimated to be 12.8% in Colorado, 12.1% in Garfield County, 16.1% in Mesa County, and 8.9% in De Beque SD 49-JT (Census Bureau 2018a). The percentage of children in poverty in the project area is lower than the reference populations in the state

and Garfield and Mesa counties. Therefore, the Proposed Action is not expected to have disproportionate impacts on low-income populations.

#### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated access roads and gathering pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, impacts associated with current operations would continue.

### **3.5 FIRE AND FUELS**

#### **Affected Environment**

The GJFO manages wildland fire using a multidisciplinary approach under the guidelines found in two sets of interagency frameworks: the broader, directive Guidance for Implementation of Federal Wildland Fire Management Policy (Fire Executive Council 2009) and the regional GJFO/Colorado National Monument Interagency Fire Management Plan (IFMP) (BLM 2008b). GJFO wildland fire and fuels management reflects a consideration of fire history, land status, public concerns and issues and other resource objectives (BLM 2008b), which is used to classify an area in a Fire Management Unit (FMU).

The majority of the Homer Deep Unit is classified as FMU B, including the Proposed Action, where unplanned wildland fire is not desired because of current resource conditions, and fire suppression is usually aggressive. Fire and non-fire fuels treatments are utilized as the major mitigating techniques to reduce potential effects of unplanned fire. Generally, fire plays a natural role in the ecosystem in Category B FMUs, but unplanned fire could have negative effects on certain resources (e.g., sagebrush ecosystems, air quality, wildlife), or be constrained by social issues (BLM 2008b). The proposed project occurs within the Upper De Beque FMU.

#### **Environmental Consequences**

##### Proposed Action

Construction and operation of the Proposed Action could increase the risk of wildland fire in the Upper De Beque FMU due to ignition threats from workers and heavy equipment, especially in dry conditions during summer months and where cheatgrass is prevalent. Reestablishment of native and desirable grasses and forbs during interim and final reclamation could reduce the threat of fire-prone, non-native species dominating the disturbed areas. Control of weeds, especially cheatgrass, is essential to fire and fuels management.

The operator would implement measures outlined in its Fire Management Plan. The Plan identifies measures to be taken by the operator and its contractor(s) to ensure that fire prevention and suppression techniques are carried out in accordance with Federal, State, and local regulations during construction, operation, and abandonment of the project to avoid fire and ensure public safety. In the event of a fire, the proposed project would not conflict with the Category B FMU management objectives detailed above.

##### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and gathering pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private. Impacts from continued operation of the existing wells and other resource uses would be expected to continue.

### 3.6 FOSSIL RESOURCES

#### **Affected Environment**

Paleontological (fossil) resources include the remains or traces of any prehistoric organism preserved by natural processes in the earth's crust. BLM manages paleontological resources for their scientific, educational, and recreational values in compliance with the Paleontological Resources Preservation Act (PRPA) of 2009. The PRPA affirms the authority for many policies the BLM has for managing resources, such as issuing permits for collecting and curating paleontological resources, and confidentiality of their locations. The law also defines prohibited acts, such as damaging or defacing paleontological resources, and establishes both criminal and civil penalties.

BLM classifies geologic formations to indicate the likelihood of significant fossil occurrence (usually vertebrate fossils of scientific interest) according to the Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands (BLM 2007). These classifications, Classes 1-5, determine the procedures to be followed prior to granting a paleontological clearance to proceed with a project.

A paleontological field survey was conducted for the proposed well pad and roads/pipelines on September 19, 2016 by Uinta Paleontological Associates Inc. (Bilbey et al. 2016).

The predominant bedrock formation present at or near the surface within the project area is the Wasatch Formation. It is overlain by areas of Quaternary gravels and earthflow deposits. Occurring in varying thicknesses, these Quaternary sediments are considered Potential Fossil Yield Classification Class 2, defined as having a low probability of fossil occurrence. Class 2 geologic units are not likely to contain vertebrate or scientifically significant invertebrate fossils.

The Wasatch Formation is considered a BLM Condition 5 formation, defined as an area that is known to contain vertebrate fossils or noteworthy occurrences of invertebrate fossils. These types of fossils are known to occur or have been documented, but may vary in occurrence and predictability. The Wasatch Formation is divided into the early Eocene Shire, and the Paleocene Molina and Atwell Gulch members.

All members of the Wasatch Formation contain vertebrate fossils in varying abundances (Murphy and Daitch 2007). Rocks of the Wasatch Formation are lithologically similar throughout the Piceance Creek Basin as heterogeneous continental fluvial deposits with interfingering channel sandstone beds and overbank deposits consisting of variegated claystone, mudstone, and siltstone beds (Franczyk et al. 1990). Eocene mammals have been found in the lower part of the Shire member.

Fossils historically identified in the Wasatch are archaic mammals—including marsupials, representatives of two extinct orders of early mammals (pantodonts and creodonts), artiodactyls (deer-like even-toed ungulates), ancestral horses and other perissodactyls (odd-toed ungulates), carnivores, and primates—as well as birds, lizards, turtles, crocodylians, gars and other fishes, freshwater clams, gastropods (snails), and other invertebrates (BLM 1999).

#### **Environmental Consequences**

##### **Proposed Action**

The locations of pads, access roads, and gathering pipelines are primarily located in the Wasatch Formation. Although mapped as the predominant bedrock formation of the project area, field inspection revealed the Wasatch Formation exposed only in a few outcrops. Most of the project impacts occur on thick Quaternary deposits. The thickness of the Quaternary sediments cannot be accurately determined, but construction activities have the potential to affect adversely any important fossils present in the underlying Wasatch Formation. The greatest potential for impacts is associated with excavation of

shallow bedrock that may be unearthed during well pad and gathering pipeline construction. In general, alluvium, colluvium, and other unconsolidated sediments are much less likely than bedrock to contain well-preserved fossils.

Although disturbance is proposed in an area where bedrock exposures are uncommon, surface-disturbing activities, and increased human access could produce unexpected discoveries and potential paleontological resource damage. Direct impacts could include damage or destruction during construction, with subsequent loss of information. Indirect impacts could include fossil damage or destruction by erosion due to surface disturbance. The greatest potential for impacts would be associated with surface and shallow bedrock disturbance.

Significant fossil resources are not likely to be impacted by ground disturbance. One fossil (5GF5324) was found on the proposed HDU 5-34 well pad, but the fossil is probably not indicative of fossils that might be found in the areas because it is a float from much higher in the section. No fossils were found in areas proposed for disturbance of the HDU 13-21-99 well pad. No outcrops of the Wasatch Formation were noted in the alluvial surface of the pads or the access roads/gathering pipelines. However, if a potentially significant fossil resource is discovered during ground disturbance, the BLM would be notified (see COA in **Appendix A**).

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and gathering pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, existing impacts related to ongoing oil and gas activities and to unauthorized collection or damage from other activities or resource uses, would continue.

**3.7 GEOLOGY**

**Affected Environment**

The HDMDP project area is located within the southern Piceance Basin, a broad, elongate structural basin located in the eastern portion of the Colorado Plateau. The basin is highly asymmetrical and deepest along its eastern side near the White River Uplift, where more than 20,000 feet of sedimentary rocks are present. Surface exposures in the project area are primarily sedimentary rocks of the Cretaceous Hunter Canyon Formation and the Tertiary Wasatch and Ohio Creek Formations. The youngest deposits in the area consist of Quaternary alluvium dating. The proposed project disturbance be located on shales, sandstone, claystone, and siltstone of the bedrock units and areas of Quaternary alluvium (**Table 16**).

**Table 16. Surficial Geologic Formations in the Project Area**

<i>Map Symbol</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>General Location</i>
Qal	Quaternary Alluvium	Holocene	Boulder- to clay-sized alluvial deposits	HDU 5-34 well pad HDU 5-34 road and pipeline
Two	Wasatch and Ohio Creek Formations	Eocene and Paleocene	Claystone, siltstone, shale, and sandstone	HDU 5-34 well pad HDU 13-21-99 well pad HDU 13-21-99 road and pipeline
Source: Hail and Smith 1997				

**Environmental Consequences**

*Proposed Action*

If the proposed wells are proven feasible, initial production rates would be expected to be highest during the first few years of production, then decline during the remainder of the economic lives of the wells. In 2016, the U.S. Geological Survey (USGS) completed a geology-based assessment of the continuous (unconventional) oil and gas resources in the Late Cretaceous Mancos Shale within the Piceance Basin (Hawkins et al. 2016). A previous USGS assessment conducted in 2003 (U.S. Geological Survey Uinta-Piceance Assessment Team 2003) was updated after more than 2,000 wells were drilled and completed in one or more intervals within the Mancos Shale of the Piceance Basin (IHS Energy Group 2015). The USGS estimated mean volumes of 66.3 trillion cubic feet of gas, 74 million barrels of oil, and 45 million barrels of natural gas liquids in the Mancos/Mowry Total Petroleum System (Hawkins et al. 2016). The integrated application of new technologies turned the Mancos Shale into a profitable play.

Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mancos Shale in this area, an action that would be consistent with BLM objectives for mineral production. Hydraulic fracturing would be utilized to create fractures within the formation to allow gas production from the wells. In recent years, public concern has been voiced regard potential impacts of hydraulic fracturing from “micro-earthquakes” and from contamination of freshwater aquifers. Potential impacts of hydraulic fracturing are addressed in the section on Water Resources (**Section 3.20**).

*No Action Alternative*

Under No Action Alternative, none of the proposed 16 wells and associated roads and gathering pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, impacts to geologic and other mineral resources from continued operation of the existing wells and other ongoing activities would be expected to continue.

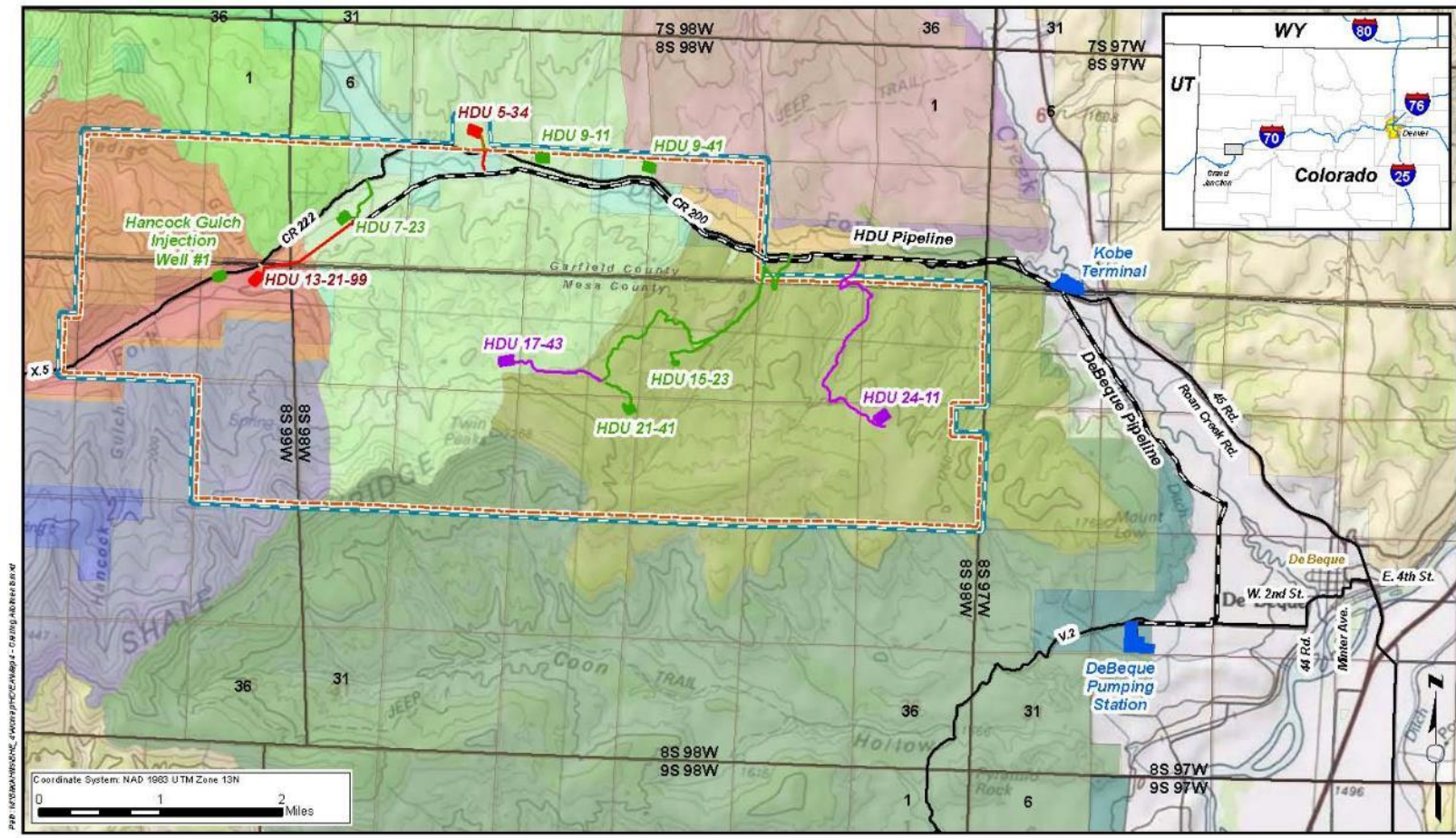
**3.8 GRAZING AND RANGELAND MANAGEMENT**

**Affected Environment**

The Proposed Action would result in disturbance in two of the five grazing allotments in the project vicinity. These two—Dry Fork and West Spears—cover approximately 21,432 acres and are permitted for 1,025 Animal Unit Months (AUMs) (**Table 17**). **Map 4** shows the location of the allotments.

**Table 17. BLM Cattle Grazing Allotments Coinciding with the Project Area**

<i>Allotment</i>	<i>Public Acres</i>	<i>Private Acres</i>	<i>AUMs</i>	<i>Period of Use</i>
Dry Fork (6715)	14,152	2,423	57	3/01—4/15
			152	4/16-6/15
			166	6/16-9/30
			189	10/1-2/28
West Spears (6753)	7,280	4,135	323	5/01—6/13
			148	11/01—12/15
<b>Total</b>	<b>21,432</b>	<b>6,558</b>	<b>1,035</b>	
Source: Price 2017.				



- Legend**
- Unit Boundary
  - Project Area Boundary
  - County Road
  - Existing Well Pad
  - Existing Resource Road/Gathering Lines
  - Existing Facilities
  - Existing Pipeline
  - Approved Well Pad - BHDEP 2013
  - Approved Resource Road/Gathering Lines
  - Proposed Well Pad
  - Proposed Upgraded Road / Gathering Lines
  - Proposed New Road
  - Proposed New Gathering Lines
- Grazing Allotments**
- Allotment Name**
- Brnk Pedigo Gulch
  - Coon Hollow Common
  - Dry Fork
  - Homestead
  - Kuhlman
  - North East Spear
  - South East Spear
  - West Spears

Homer Deep Master Development Plan  
 Grazing Allotments  
 Map 4



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This project was developed through digital means and may be updated without notice.



AUMs are calculated by the amount of forage necessary to sustain one cow/calf pair, or equivalent, for one month. The grazing allotments encompass both public and private lands, but only public lands are included in determining active AUMs. Range improvements in the area include corrals, trails, and retention ponds.

### **Environmental Consequences**

#### *Proposed Action*

Impacts to grazing resources under the Proposed Action would take place mostly from temporary removal of forage across the two grazing allotments. Surface disturbance would occur on approximately 21 acres within the two grazing allotments (9.54 acres in the Dry Fork Allotment and 11.49 acres in the West Spears Allotment).

Approximately 7.8 acres would be reclaimed after access road and gathering line construction and approximately 7.93 acres would be reclaimed once the last wells are drilled on the pads leaving long-term disturbance of 5.31 acres (**Table 6**). Well pads would be fenced to BLM standards to exclude grazing livestock for the first two growing seasons, or until seeded species are firmly established, whichever comes later. If reclamation succeeds in these areas, grasses and forbs would be expected to provide forage within about 2 to 3 years after reclamation.

With potential livestock use along the gathering pipeline rights-of-ways, reclamation success would be expected to require some additional years to achieve success, including multiple treatment of weeds and, when necessary, reseeding of unsuccessful areas. The total disturbed acreage would have an immeasurably small impact on the total acres within the grazing allotments.

BLM-permitted cattle grazing would continue throughout the duration of the Proposed Action. In addition to the minor loss of forage, increased vehicle traffic would increase the risk of injury or death to grazing cattle that may use the project area, as well as proposed access to the project area during construction. A COA in **Appendix A** would limit project-related vehicular travel along the proposed pipeline corridor to 20 mph or less and should reduce potential impacts to grazing cattle. None of the range improvements in the HDMDP project area would be impacted by the Proposed Action.

#### *No Action Alternative*

Under the No Action Alternative, none of the proposed 16 wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, impacts to grazing and rangeland management from continued operation of the existing wells and other ongoing activities would continue.

### **3.9 INVASIVE NON-NATIVE SPECIES**

#### **Affected Environment**

State-listed noxious weeds are designated by the Colorado Department of Agriculture and management of these weeds is regulated under the Colorado Noxious Weed Act, Title 35, Article 5.5. Biological surveys were completed within the project area from April to August 2014, 2015, and 2016, which also included an inventory for noxious weeds (WestWater Engineering 2016). Existing well pads, pipeline reclaimed disturbances, and roads occur in the project area BLM lands and private lands. Ten state listed noxious weeds and non-native nuisance plants have become established in the area along areas of previous disturbance. Noxious weeds in the project area are described in **Table 18** (WestWater Engineering 2016).

**Table 18. State Listed Noxious Weed Observations within the HDMDP Project Area**

<i>Common Name</i>	<i>Scientific Name</i>	<i>State Listing Status</i>	<i>Location description</i>
Bulbous bluegrass	<i>Poa bulbosa</i>	C List	Scattered throughout project area.
Common mullein	<i>Verbascum thapsus</i>	C List	Scattered near the proposed HDU 13-21-99 well pad.
Cheatgrass	<i>Bromus tectorum</i>	C List	Scattered throughout project area.
Diffuse knapweed	<i>Centaurea diffusa</i>	B List	Isolated occurrence near the terminus of the proposed HDU 13-21-99 pipeline.
Halogeton	<i>Halogeton glomeratus</i>	C List	Scattered throughout project area on disturbed sites.
Jointed goatgrass	<i>Aegilops cylindrica</i>	B List	Scattered along access roads and pipeline alignments throughout project area.
Plumeless thistle	<i>Carduus acanthoides</i>	B List	Isolated occurrence near the proposed HDU 13-21-99 well pad.
Redstem filaree	<i>Erodium cicutarium</i>	C List	Scattered throughout project area.
Tamarisk	<i>Tamarix ramosissima</i>	B List	Scattered throughout project area along intermittent and perennial drainages.
Whitetop	<i>Cardaria draba</i>	B List	Isolated occurrences near the proposed HDU 13-21-99 pipeline and HDU 5-34 well pad.
Sources: WestWater Engineering 2016, Colorado Department of Agriculture 2017			

Additional problematic non-native problematic plant species not listed by the State of Colorado or Garfield County but observed in the project area included prickly prostrate knotweed (*Polygonum aviculare*), and burningbush (*Bassia scoparia*), flixweed sophia (*Descurainia sophia*), and Russian-thistle (*Salsola tragus*) (WestWater Engineering 2016).

**HDU 13-21-99 Well Pad and Access Road.** Common mullein, jointed goatgrass, musk thistle, plumeless thistle, halogeton, tamarisk, whitetop, cheatgrass, bulbous bluegrass, and redstem filaree are scattered throughout the sagebrush shrublands understory within 100 meters of the proposed HDU 13-21-99 well pad location.

**HDU 13-21-99 Pipeline.** Tamarisk is located along the banks of South Dry Fork within 100 meters of the proposed pipeline alignment and near the pipeline crossing of South Dry Fork. In addition to tamarisk, there is also common mullein, jointed goatgrass, musk thistle, whitetop, halogeton, and diffuse knapweed scattered along existing disturbances near the proposed pipeline alignment.

**HDU 5-34 Well Pad, Access Road, and Pipeline.** One isolated occurrence of whitetop was observed within 100 meters of the north edge of the proposed well pad. There is also an occurrence of tamarisk along the banks of Dry Fork south of the associated access road and proposed pipeline alignment.



## **Environmental Consequences**

### *Proposed Action*

The Proposed Action would be located in an area with existing roads, active oil and gas development, as well as livestock and wildlife use. As a result, weed infestations are present in the project area (see **Table 18**, above). Linear disturbances, such as roads, provide corridors of connected habitat along which invasive plants can easily spread (Gelbard and Belnap 2003). Well pad construction, subsequent drilling and operations activities, road improvement, and installation of pipelines require construction equipment and motorized vehicles, which often transport invasive plant seeds and deposit them in disturbed habitats along access roads and at well pad sites (Zwaenepoel et al. 2006). Clearing native vegetation and exposing bare ground surfaces, especially within closed canopy big sagebrush shrub communities, allows invasive species, particularly annuals, to become established at the expense of perennial bunchgrasses (West 1988). Surface disturbance, vehicle traffic, equipment placement and operation, foot traffic, and other activities associated with the Proposed Action could increase the distributions of established weed species and/or could introduce new invasive species into areas not currently infested.

To minimize the potential for disturbed areas to be infested with noxious weeds and other invasive species, the operator would ensure timely reclamation of disturbed areas. Disturbance resulting from gathering pipeline installation and access road construction would be reclaimed and revegetated at the time of construction using certified weed-free native seed mix approved by the BLM or private landowner. Interim reclamation at well pads would occur within 30 days of well pad construction; additional interim reclamation would occur on well pads within 6 months following the last well completion. To mitigate the invasive species risk, noxious weed infestations would be treated prior to project construction and the standard weed control COA would be attached to APDs to require periodic monitoring and weed control practices to ensure that weedy plant species are controlled (**Appendix A**).

### *No Action Alternative*

Under the No Action Alternative, none of the proposed 16 wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, impacts from invasive non-native plant species resulting from continued operation of the existing wells and other such as recreation and grazing would continue.

## **3.10 NATIVE AMERICAN RELIGIOUS CONCERNS**

### **Affected Environment**

The proposed HDMDP project is located within a larger area identified by the Ute Tribes as part of their ancestral homeland. A cultural resource inventory specific to this project was completed in addition to a number of previous inventories (**Section 3.3**, Cultural Resources) were conducted to determine if there were any areas that might be culturally sensitive to Native Americans. Although numerous cultural resources were identified in this and prior inventories; no historic properties are currently known to be located in the project's APE.

## **Environmental Consequences**

### *Proposed Action*

No areas were identified during the inventories and none are currently known within the proposed HDMDP project area. The Ute Tribe was notified of the project via letter sent on March 30, 2017, and there has been no response. Although the Proposed Action would have no direct impacts, increased

access and personnel at the site could indirectly impact previously unidentified Native American resources ranging from illegal collection to vandalism.

The NHPA requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the BLM notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).

Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act. The operator would notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project implementation. A standard Education/Discovery COA for the protection of Native American values would be attached to the ROW Agreement (see **Appendix A**). The importance of these COAs would be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered. The operator and its contractors would be made aware of the requirements under the NAGPRA.

#### No Action Alternative

Under the No Action Alternative, none of the proposed 16 wells and associated roads and gathering pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, no project-related impacts affecting Native American religious concerns from implementation of the Proposed Action would occur. Potential impacts due to vandalism or accidental disturbance of previously unidentified cultural resources would be reduced compared to the Proposed Action but not eliminated.

### **3.11 NOISE**

#### **Affected Environment**

The project area is located about 8 to 10 air-miles northwest of the town of De Beque and about 16 to 18 air-miles southwest of the town of Parachute in a rural setting characterized by oil and gas development, wildlife habitat, ranching, recreation, and sparse residences. Noise levels in the area are generally created by traffic on rural roads and by activities associated with oil and gas development, the latter primarily during construction, drilling, and completion activities. The nearest residence is located approximately 2,000 feet southwest of the HDU 5-34 pad. The property is owned by High Lonesome Ranch. Additionally, the main ranch house and horse barns are approximately 2,000 feet northeast of the gathering pipeline for the HDU 13-21-99 pad. The fishing ponds used by visitors to the ranch are more than 1 mile east of the proposed HDU 5-34 pad, along North Dry Fork Road.

Noise, generally described as unwanted sound, may be measured with an A-weighted decibel (dBA) scale. The decibel scale is logarithmic, not linear, because the range of sound that can be detected by the human ear is so great that it is convenient to compress the scale. A dBA scale accounts for the lesser sensitivity of the human ear to low and high frequencies, which are in turn weighted less on the dBA scale than on the standard dB scale. Each 10-unit increase in dBA increases sound intensity by a factor of 10.

Sound levels have been calculated for areas with typical land uses and population densities. In rural areas, ambient sound levels are typically 30 to 40 dBA (EPA 1974, Harris 1991). As a basis for comparison, the sound level of a normal conversation between two people 5 feet apart is 60 dBA.

**Environmental Consequences**

*Proposed Action*

The Proposed Action would increase the frequency of noise. Noise levels would increase during construction activities, well drilling and completions, and periodic maintenance activities. The noise would be most noticeable along the roads used to haul equipment and at the pad locations.

Drilling, completion, and operation of oil and gas wells and production facilities are subject to COGCC noise control regulations (COGCC 2014). Oil and gas operations at any well site, production facility, or gas facility are to comply with COGCC maximum permissible noise levels (**Table 19**) at a distance of 350 feet from the noise source. During the daytime, noise levels may be increased 10 dBA for a period not to exceed 15 minutes in any 1-hour period. The allowable noise level for periodic, impulsive, or shrill noises is reduced by 5 dBA from the levels shown. Operations involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, and workover rig are subject to the maximum permissible noise levels for industrial zones.

**Table 19. COGCC Maximum Permissible Noise Levels**

<i>Zone</i>	<i>Noise Level at 350 feet from the Source (dBA)</i>	
	<i>Daytime (7:00 A.M. to 7:00 P.M.)</i>	<i>Nighttime (7:00 P.M. to 7:00 A.M.)</i>
Residential/Agricultural/Rural	55	50
Light Industrial	70	65
Industrial	80	75
Source: COCGG 2014.		

Based on the location of the project activities and current activities in the area, the light industrial standard is applicable. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown (COGCC 2014).

Short-term increases in noise levels would characterize the pipeline, road, and well pad construction. Based on the Inverse Square Law of Noise Propagation (Harris 1991), the typical noise level for construction sites is about 68 dBA at 350 feet (**Table 20**). Project-related noise levels would be approximately 59 dBA at a distance of 1,000 feet, approximating active commercial areas (EPA 1974).

Using this information, anticipated noise levels for the project would meet the noise standards for daytime operations (defined as 7:00 a.m. to 7:00 p.m.) in the light industrial zone at a distance of 350 feet (**Tables 19 and 20**). At a distance of 2,000 feet (the distance to the nearest residence), the anticipated levels would approximate the daytime standard for the residential/agricultural/rural zone.

Traffic noise would be elevated with implementation of the Proposed Action. The greatest increase would be along access roads during the drilling and completion phases. To minimize truck traffic, the project would use existing water line systems to transport water. Based on La Plata County data presented in **Table 20**, approximately 71 dBA of noise (at 350 feet) would be created by each fuel and water truck. Less noise would be created by smaller trucks and passenger vehicles, such as pickup trucks and sport utility vehicles. Although the duration of increased noise from this source would be short, it would occur repeatedly during the drilling and completion phases. **Appendix A** lists COAs intended to reduce noise impacts from heavy truck use and the operation of machinery

**Table 20. Noise Levels at Typical Construction Sites and along Access Roads**

Zone	Noise Level (dBA)		
	50 feet	350 feet	1,000 feet
Air Compressor, Concrete Pump	82	65	56
Backhoe	85	68	59
Bulldozer	89	72	63
Crane	88	71	62
Front End Loader	83	66	57
Heavy Truck	88	71	62
Motor Grader	85	68	59
Road Scraper	87	70	61
Tractor, Vibrator/Roller	80	63	54

Source: BLM 1999; La Plata County 2002.

Noise impacts would decrease during the production phase but would remain as background noise. During maintenance and well workover operations, noise levels would temporarily increase above those associated with routine well production.

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related noise impacts from activities described above for the Proposed Action would occur. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

**3.12 REALTY AUTHORIZATIONS**

**Affected Environment**

The project area contains numerous existing realty authorizations (**Table 21**). These include eight Federal oil and gas leases, one communication agreement covering gas production in Cameo Formation, and two units (the Homer Deep Unit and the South Shale Ridge Unit). Quest Corporation holds a BLM ROW for a buried telephone pipeline. One right-of-way, issued to #10 Enterprises, is for an access road to the High Lonesome Ranch private property. Grand Valley Power holds a 2.88-mile powerline ROW that services the existing HDU 7-23 pad. Other authorizations associated with oil and gas development in the area include a saltwater disposal well, geophysical exploration ROW, gathering pipelines, and water disposal lines.

**Environmental Consequences**

Proposed Action

**Table 5** lists the five ROWs to be issued for the Proposed Action to authorize the development of 16 wells being drilled into underlying Federal mineral leases. Separate ROWs would be issued to the

operator for the well pad, access road, and water gathering line; a fourth ROW would be issued to RRG for the natural gas gathering line (RRG). The fifth ROW would also be issued to RRG for the natural gas pipeline from the HDU Pipelines to the HDU 13-21-99 pad. Potential impacts to any of the existing BLM rights-of-way (ROWs) listed in **Table 21** by the lease operations or ROWs would be mitigated based on written maintenance and use agreements between the operator and existing ROW holders.

**Table 21. Existing Realty Authorizations within the Project Area (T8S, R98W, Sections 5, 7, 8, and 18, and T8S, R99W, Section 13, 6<sup>th</sup> P.M.)**

<i>Oil and Gas Leases, Communitization Agreements (CAs) and Federal Units</i>	<i>Access Road</i>	<i>Powerline</i>	<i>Pipeline</i>	<i>Telephone Line</i>
<u>Leases</u> COC012733A – BHPP (LE) COC012736 – BHPP (LE) COC012747 – BHPP (LE) COC014176 – BHPP (LE) COC052686 – BHPP (LE) COC011355 – BHPP (LE) COC052679 – BHPP (LE) COC067159 – Maralex  COC075184 – Noble Energy – Geophysical Exploration #D Survey  <u>Communitization Agreement</u> COC068914 – Maralex Resources Inc., Cameo Formation  <u>Units</u> COC72921X – BHPP (LE), Homer Deep Unit  COC052113X – Maralex Resources Inc., South Shale Ridge Unit	COC068207 – #10 Enterprises (HLR)	COC040192 – Grand Valley Power	COC031840 – RRG  COC034241 – RRG  COC050792 – BHPP (LE)  COC074158 – BHPP - Saltwater Disposal  COC076368 – RRG  COC077205 – RRG	COC038537 – Qwest Corp.
Source: BLM 2018b.				

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts to existing ROW holders and other authorized users from activities described above for the Proposed Action would occur. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

### 3.13 RECREATION

#### **Affected Environment**

The project would be located in an area of rugged terrain interspersed with elements of existing natural gas development. There are no developed BLM recreational facilities, such as campgrounds or picnic areas, within the HDMDP project area.

Much of the project area provides visitors with opportunities for varied forms of dispersed recreation including hunting, off-highway vehicle (OHV) use, camping, fishing, and occasional mountain biking. Multiple area ranchers and outfitters operate recreation-based businesses that host activities within the project area. Such activities include hunting, fishing, horseback riding, guest-ranching, lodging, banquets, and other events. Scenic auto-touring occurs throughout the project area.

Colorado Parks and Wildlife (CPW) Game Management Unit (GMU) 31 encompasses the project area, where hunting is seasonally available for mule deer and elk in the project area (**Section 3.21**). A substantial number of hunters spend time pursuing mule deer and elk within GMU 31. In 2016 for example, 543 mule deer hunters each spent an average of 4.7 days and 1,694 elk hunters spent 4.7 recreation days hunting in GMU 31 (CPW 2017b). The hunting season in GMU 31 generally runs from the end of mid-August through mid-November.

#### **Environmental Consequences**

##### *Proposed Action*

Impacts to recreation could result from increased light and heavy traffic on area roads, human activity, noise, nighttime lighting, and dust. Construction and production activities could displace game species in some areas, depending on levels of human activities as well as forage and cover opportunities. The Proposed Action would occur in an area where existing oil and gas development is scattered throughout the region. Because existing and proposed well pads and other facilities are relatively dispersed, impacts to hunting, guest-ranching, outfitting, fishing, and other dispersed recreation during construction and drilling may be seasonal and/or relatively short-term, but similar to current effects.

Indirect impacts to area recreationists would be temporary and could include diminished hunting and wildlife viewing opportunities due to potential wildlife displacement caused by oil and gas operations. Alternative design features of HDU 5-34 well pad could reduce noise and visual impacts to the nearby High Lonesome guest ranch as well as big game outfitting that occurs in proximity to the pad (see **Section 3.18**, Visual Resources).

Over the life of the Proposed Action, natural gas wells, equipment, and facilities could alter the general solitude and scenic values of the area. These values currently exist as important attributes to quality recreational experiences. Industrial activity would concentrate around well pads and roads. The amount of surface disturbance attributed to well pads would be reduced by interim reclamation, required at all Federally permitted well pads. Interim reclamation would reduce the disturbed area at each well pad by several acres including some rebuilding of natural topographic contours, and reestablishing natural vegetation.

Recreation opportunities would be most impeded by the Proposed Action during drilling and well completion. Traffic and surface disturbance would diminish considerably when drilling and well completions are finished and the wells have gone into production status. With the dispersed character of the recreation types, overall potential impacts to recreation in the project area would be minimal.

### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts to recreation from activities described above for the Proposed Action would occur. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, and grazing.

## **3.14 SOCIOECONOMICS**

### **Affected Environment**

The HDMDP project area is located in northwest Colorado, in the sparsely populated high desert plateau of northern Mesa County and southwest Garfield County. The economies of these two counties are characterized by natural resource extraction, tourism, and agriculture. Garfield County has the second greatest number of active wells in the state, behind Weld County (Garfield County 2017a). Grand Junction (population 60,630) is the largest city in western Colorado and a regional service and trade center for western Colorado and eastern Utah, and is located approximately 17 to 19 air-miles southwest of the project area. Approximately 28 to 30 air-miles northeast of the project area, the city of Rifle (population 9,488) is the primary service and retail center in western Garfield County.

Abundant energy reserves have made counties in northwest Colorado vulnerable to levels of exploration and production. The surge in energy activity that occurred between 2006 and 2008 began to drop in 2009 due to steep declines in natural gas and oil prices, and the energy industry in Garfield and Mesa counties has yet to see a full recovery.

The Town of De Beque (population 400) is the community closest to the project area. Located approximately 8 to 10 air-miles southeast of the project area, De Beque has limited services. Facing severe municipal financial constraints, residents of De Beque approved retail marijuana sales in 2014. The town collects a 5% local excise tax on dispensaries and is the western-most point of marijuana retail sales in Colorado.

**Population.** From 2000 to 2010, the populations of Garfield and Mesa counties grew more rapidly than the state as a whole. During the decade, Garfield County's population grew at an average annual rate of 2.8% (from 43,791 to 56,389) and Mesa County's population grew 2.6% annually (from 116,255 to 146,723), compared to statewide annual growth of 1.8% (Census Bureau 2001 and 2011). Led by declining energy activity, regional population growth has slowed in recent years. From 2010 to 2016, annual population growth averaged 0.08% in Garfield County (to 58,984) and 0.5% in Mesa County (to 150,731), compared to a statewide average annual growth rate of 1.9% (Colorado Department of Local Affairs [CDOLA] 2017a). The Colorado Department of Local Affairs projects that population growth will average 1.9% annually in Garfield County and 1.4% annually in Mesa County through 2040, and that, by that year, Garfield County will have 91,836 residents, and Mesa County will have 212,598 residents (CDOLA 2017b).

**Employment and Income.** Between 2000 and 2010, employment increased 20% in Garfield County (from 19,190 to 23,095 jobs) and 15% in Mesa County (from 49,947 to 57,329 jobs). The Mining and Health Care sectors accounted for most of the employment growth in both counties. The Mining sector added 1,678 jobs in Garfield County and 2,445 jobs in Mesa County, while the Health Care sector added 866 jobs in Garfield County and 2,026 jobs in Mesa County. During the decade, the greatest job losses occurred in Garfield County's Construction sector (929 job losses) and Mesa County's Manufacturing sector (1,429 job losses) (Colorado Department of Labor and Employment [CDLE] 2017a).

In recent years, employment growth has been more robust in Garfield County. Between 2010 and 2016, employment increased 11% in Garfield County to a total of 25,585 jobs, and 4% in Mesa County to a total of 59,597 jobs. The Health Care, Accommodation and Food Services, and Construction sectors account for most of the employment growth in both counties. The Health Care sector added 807 jobs in Garfield County and 1,345 jobs in Mesa County, the Accommodation and Food Services sector added 669 jobs in Garfield County and 742 jobs in Mesa County, and the Construction sector added 336 jobs in Garfield County and 447 jobs in Mesa County. The greatest job losses were in the Mining sector. Between 2010 and 2016, Garfield County lost 859 mining jobs and Mesa County lost 1,082 mining jobs.

Industry wages tend to be higher in Garfield County than in Mesa County. In 2016, annual wages averaged \$46,682 in Garfield County and \$40,906 in Mesa County. In Garfield County, wages were highest in the Mining (\$94,050) and Utility (\$79,299) sectors, and in Mesa County, wages were highest in the Management of Companies and Enterprises (\$88,145) and Mining (\$77,262) sectors. Wages in both counties were lowest in the Arts, Entertainment and Recreation (\$22,690 in Garfield County and \$17,304 in Mesa County) and Accommodation and Food Services (\$20,605 in Garfield County and \$17,281 in Mesa County) sectors (CDLE 2017a).

**Unemployment.** Spurred by an expanding energy industry, unemployment rates in Garfield and Mesa counties were lower than the statewide average for most of the early 2000s. Between 2000 and 2008, annual unemployment rates ranged between 2.5% and 4.9% in Garfield County, 3.2% and 5.4% in Mesa County, and 2.8% and 6.0% in Colorado. Unemployment rates in Garfield and Mesa counties began to increase dramatically in 2009, peaking at 10.3% in Garfield County and 11.0% in Mesa County in 2010. Due to a slowly recovering economy and decreases in the labor force, unemployment rates had fallen to 3.6% in Garfield County and 5.4% in Mesa County by 2016. Across Colorado, the labor force has continued to increase and the 2016 unemployment rate was 3.3% (CDLE 2017b).

**Fiscal Conditions.** County budgets reflect local economic conditions through the revenues that are available to fund county programs and services. Between 2007 and 2010, total revenues to Garfield County government nearly doubled, and increased from \$81.8 million to \$157.8 million. County revenues fell to \$104.5 million in 2011, and made a modest recovery to \$105.1 million in 2016 (Garfield County 2017a and 2017b). Mesa County government revenues increased from \$147.3 million in 2007 to \$177.3 million in 2010, fell to \$131.0 million in 2012, and were \$148.2 million in 2016 (Mesa County 2017).

The largest sources of revenue to both county governments are property tax, sales and use tax, and intergovernmental transfers. Garfield County is highly reliant on property tax. On average, property tax accounted for 44% of Garfield County revenues between 2007 and 2016, while intergovernmental transfers accounted for 29%, and sales and use tax accounted for 7% (Garfield County 2017a and 2017b). Because of Mesa County's role as a regional commercial center, sales and use tax make a larger contribution to Mesa County government revenues. On average, intergovernmental transfers contributed 32% to Mesa County revenues between 2007 and 2016, sales and use tax contributed 21%, and property tax contributed 17% (Mesa County 2017).

Natural gas production primarily affects a county's fiscal status through its impact on the property, or ad valorem, tax base. Property taxes are based largely on the assessed value of property and mineral production within a county. Between 2007 and 2016, oil and gas accounted for 68% of total assessed valuations in Garfield County and 9% in Mesa County. During this time, assessed valuations in Garfield County decreased from \$2.86 billion to \$2.21 billion, with oil and gas accounting for 89% of the decrease. In Mesa County, assessed valuations increased from \$1.78 billion in 2007 to \$1.85 billion in 2016, with oil and gas accounting for 57% of the increase (CDOLA 2017c).



**Short-Term Housing.** Short-term housing accommodations closest to the project area are in the town of Parachute, 16 to 18 air-miles to the northeast along I-70. Parachute has four motels with over 260 rooms. Several motels with over 600 rooms are located in the town of Rifle farther east along I-70, and more than 3,000 motel or hotel rooms are located in Grand Junction, the largest city in the project region.

### **Environmental Consequences**

#### **Proposed Action**

Most socioeconomic impacts would be associated with the size of the Proposed Action's workforce and the length of time exploration and production activities would continue in the project area. The construction phase would require approximately 90 workers to construct well pads and roads, and to drill and complete wells over a 4-year period, and that the operational phase would require three local workers. Because the workforce requirements would be greatest during construction, most socioeconomic impacts would be short term. Fiscal impacts would continue throughout operations.

**Population.** Residents of Garfield and Mesa counties are expected to account for half of the construction workforce and that the remaining workers would be non-local. The workforce needed to develop a natural gas field is transitory because drilling and completion crews tend to travel to where fields are being developed. Consequently, the construction workforce would not be expected to impact regional population trends. Due to its small size, the operational workforce would not impact regional or local populations.

**Employment and Income.** Nearly all direct employment associated with the Proposed Action would be short-term. Direct employment benefits would include approximately 90 construction-related jobs. In 2015, weekly wages earned in the "Support activities for oil and gas operations" industry averaged \$1,183 in Garfield County and \$1,400 in Mesa County (Bureau of Labor Statistics [BLS] 2018).

The Proposed Action would generate indirect economic benefits to local and regional businesses through contractors' purchases of goods and services associated with construction. Most of these regional benefits would be likely to occur in the Grand Junction and Rifle areas, where most oil and gas service businesses are located. Businesses providing consumer goods and services would also benefit from the increased demand of pipeline construction workers. This "induced" demand for goods and services would be further stimulated by purchases made by people employed by businesses that support other workers associated with the Proposed Action.

**Fiscal Conditions.** Natural gas production in the project area would provide economic benefits to Federal, state and local governments through the generation of Federal mineral lease (FML) royalties, severance tax, and property (ad valorem) tax on natural gas production. Property tax revenues from production in Mesa County would support Mesa County government activities, the Mesa County Library District, De Beque Fire Protection District, De Beque Joint School District, and Mesa County Social Services (Mesa County 2017). Property tax revenues from production in Garfield County would support Garfield County government activities, De Beque Joint School District, De Beque Fire Protection District, Grand River Hospital District, and Garfield County Road and Bridge (Garfield County 2017a). Both counties could also expect to receive sales tax revenue, especially during construction.

**Short-Term Housing.** The Proposed Action is not likely to have a noticeable impact on the short-term housing market. The potential peak demand for short-term housing (up to 45 workers) corresponds to approximately 5% of the motel accommodations in Parachute and Rifle and 2% of the lodging accommodations in Grand Junction.

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting socioeconomics from activities described above for the Proposed Action would occur. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

**3.15 SOILS**

**Affected Environment**

The location of the Proposed Action is along the north side of South Shale Ridge and is composed of broad to narrow ridges divided by intermittent and ephemeral drainages. The two well pads would be located in the valley bottoms of South Dry Fork and Dry Fork, at elevations between 5,600 and 5,800 feet above mean sea level (amsl), and slopes ranging from 1% to 12%. Three soil types would be disturbed and are described in **Table 22** (Soil Survey Staff 2017), arranged by decreasing proportion of the proposed disturbance area.

**Table 22. Soil Description of the HDMDP Development Area**

<i>Soil Map Unit</i>	<i>Description</i>	<i>Disturbance (acres)</i>	<i>Project Components</i>
70 Uffens loam, 1 to 8% slopes	Deep, well-drained loam found on mesas and terraces. Formed in alluvium derived from mixed materials. The soil is alkaline, sodic, moderately to strongly saline, and with a calcium carbonate concentration that does not exceed 30%. Runoff is high. Moderate erosion hazard. Soil rutting hazard is severe due to low strength.	12.24	HDU 13-21-99 – nearly all of pad, all of gathering pipeline, all of new access road
44 Happle very channery sandy loam, 3 to 12% slopes	Deep well-drained sandy loam found on alluvial fans, derived dominantly from the Green River shale formation. Non-saline to very slightly saline, with a calcium carbonate concentration that does not exceed 10%. Moderate erosion hazard. Soil rutting hazard is moderate.	7.91	HDU 5-34 – pad, majority of gathering pipeline, new access road
54 Panitchen loam, 1 to 6% slopes	Deep, well drained loam found on low terraces and floodplains. Originates from mixed material alluvium. Moderate erosion hazard. Soil rutting hazard is severe due to low strength. Alkaline, slightly to moderately saline, with a calcium carbonate concentration that does not exceed 15%.	0.87	HDU 13-21-99 – south corner of pad HDU 5-34 – southern portion of gathering pipeline
Source: Soil Survey Staff 2017			

**Environmental Consequences**

Proposed Action

All of the proposed disturbance is new disturbance (**Table 6**). The Proposed Action would impact soil characteristics and productivity. Additional potential impacts would include increased risk of wind and water erosion, compaction and damage to soil structure, mixing of topsoil with subsoil materials, rutting,

and introduction of gravel and coarser fragments into the topsoil. The Proposed Action would also increase sediment available for transport to surface waters. Infestations of noxious weeds resulting from soil disturbance could also affect soil productivity.

Long-term soil protection would be achieved by maintaining roads and pads to reduce erosion (e.g., by graveling, crowning, and controlling stormwater runoff), salvaging and properly storing topsoil to maintain viability, reducing pad footprints through interim reclamation and promptly reclaiming temporarily disturbed areas, implementing rapid containment and cleanup of any spills or releases of chemical pollutants. The COAs in **Appendix A** are expected to result in minimal long-term loss of soil and soil productivity in the project area.

*No Action Alternative*

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Therefore, existing impacts from continued operation of the existing wells and from recreation and grazing would continue.

**3.16 SPECIAL STATUS PLANTS**

**3.16.1 Federally Listed, Proposed, or Candidate Threatened or Endangered Species**

**Affected Environment**

**Table 23** includes Federally listed as threatened or endangered plant species potentially present and summarizes information on their habitat associations, potential for occurrence in the project vicinity based on known geographic range and habitats present, and potential for project impacts.

**Table 23. Potential for Occurrence and Effects on Threatened or Endangered Plant Species**

<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Colorado hookless cactus ( <i>Sclerocactus glaucus</i> ) Threatened	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities, often with well-formed microbiotic crusts; can occur in dense cheatgrass; 3,900 to 6,500 feet.	Desert shrubland with shadscale, galleta grass, black sagebrush, Indian ricegrass grading upward into big sagebrush and sagebrush/pinyon-juniper.	Yes	Yes
De Beque phacelia ( <i>Phacelia submutica</i> ) Threatened with Critical Habitat	Sparsely vegetated, steep slopes in chocolate-brown, gray, or red clay on Atwell Gulch and Shire Members, Wasatch Formation; 4,700 to 6,200 feet.	Desert shrubland with four wing saltbush, shadscale, greasewood, broom snakeweed, bottlebrush squirreltail, and Indian ricegrass, grading upward into scattered junipers.	Yes	Yes
Parachute penstemon ( <i>Penstemon debilis</i> ) Threatened with Critical Habitat	Sparsely vegetated, south-facing, steep, white shale talus of the Parachute Creek Member of the Green River Formation; 8,000 to 9,000 feet.	Other oil shale endemic species, such as Roan Cliffs blazing-star, Cathedral Bluffs meadow-rue, dragon milkvetch, Piceance bladderpod, and oil shale fescue.	No	No

<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Ute ladies'-tresses orchid ( <i>Spiranthes diluvialis</i> ) Threatened	Subirrigated alluvial soils along streams and in open meadows in floodplains; 4,500 to 7,200 feet.	Box-elders, cottonwoods, willows, scouring-rushes, and riparian grasses, sedges, and forbs.	No	No
Source: USFWS 2016				

Two plant species Federally listed as threatened—the Colorado hookless cactus and De Beque phacelia—are known to occur within the project vicinity, including De Beque phacelia designated critical habitat (Pyramid Rock – Unit 2). Botanical surveys were conducted between April and August in 2014, 2015, and 2016 within at least 100 meters (Colorado hookless cactus and other special status species) and 200 meters (De Beque phacelia) of proposed well pads, gathering lines, and access roads following BLM GJFO plant inventory standards (BLM 2015c).

Botanical surveys for the Proposed Action did not document Colorado hookless cactus plants within 100 meters of well pads HDU 13-21-99 and HDU 5-34 or associated gathering lines and access roads (WestWater Engineering 2016). However, other previous surveys along proposed access CR 200 (existing and maintained county road) documented 25 Colorado hookless cactus within 100 meters of existing CR 200 (WestWater Engineering 2012), of which one cactus plant occurs within 50 meters of the county road (approximately 7 meters from CR 200).

De Beque phacelia is an annual species endemic to Colorado and is found exclusively on sparsely vegetated, steep slopes in clay soils on Atwell Gulch and Shire members of the Wasatch Formation within a 20-mile radius of the town of De Beque (USFWS 2011). De Beque phacelia does not necessarily appear every year. During favorable years, seeds germinate in early April, plants flower from late April through late June, and fruits develop from mid-May through late June. Its flowers are hermaphroditic, suggesting that it may be able to self-pollinate (Ladyman 2003).

Botanical surveys for De Beque phacelia identified one area of marginal De Beque phacelia habitat (0.1 acre) within 155 meters of the proposed well pad HDU 5-34 (WestWater Engineering 2016); this delineated habitat is not located within designated critical habitat, nor is it located on Atwell Gulch or Shire members of the Wasatch Formation. Other previous surveys along improved CR 200 identified nine areas of marginal to highly suitable De Beque phacelia habitat (approximately 1.16 acres) within 300 meters of CR 200 in designated De Beque phacelia critical habitat (WestWater Engineering 2012 and 2015), of which eight areas (1.13 acres) occur within 100 meters of CR 200 (closest is 6 meters south of CR 200). De Beque phacelia plants were observed in three phacelia habitat areas (1.03 acres).

### **Environmental Consequences**

#### **Proposed Action**

Projects such as the Proposed Action have the potential to affect special status plants through one or more of the following mechanisms:

1. Direct mortality of plants and/or destruction of seed banks during clearing and grading.
2. Fragmentation and isolation of existing populations and areas of suitable habitat.
3. Increased populations of invasive noxious weed species that interfere with growth and survival of special status plants.

4. Damage or mortality of individual plants by deposition of dust on photosynthetic surfaces during construction and operation.
5. Changes in characteristics (shade, temperature, soil moisture, species composition, etc.) that alter suitable habitat.
6. Loss of pollinators due to habitat alteration, dust, and/or increased presence of noxious weeds or other invasive non-native plants.

The GJFO Resource Management Plan (BLM 2015a) includes a BMP (FWS-7) to avoid surface-disturbing activities within 200 meters of occupied threatened, endangered, proposed, and candidate species wherever possible and where geography and other resource concerns allow to minimize dust transport, weed invasion, unauthorized vehicular activities, and chemical/produced water spills, and protect pollinator habitat. The USFWS recommends avoiding surface disturbances within 150 meters of habitat occupied by Colorado hookless cactus and within 300 meters of suitable De Beque phacelia habitat where possible and where geography and other resources allow. The purpose of this measure is to protect plants and habitat from, runoff, erosion, dust deposition, or other indirect effects. Surface disturbances farther than 150 meters would have no effect on the Colorado hookless cactus, whereas surface disturbances closer than 50 meters from Colorado hookless cactus could be considered an adverse effect (USFWS 2013). Surface disturbances farther than 300 meters from suitable phacelia habitat are assumed to have no effect on De Beque phacelia plants or seed bank. Surface disturbances closer than 100 meters from De Beque phacelia habitat could be considered an adverse effect (USFWS 2013), and could destroy the seed bank of De Beque phacelia and modify its habitat so that the plants could no longer grow in affected areas.

No new disturbance would occur within 150 meters of Colorado hookless cactus. However, marginal De Beque phacelia habitat is within 155 meters of proposed disturbance limits of proposed well pad HDU 5-34 and fugitive dust from construction activities could affect De Beque phacelia habitat. To minimize potential effects of fugitive dust to marginal De Beque phacelia habitat during construction of well pad HDU 5-34, water (no additives) would be applied sparingly to disturbed surfaces to control dust but not contribute to surface runoff.

Proposed access to the project area on maintained CR 200 occurs within 150 meters of 25 Colorado hookless cactus plants (within 50 meters of one cactus plant), and 300 meters of nine De Beque phacelia habitat areas (1.16 acres), of which eight (1.13 acres) occur within 100 meters of CR 200. Increased vehicle use along CR 200 during construction and operation of the Proposed Action could affect Colorado hookless cactus and De Beque phacelia habitat and/or plants in close proximity to CR 200 from increased fugitive dust and increased risk of weed transport and weed invasion. Implementing dust suppression measures within 200 meters of known Colorado hookless cactus plants and De Beque phacelia habitat would minimize effects of dust. Hay wattles would be anchored along CR 200 within 20 meters each side of each Colorado hookless cactus plant(s) and 100 meters each side of De Beque phacelia suitable habitat that are downslope of the road to reduce the potential to change hydrology in adjacent habitats and minimize the potential for invasive species to become established.

BLM's required surface-use COAs (**Appendix A**) include measures related to management of noxious weeds and other invasive non-native plants, restoration of a self-sustaining native plant cover, control of fugitive dust, and avoidance of direct impacts to special status plants.

On December 19, 2017, pursuant to Section 7 of the Endangered Species Act (ESA), the BLM submitted a biological assessment (BA) to the USFWS Western Colorado Ecological Services Field Office, describing the expected effects to the Colorado hookless cactus within 150 meters of Proposed Action components, and to De Beque phacelia suitable habitat and designated critical habitat within 300 meters of Proposed Action components. These surveys included both proposed and existing access roads. The

BLM described the conservation measures included within this EA that would minimize potential effects to Colorado hookless cactus and De Beque phacelia suitable habitat located along CR 200 and near well pad HDU 5-34, and provided an effects determination of “**Not Likely to Adversely Affect**” for both Colorado hookless cactus and De Beque phacelia. On January 18, 2018, the USFWS concurred with BLM’s analysis of effects to the two threatened plants associated with the project, and with implementation of the following conservation measures (**Appendix B**):

- Conduct botanical surveys for Colorado hookless cactus prior to ground-disturbing activities during the appropriate survey season (April through May) to verify absence within 50 meters of proposed disturbance, if ground-disturbing activities occur after 2018 (BLM 2015c).
- Revegetate disturbed areas with native seed mixes approved by the BLM CRVFO on BLM lands or private landowner on private lands that are certified weed-free. Well pad reclamation and gathering pipeline revegetation must be established within 1 year after pipeline construction and well completion.
- Monitor the effectiveness of site restoration annually, including presence of noxious weeds until restoration is considered successful by the BLM ecologist. Noxious weeds would be controlled and other undesirable plant species within disturbed areas that may out-compete Colorado hookless cactus and/or De Beque phacelia documented within the vicinity of the project area. An annual monitoring report would be submitted to the BLM by December 1 of each year.
- Control fugitive dust (water, no additives) on CR 200 within 200 meters of Colorado hookless cactus plants during the flowering season (April through May) and within 200 meters of De Beque phacelia habitat to minimize effects to cactus along CR 200 that could result from an increase in traffic during construction of the Proposed Action.
- Anchor hay wattles on the edge of CR 200 within 20 meters each side of Colorado hookless cactus plants and within 100 meters each side of De Beque phacelia habitat that are downslope of the road to reduce the potential to change hydrology in adjacent habitats and minimize the potential for invasive species to become established.

#### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting special status plant species would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

#### **3.16.2 BLM Sensitive Plant Species**

##### **Affected Environment**

The BLM (2015d; Appendix B) identified 23 species of sensitive vascular plants that occur or could occur within the GJFO management area. **Table 24** provides information for the three BLM sensitive species known to occur or potentially present in the project area, based on their known geographic ranges, typical occurrences, habitat associations, and potential to be affected by the project.

Botanical surveys for BLM sensitive plant species conducted during the flowering season within at least 100 meters of proposed project features in 2014, 2015, and 2016 (WestWater Engineering 2016) resulted in no observations of these species or other BLM sensitive species.

**Table 24. Sensitive BLM Plant Species with Potential for Occurrence and Effects**

<i>Common Name (Scientific Name)</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Aromatic Indian breadroot ( <i>Pediomelum aromaticum</i> )	Sandy soils or adobe hills; 4,623 to 6,693 feet.	Pinyon-juniper woodlands and shrublands	Yes	No
De Beque milkvetch ( <i>Astragalus debequaeus</i> )	Varicolored, fine to textured, seleniferous or saline soils of Wasatch Formation; 5,100 to 6,400 feet.	Pinyon-juniper woodlands and desert shrublands	Yes	No
Naturita milkvetch ( <i>Astragalus naturitensis</i> )	Sandstone mesas, ledges, crevices and slopes in pinyon/juniper woodlands; 5,000 to 7,000 feet.	Pinyon-juniper woodlands	Yes	No
Source: BLM 2015d				

## **Environmental Consequences**

### **Proposed Action**

Because BLM sensitive plants were not observed during survey efforts conducted for the Proposed Action, no effects to BLM sensitive plant species, similar to those discussed above for the Federally listed plant species would be expected.

### **No Action Alternative**

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting BLM sensitive plant species would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

## **3.17 SPECIAL STATUS WILDLIFE**

### ***3.17.1 Federally Listed, Proposed, or Candidate Threatened or Endangered Species***

#### **Affected Environment**

Federally listed, proposed, or candidate species potentially occurring within or affected by actions in Mesa and Garfield counties include eight species of vertebrate wildlife. **Table 25** lists these species and summarizes information on their distribution, habitat associations, and potential to occur or to be affected by the Proposed Action.

**Table 25. Potential Occurrence of and Impacts Threatened or Endangered Animal Species**

<i>Common Name (Scientific Name)</i>	<i>Distribution in Region</i>	<i>Preferred Habitats</i>	<i>Potentially Present?</i>	<i>Potentially Affected?</i>
North American wolverine ( <i>Gulo gulo luscus</i> ) Proposed Threatened	Dispersal habitat in rugged, remote areas above treeline; no evidence of an extant population in Colorado.	Boreal forests, tundra, and western mountains generally above treeline.	No	No
Mexican spotted owl ( <i>Strix occidentalis lucida</i> ) Threatened	No historic occurrence in area; present in southwestern Colorado and southern Front Range.	Rocky cliffs in canyons with closed-canopy coniferous forests.	No	No
Yellow-billed cuckoo, Western Distinct Population Segment ( <i>Coccyzus americanus</i> ) Threatened	Major rivers and tributaries of western, northwestern, and south-central Colorado.	Large cottonwood stands with tall shrub understory along rivers.	No	No
Razorback sucker ( <i>Xyrauchen texanus</i> ) Endangered	Colorado River and major tributary rivers, including mainstem Colorado River upstream to town of Rifle.	General: Deep, slow runs, pools, and eddies. Spawning: silt to gravel substrates in shallow water and seasonally flooded overbank areas.	Present in Colorado River near the project area.	<b>Yes</b>
Colorado pikeminnow ( <i>Ptychocheilus lucius</i> ) Endangered				
Humpback chub ( <i>Gila cypha</i> ) Endangered	Mainstem Colorado River and major tributaries – upstream to Black Rocks near Utah state line.	Rocky runs, riffles, and rapids in swift, deep rivers.	Present in Colorado River near Utah line.	<b>Yes</b>
Bonytail chub ( <i>Gila elegans</i> ) Endangered				<b>Yes</b>
*Green Lineage Colorado River cutthroat trout ( <i>Oncorhynchus clarkii</i> cf. <i>stomias</i> ) Threatened	Identified in 60 streams in Colorado River basin, including the GJFO area.	Clean, cool headwaters streams and ponds isolated from other strains of cutthroat trout.	Present in Roan Creek upstream from project inflows.	No
Source: USFWS 2016. *Green Lineage = Relict populations of cutthroat trout indigenous to the Colorado/Gunnison/Dolores River drainages. Currently protected under the ESA pursuant to prior listing of the greenback cutthroat trout ( <i>O. c. stomias</i> ) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.				

**Environmental Consequences**

*Proposed Action*

The North American wolverine, Mexican spotted owl, yellow-billed cuckoo, and Green Lineage Colorado River cutthroat trout are not expected to occur in the project vicinity or to be affected by the proposed action. Suitable habitats for the wolverine and Mexican spotted owl are not present in the project vicinity or surrounding area. Riparian habitat of the general composition and structure as used by the yellow-billed cuckoo in western Colorado is present along the South Dry Fork, which flows past the project area.



However, surveys conducted for cuckoos during the 2017 nesting season did not reveal their presence, and the riparian habitat in the project vicinity is considered too limited in area and contiguous length to support nesting. The Green Lineage Colorado River cutthroat trout occurs in the Roan Creek Drainage upstream from the confluence with Dry Fork, and reaches adjacent to or below inflows from the project area are not considered suitable for the trout. Therefore, the Proposed Action would have “**No Effect**” on these species, and they are not discussed further.

The Colorado River mainstem within the Grand Valley is occupied habitat for the Colorado pikeminnow, bonytail chub (*Gila elegans*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) from Palisade, Colorado, downstream to Lake Powell (USFWS 2002a, b, c, and d). Two of these, the pikeminnow and razorback sucker, are known to occupy portions of the Colorado River upstream from Palisade approximately 50 miles to the town of Rifle, Colorado, aided by the construction of fish passageways that allow the fish to move past major diversion structures in the lower De Beque Canyon (Valdez et al. 2011). Designated Critical Habitat for these two species occurs in the Action Area along the Colorado River and its 100-year floodplain.

In 2008, the USFWS issued a Programmatic Biological Opinion (PBO) that addressed BLM's fluid minerals program in the Colorado River Basin in Colorado (USFWS 2008) and concurred with BLM's effects determination of “**May Affect, Likely to Adversely Affect**” relative to the endangered Colorado River fishes. This determination was based on depletions in flows in the Colorado River basin associated with consumptive use of fresh water for oil and gas activities, including drilling and completions, hydrostatic testing of pipelines, and dust abatement. Depletions in flows in the mainstem and major tributaries are a major source of impacts to changes in the flow regime that reduce the availability and suitability of spawning sites and habitats needed for survival and growth of the larvae. Mandatory conservation measures in the PBO, including an upfront mitigation payment to aid in recovery of the species and annual reporting of depletions based on an assumed per-well average, allowed for a determination that such effects would be unlikely to jeopardize continued existence of the four endangered fishes or to destroy or adversely modify their designated critical habitat.

The 2008 PBO was replaced with a new PBO on December 26, 2017 (USFWS 2017a), which specifies conservation measures similar to those in 2008 PBO. However, the 2017 PBO requires annual reporting by the BLM of actual quantities of fresh water and recycled water used in Federal oil and gas operations, replacing the assumed per-well average incorporated into the 2008 PBO. This requirement is applied as a drilling COA for all approved APDs.

Additional conservation measures and other mitigations incorporated into the COAs to this EA would reduce the potential for contamination of occupied streams or their tributaries from transport of sediments or chemical pollutants to the Colorado River or its tributaries, and to reduce the potential for loss of individual fishes, larvae, and eggs due to entrainment or impingement during withdrawal of surface waters. These include:

- Avoiding use chemical dust suppressants in volumes that could flow into drainages.
- Using only herbicides non-toxic to aquatic organisms when treating weeds near drainages.
- Transporting and treating or disposing water used to hydrostatic testing of pipelines instead of releasing the water onto the ground.
- Avoiding withdrawal of surface water from slow-flow or no-flow areas, where larval fish tend to congregate, and avoiding pumping during the late pre-dawn period, when larvae are most active.
- Screening all pipes or hoses uses to withdraw water with 0.25-inch or finer mesh material and reporting promptly to the USFWS or CPW any endangered fish impinged on such a screen.

Based on the above, the BLM has determined that inflow of sediments and chemicals into the Colorado River would have “**No Effect**” on the endangered big river fishes. In the unlikely event of a spill with the potential to affect, or documented occurrence of an effect, the USFWS would initiate discussions with the involved parties to identify appropriate remedies.

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but existing oil and gas production in the HDU would continue to operate using existing road and pipeline infrastructure on BLM and private lands. Impacts resulting from other activities and resource uses including grazing of livestock, and with natural processes such as drought and wildland fires, would also continue to occur.

**3.17.2 BLM Sensitive Species**

**Affected Environment**

**Table 26** lists BLM sensitive vertebrate wildlife species that are known to occur in the region and, if present, could potentially be adversely affected by the Proposed Action (BLM 2015d). Surveys for special status wildlife and habitat assessments were conducted in conjunction with raptor and special status plant surveys in the project area in 2014, 2015, and 2016 (WestWater Engineering 2016). Two BLM sensitive wildlife species were observed during survey efforts (WestWater Engineering 2016): the northern leopard frog and the midget faded rattlesnake near Dry Fork. No rattlesnake den was located.

**Table 26. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area**

<i>Common Name (Scientific Name)</i>	<i>Habitat Description</i>	<i>Potential for Occurrence</i>
<b>Mammals</b>		
Townsend’s big-eared bat ( <i>Corynorhinus townsendii</i> )	Roosts in caves or crevices in rock faces near semi-desert shrublands, pinyon-juniper woodlands, and open montane forests (foraging habitat) below 9,500 feet.	Suitable foraging and roosting habitat in vicinity.
Fringed myotis ( <i>Myotis thysanodes</i> )	Roosts in caves or mines near ponderosa, oak brush, greasewood, or saltbush shrublands (foraging habitat); elevations up to 7,500 feet.	Suitable foraging and roosting habitat in vicinity.
Big free-tailed bat ( <i>Nyctinomops macrotis</i> )	Rocky areas and rugged terrain in desert and woodland habitats; roosts in rock crevices in cliffs and in buildings, caves, and occasionally tree holes.	Potentially suitable foraging and roosting habitat, but distribution in Colorado very spotty.
White-tailed prairie dog ( <i>Cynomys leucurus</i> )	Burrows in semi-desert shrublands, agricultural lands or pastures in elevations typically below 8,500 feet.	No colonies observed; habitat in vicinity probably unsuitable (too wooded to support use).
<b>Birds</b>		
Greater sage-grouse ( <i>Centrocercus urophasianus</i> )	Nests and engages in communal courtship in large stands of Wyoming or mountain sagebrush, often interspersed with grasslands, meadows, and riparian habitats for feeding and brood-rearing.	Reported to have been historically present in the project area, but no general or priority habitat or habitat linkages are currently mapped near the project by CPW.

<b>Common Name (Scientific Name)</b>	<b>Habitat Description</b>	<b>Potential for Occurrence</b>
Northern goshawk ( <i>Accipiter gentilis</i> )	Nests in mature subalpine or upper montane conifer and aspen forests; may move to lower montane and foothills conifers (including pinyon-juniper) in winter.	Suitable winter roosting and winter foraging habitat in vicinity but area below normal nesting elevation.
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Nests along forested rivers and lakes; winters in upland areas, often with rivers or lakes nearby.	Nesting, roosting, and foraging habitat along the Colorado River; winter range mapped along Roan Creek.
Ferruginous hawk ( <i>Buteo regalis</i> )	Large grassland/shrublands with good numbers of rodents and lagomorphs.	Possible limited use, but habitat in the project area generally too wooded for nesting or foraging.
American peregrine falcon ( <i>Falco peregrinus anatum</i> )	Open country near cliffs, often near rivers, lakes, and marshes; nests on ledges or holes on cliff ledges and crags.	Suitable nesting, roosting, and foraging habitat in vicinity.
Brewer's sparrow ( <i>Spizella breweri</i> )	Expanses of big sagebrush (especially Wyoming big sagebrush); also saltbush.	Suitable nesting and foraging habitat in stands of Wyoming sagebrush; basin big sagebrush and saltbush/greasewood marginal.
<b>Reptiles and Amphibians</b>		
Midget faded rattlesnake ( <i>Crotalus oreganus concolor</i> )	Rock outcrops for refuge and hibernation, often near riparian corridors, generally below 7,500 feet	Present.
Northern leopard frog ( <i>Lithobates pipiens</i> )	Areas of standing or slow-flowing perennial waters with good water quality and aquatic or wetland vegetation along the shore.	Suitable habitat in project vicinity; observed near Dry Fork.
<b>Fish</b>		
Roundtail chub ( <i>Gila robusta</i> )	Deep pools and eddies in mid- to large-sized rivers and streams throughout the Colorado River Basin.	Present in Colorado River.
Bluehead (Colorado) sucker ( <i>Catostomus discobolus</i> )	Perennial waters from headwater streams to large rivers.	Present in Colorado River.
Flannelmouth sucker ( <i>Catostomus latipinnis</i> )	Perennial waters from headwater streams to large rivers.	Present in Colorado River.
*Blue Lineage Colorado River cutthroat trout ( <i>Oncorhynchus clarkii</i> cf. <i>stomias</i> )	Clean, cool headwaters streams and ponds isolated from other strains of cutthroat trout. Widely introduced throughout western Colorado.	Not present in Dry Creek or in Roan Creek downstream from Dry Fork inflow.
Source: BLM 2015d. *Blue Lineage = Relict populations of cutthroat trout indigenous to the Yampa/White/Green River drainages. Currently treated as a BLM sensitive species pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.		

## Environmental Consequences

### Proposed Action

Townsend's Big-eared Bat, Fringed Myotis, and Big Free-tailed Bat. No caves or other suitable roosting sites occur in the project area. Loss of large trees, potentially also used for roosting, would be negligible. Loss of habitat above which the bats could search for aerial prey would also be minimal, and disturbance due to construction activities would not occur at night when the bats are feeding.

Northern Goshawk. This species is mostly limited to spruce/fir or aspen forests at higher elevations. However, goshawks may migrate to lower elevation pinyon/juniper or Douglas-fir habitats during winter and therefore could make occasional, transitory use of the project area for winter foraging. Loss of foraging habitat resulting from the project would be negligible.

Bald Eagle. Although bald eagles nest and roost along the Colorado River in the project vicinity, the potential for use of the project area is low. Any use would be expected to be by an individual passing through and would be transitory in nature, primarily during winter. Roan Creek is mapped as including winter roosting habitat.

Peregrine Falcon. Peregrine falcons nest along cliff bands south and north of the project and hunt for waterfowl along the Colorado River or other birds across open terrain. Use of the project area is unlikely, except for infrequent, transitory overflights between the Colorado River and cliff bands to the north.

Brewer's Sparrow. The 60-day TL to prohibit removal of vegetation during the period May 15 to July 15 (**Appendix A**) would avoid or minimize the potential for impacts to nesting Brewer's sparrows. Construction activities outside this period could cause individuals to avoid the disturbance while feeding. However, this impact would be limited by the larger home ranges used by individuals outside the nesting period. The species is absent from the region from late summer until late spring.

Midget Faded Rattlesnake. Movement patterns of this small viper are not well known but are believed to be limited to a few hundred meters from den sites. The limited distribution and small home range make this snake susceptible to impacts from human disturbance (Parker and Anderson 2007). Threats include direct mortality from vehicles, trampling by livestock, removal by collectors, and intentional infliction of injury or death by humans. Increased access and human presence in the project area would increase the risk of mortality. Suitable denning habitat was observed during surveys, and one individual was observed during surveys in 2015 (WestWater Engineering 2016). The Proposed Action is not expected to affect the suitable denning habitat, and loss of foraging habitat would be negligible.

Northern Leopard Frog. Suitable aquatic habitat for this species exists along South Dry Fork near the project area, and the species is known to occur along Dry Fork. Potential impacts could result from inflow of sediments from areas of surface disturbance and inflow of chemical pollutants associated with spills or accidental releases. Protective COAs for water quality (**Appendix A**) would minimize the potential for spills and chemical pollutants to reach downstream waterways.

Flannelmouth Sucker, Bluehead Sucker, and Roundtail Chub. As with the ecologically similar Colorado River endangered fishes described above, the flannelmouth sucker and roundtail chub are adapted to naturally high sediment loads and therefore would not be affected by increased sediment transport to the Colorado River. Furthermore, protective COAs for water quality (**Appendix A**) would minimize this potential. However, these species are vulnerable to alterations in flow regimes in the Colorado River (including evaporative losses from dams and depletions from withdrawal of water for irrigation or municipal water supplies) that affect the presence of sandbars and seasonally flooded overbank areas needed for reproduction. The amount of depletion in flows associated with this project is not expected to have a significant adverse impact on the survival or reproductive success of these species

### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but existing oil and gas production in the HDU would continue to operate using existing road and pipeline infrastructure on BLM and private lands. Therefore, impacts associated with continued operation of the existing oil and gas facilities, and other resource uses such as grazing of livestock, and natural processes such as drought and wildland fires would continue to occur.

## **3.18 VEGETATION**

### Affected Environment

The two proposed well pads are located in the valley floors of South Dry Fork and Dry Fork, and the proposed gathering line to HDU 13-21-99 would cross South Dry Fork, which is intermittent, and an ephemeral unnamed drainage. Plant communities in the project area are primarily basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) mixed with greasewood (*Sarcobatus vermiculatus*), fourwing saltbush (*Atriplex canescens*), and shadscale saltbush (*Atriplex confertifolia*) along valley bottoms. Hillsides and ridges on the edges of the valley floor include woodlands of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and shrublands of Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) shrublands with primarily native grasses and forbs. Shrubs more typical of foothills habitats are also present on nearby slopes and ridges.

Disturbed vegetation within the project vicinity occurs along existing roads, existing well pads, and previously constructed pipelines. Areas along existing ROWs, partially or fully reclaimed well pads, and bar ditches along county roads support basin big sagebrush, fourwing saltbush, shadscale saltbush, and species of grasses and forbs commonly associated disturbed or degraded areas. Among these are alyssums (*Alyssum desertorum* and *A. simplex*), desert madwort (*Alyssum desertorum*), purple mustard (*Chorispora tenella*), flixweed (*Descurainia sophia*), redstem stork's-bill (*Erodium cicutarium*), curlycup gumweed (*Grindelia squarrosa*), halogeton (*Halogeton glomeratus*), European stickseed (*Lappula squarrosa*), common sunflower (*Helianthus annuus*), prickly Russian-thistle (*Salsola tragus*), and yellow salsify (*Tragopogon dubius*). See **Section 3.9** for a more detailed description of noxious weeds and other invasive non-native species present in the project area.

Grasses occurring in the project area include native perennial species such as Indian ricegrass (*Achnatherum hymenoides*), joint slender wheatgrass (*Elymus trachycaulus*), James' galleta (*Hilaria jamesii*), salina wildrye (*Leymus salinus*), western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Sandberg bluegrass (*Poa secunda*). Non-natives include the widely planted crested wheatgrass (*Agropyron cristatum*) and tall wheatgrass (*Thinopyrum ponticum*) and invasive species such as goatgrass (*Aegilops cylindrica*), cheatgrass (*Bromus tectorum*), annual wheatgrass (*Eremopyrum triticeum*), and bulbous bluegrass (*Poa bulbosa*).

No wetland or riparian vegetation occurs along drainages that would be crossed by the proposed gathering pipeline to HDU 13-21-99 (WestWater Engineering 2016).

### Environmental Consequences

#### Proposed Action

Implementation of the Proposed Action would result in short-term and long-term effects to vegetation through removal of approximately 21.03 acres of vegetation. This total would include 11.49 acres on BLM lands and 9.54 acres on private lands. Vegetation removed during construction would consist primarily of basin big sagebrush and greasewood, with the exception of revegetated areas along existing disturbances. Short-term effects would occur where vegetation has been previously disturbed, while long-term effects would persist for more than 5 years and would occur where basin big sagebrush

shrubland is removed. For example, sagebrush can take 10 to 15 years or longer to become reestablished (West 1988). Following project completion, interim reclamation around well pads, and reclamation of the buried pipeline corridors, a total of 5.31 acres would remain as long-term disturbance for the life of the well pad until final plugging and abandonment of wells.

Vegetation adjacent to surface disturbance may be affected over the short-term by fugitive dust created during project construction, including increased vehicle traffic that could affect photosynthesis processes (Sharifi et al. 1997). The operator would implement dust abatement along the access roads, well pads, and gathering pipeline disturbances using approved dust suppression methods to reduce fugitive dust and potential effects to adjacent vegetation. In addition, the operator would enforce vehicle speed limits to minimize fugitive dust further. Other indirect impacts to adjacent vegetation could occur from the introduction of noxious weeds and other non-native plants, and the spread of existing populations.

The operator would revegetate topsoil storage piles, stormwater control features, and temporarily disturbed areas along roads and pipelines within 30 days, season permitting, to stabilize materials, maintain soil microbial activities, and reduce the potential for weed infestations. Interim reclamation would include recontouring and seeding. Certified weed-free native seed mix approved by the BLM and private landowners would be used during revegetation of the project. After all wells have been plugged and abandoned, final reclamation would occur within 1 year and would obtain levels of revegetation approximate to adjacent vegetation cover types and original contours.

Annual monitoring of reclamation success, including monitoring for weeds, would be required as described in the COAs (**Appendix A**). BLM’s revegetation requirements include treatment of weeds and, if necessary, repeating the native seeding to correct unsuccessful establishment of seeded species.

No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. Ongoing oil and gas activities and other activities would continue, as would their associated impacts. These additional sources of impacts would include recreation and grazing.

**3.19 VISUAL RESOURCES**

**Affected Environment**

BLM manages visual resources on BLM lands to protect the quality of scenic values, specifically protecting areas with cultural significance and highly valued scenic resources. Scenic values are classified according to the Visual Resource Management (VRM) system, with objectives to minimize the visual impacts of surface disturbing activities and to maintain scenic values on public lands. VRM objectives are included in the GJFO RMP (BLM 2015a), and summarized below in **Table 27**.

**Table 27. BLM Visual Resource Management Classes and Objectives in the Project Area**

<i>VRM Class</i>	<i>Visual Resource Objective</i>	<i>Change Allowed (Relative Level)</i>	<i>Relationship to the Casual Observer</i>
Class 2	<b>Retain</b> the existing character of the landscape.	<b>Low</b>	Activities may be visible, but <b>should not attract attention</b> .
Class 3	<b>Partially retain</b> the existing character of the landscape.	<b>Moderate</b>	Activities <b>may attract attention</b> but <b>should not dominate</b> the view.

Most of the HDU occurs in VRM Class III areas, with the southern portion and the extreme north portion occurring in VRM Class II (**Map 5**). The proposed gathering pipeline to HDU 13-21-99 on BLM lands, and the majority of well pad HDU 5-34 coincides with VRM Class III. The eastern portion of well pad HDU 5-34 and the gathering pipeline on BLM land coincides with VRM Class II, for which objectives allow a low level of change to the existing landscape and proposed disturbance should retain the visual character of the existing landscape by repeating the basic elements found in the natural features of the landscape including form, line, color, and texture.

### **Environmental Consequences**

#### *Proposed Action*

Construction of the proposed project would result in both short-term and long-term changes to the current environment. Surface disturbance associated with construction of well pads, installation of gathering pipelines, and construction or improvement of access roads would impact visual resources by creating contrasts in line, form, color and texture, depending on existing site-specific landscape characteristics. Disturbance and exposure of soils and subsoils would create moderate color. The textures of the exposed soils, such as in cut and fill slopes, could also add smoothness to the landscape, interrupting and creating contrast with the existing rougher textures of rocks and vegetation. Such contrasts would likely draw the eye of casual observers to varying degrees.

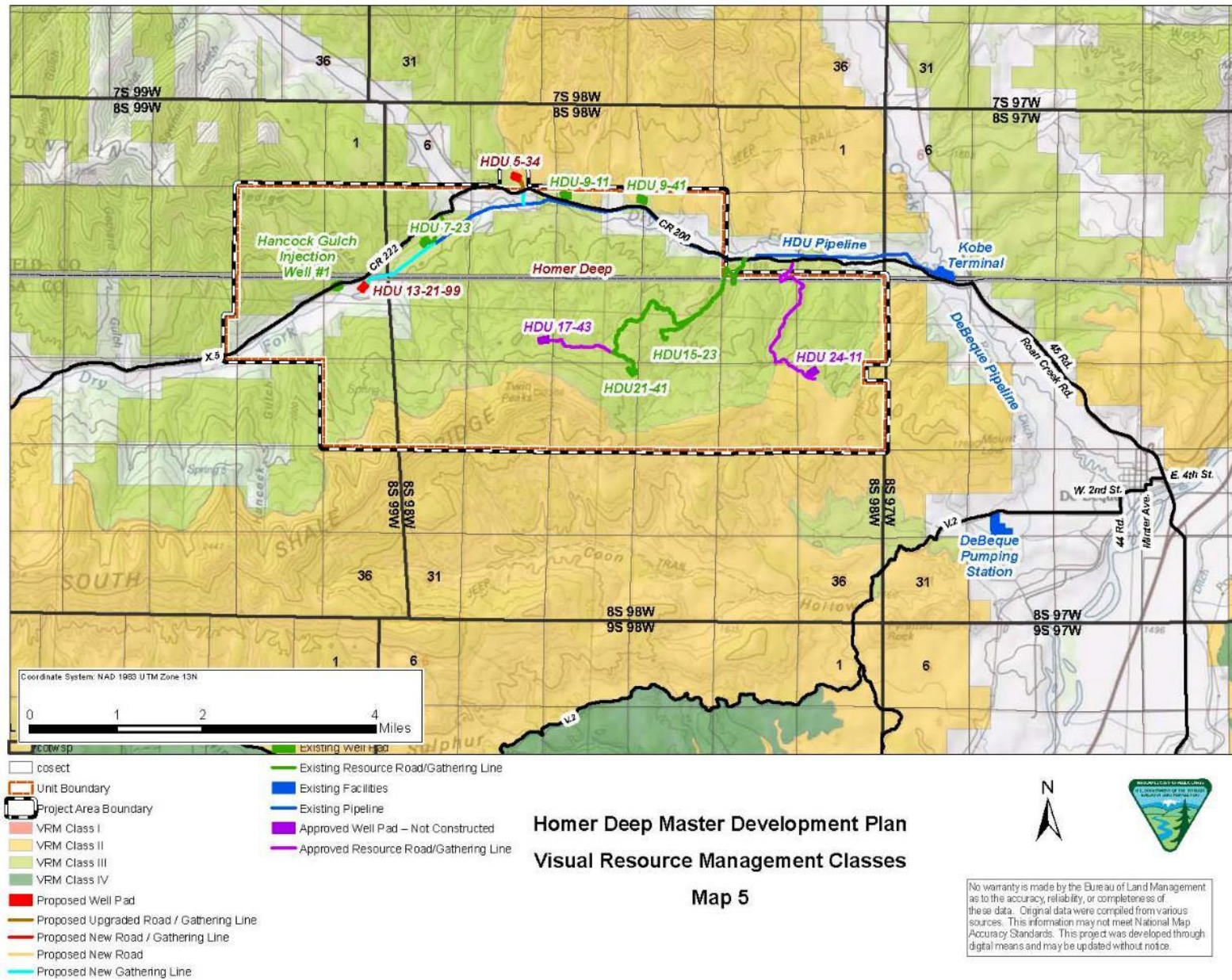
Surface disturbances for the proposed gathering pipelines would be visible from CR 200 and likely to attract the attention of the casual observer. To reduce this impact, the pipeline to well pad HDU 13-21-99 in VRM Class III would be adjacent to a revegetated pipeline right-of-way, and the pipeline to HDU 5-34 in VRM Class II would be adjacent to an existing road. Revegetation would further reduce these impacts.

Well pad HDU 5-34 is located in VRM Classes II and III and could be visible for a short duration (10 to 15 seconds) by the traveling public on CR 200. To minimize impact to visual resources during construction of well pad HDU 5-34 and achieve the visual resource objectives (**Table 27**), the operator would implement the following measures developed during onsite field visits with the BLM:

- Raise and undulate the topsoil berm height along the edge of the pad disturbance closest to CR 200 to create a vegetation buffer that would help hide the facilities located on the well pad.
- Place brush to be removed during the pad clearing work on the topsoil berms and pad fill slope to reduce visual contrast, create shade and a favorable growing space for establishing vegetation, and blend the well site with the surrounding landscape.
- Selectively excavate small (< 12 feet tall) juniper trees within the disturbance area and “plant” the trees in the topsoil berm and fill-slope to maintain the vertical appearance of trees in the landscape even though the trees are likely to die. The transplanted trees would help maintain the appearance of junipers across the landscape.
- Extend the length of the pad fill-slope to reduce its grade to facilitate revegetation.
- Extend the length of the road entrance at the southwest corner of the proposed pad to help “soften” and mitigate the typical color contrast associated with the graveled roadway.

Additional short-term effects to visual resources would result from fugitive dust and the presence of construction and drilling equipment and personnel during construction, drilling, and completion. The operator would control dust in areas of disturbance and along existing access roads, which would minimize effects to visual resources. Night lighting would also be required for operational safety on well pads during continuous drilling activities, which could adversely affect visual resources over the short-term. Light would be down-directed and focused on work areas, and permanent lights would be shielded and/or directed specifically to the work area to reduce visual impact.







### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

## **3.20 WASTES – HAZARDOUS OR SOLID**

### **Affected Environment**

Federal laws regulating hazardous wastes or other hazardous materials include:

The Oil Pollution Act (Public Law 101-380, August 18, 1990). This law prohibits discharge of pollutants into Waters of the U.S., which by definition would include any tributary or dry wash that eventually connects with the Colorado River.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Public Law 96-510 of 1980). This law provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. It also provides national, regional, and local contingency plans. Applicable emergency operations plans in place include the National Contingency Plan (40 CFR 300, required by section 105 of CERCLA), the Region VIII Regional

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Public Law 96-510 of 1980). This law provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. It also provides national, regional, and local contingency plans. Applicable emergency operations plans in place include the *National Contingency Plan* (40 CFR 300, required by section 105 of CERCLA), the *Region VIII Regional Contingency Plan*, the *Colorado River Sub-Area Contingency Plan* (these three are EPA plans), the *Mesa County Emergency Operations Plan* (developed by the Mesa County Office of Emergency Management), and the BLM *GJFO Hazardous Materials Contingency Plan*.

The Resource Conservation and Recovery Act (RCRA) (Public Law 94-580, October 21, 1976). This law regulates the use of hazardous substances and disposal of hazardous wastes. Note: While oil and gas lessees are exempt from RCRA, ROW holders are not exempt from this legislation. RCRA strictly regulates the management and disposal of hazardous wastes. Most of the drilling and production wastes that would be generated by the Proposed Action would be exempt from the RCRA hazardous waste regulations (e.g., produced water, produced gas). However, the exemption would not mean that these wastes present no hazard to human health and the environment, nor would the exemption relieve the operator from corrective action to address releases of exempt wastes.

In addition, BLM Instruction Memoranda WO-93-344 and CO-97-023 require that all NEPA documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed as a result of a project. Practices commonly used in oil and gas developments are dictated by various Federal and State laws and regulations and the BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis.

## **Environmental Consequences**

### **Proposed Action**

Pollutants potentially spilled or otherwise accidentally released during the construction phase of the project would include diesel fuel, hydraulic fluid, and lubricants associated with the operation of heavy equipment. These materials would be used during construction of the pad, road, and pipelines and for refueling and maintaining the vehicles and equipment. Potentially harmful substances used in the construction and operation phases would be kept onsite in limited quantities and trucked to and from the site as required. No hazardous substance, as defined by 40 CFR 355 would be used, produced, stored, transported, or disposed of in amounts above threshold quantities. Waste generated by construction activities would not be exempt from hazardous waste regulations under the oil and gas exploration and production exemption of RCRA. Exempt wastes include those associated with well production and transmission of natural gas through the gathering lines and the natural gas itself.

With the exception of produced hydrocarbons, ethylene glycol (antifreeze), lubricants, and amine compounds, chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act in quantities of 10,000 pounds or more would not be used, produced, stored, transported, or disposed of during construction or operation of the facilities. None of the chemicals used in construction meets the criteria for an acutely hazardous material/substance or the quantities criteria per BLM Instruction Memorandum No. 93-344. In addition, no extremely hazardous substance, as defined in 40 CFR 355, would be produced, used, stored, transported, or disposed of during construction or operation of the facilities in amounts above threshold permissible quantities.

Solid waste (human waste, garbage, etc.) would be generated during construction activities, largely during drilling and completion operations due to an increased workforce. Trailers housing workers would be outfitted with self-contained sewage collection system; regular trash collection would occur throughout the drilling and well completion process.

Because of the use or production of solid and hazardous wastes, the potential exists for accidental contamination of surface water or groundwater. While uncommon, an accident could occur that would result in a release of one or more of these materials directly or indirectly into surface waters or in a way that poses a potential for transport to groundwater. For example, improper casing and cementing of the boreholes could result in the contamination of groundwater resources. Releases are also possible from tanks used for storage on the pad, from haul trucks used to transport materials to and from the pad, or from pipelines. Storage tanks on the pad are required to be placed within an area of secondary containment equal to 110% of the volume of the enclosed tanks.

In the event of any release of a hazardous substance to the environment in reportable quantities, the responsible party is required to implement a *Spill Prevention, Control, and Countermeasures (SPCC) Plan* and is liable for cleanup and monetary damages. Depending on the scope of the accident, the SPCC Plan or the GJFO contingency plan would apply. These laws, regulations, standard lease stipulations, and contingency plans and emergency response resources are expected to mitigate any potential hazardous or solid waste issues associated with the Proposed Action.

### **No Action Alternative**

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and gathering pipelines would be approved, but existing oil and gas production in the HDU would continue to operate using existing road and pipeline infrastructure on BLM and private lands. The potential for impacts associated with hazardous materials resulting from continued operation of existing facilities in the HDU would continue.

### 3.21 WATER RESOURCES – SURFACE AND GROUND

#### 3.21.1 Surface Water Quality

##### Affected Environment

The project area is located in the Colorado Plateau Physiographic Province, where basins and the broad valleys of the middle Colorado River and its tributaries form an irregular intermontane topography (Robson and Banta 1995). The uplift of the Colorado Plateau steepened stream gradients and accelerated the downcutting of the Colorado River and its principal tributaries.

The climate of the project area is characterized as semi-arid, with average annual precipitation from 10 to 15 inches for most of the project vicinity (Daly and Taylor 2012). Thus, perennial (year-round) surface water flows in the project vicinity are mostly limited to the Colorado River and to tributaries such as Roan Creek and Dry Fork with sources at high elevations that receive more than 30 inches of annual precipitation. Flows in intermittent and ephemeral drainages within the project area occur in response to spring snowmelt and large summer and early autumn thunderstorms.

The USGS classifies watershed areas in the United States into successively smaller hydrologic units: regions, sub-regions, basins, subbasins, watersheds and subwatersheds. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the six levels of classification in the hydrologic unit system. The project area is located in the Upper Colorado Region, Colorado Headwaters subregion and basin, Colorado Headwaters – Plateau (HUC 14010005) sub-basin, and Kimball Creek – Roan Creek watershed (NRCS 2017).

The two main subwatersheds of the HDMDP project area are:

- South Dry Fork Roan Creek (HUC 140100051004)
- Dry Fork Roan Creek (HUC 140100051005)

North Dry Fork Roan Creek (HUC 140100051003) also coincides with the HDMDP project area, but no project components would be located within that watershed.

Dry Fork Roan Creek begins at the confluence of South Dry Fork and North Dry Fork. Dry Fork drains into Roan Creek, which drains into the Colorado River. North Dry Fork is categorized as a perennial stream, but South Dry Fork has intermittent flows (NRCS 2017). Dry Fork Roan Creek, the principal drainage in the Homer Deep Unit, has perennial flows. There are numerous intermittent and ephemeral tributaries to Dry Fork, South Dry Fork, and North Dry Fork.

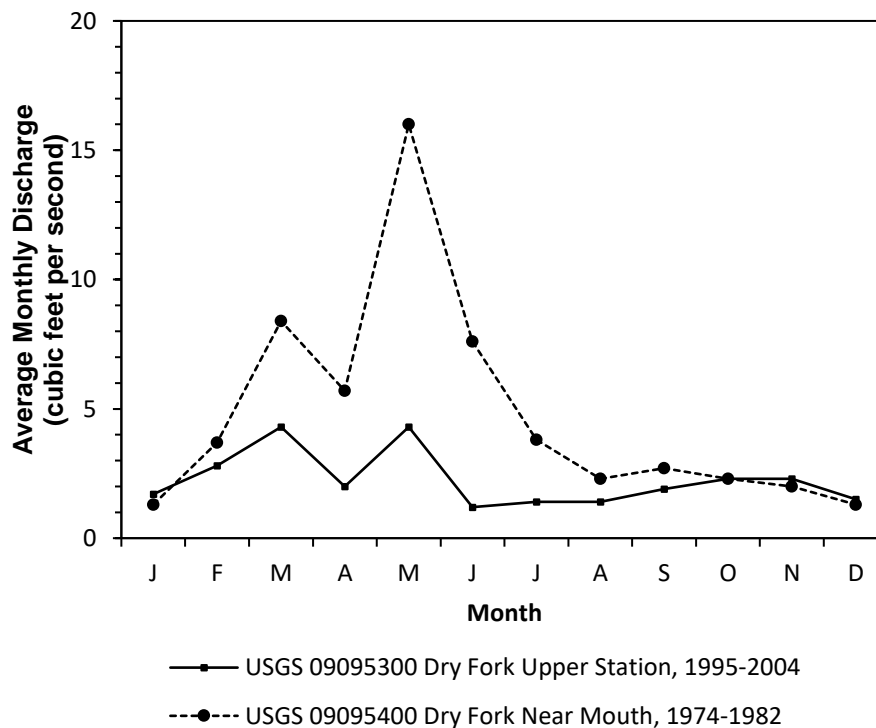
Middle Dry Fork is the main named tributary to North Dry Fork; other tributaries include Sawmill Gulch, Forshay Gulch, Lion Gulch, Bledsaw Gulch, Piling Gulch, Boldt Gulch, and a second Sawmill Gulch. McKay Fork and Corcoran Wash are the main named tributaries to South Dry Fork; other tributaries include streams in Lefthand Draw, Gothard Gulch, Hancock Gulch, and Pedigo Gulch. There are no named tributaries to Dry Fork of Roan Creek.

Numerous springs are mapped in the North Fork and South Dry Fork Roan Creek subwatersheds. One flow measurement for North Dry Fork downstream from the confluence of Middle Dry Fork with North Dry Fork (USGS 392501108295700) from August 1975 indicates a flow of 0.8 cubic feet per second (cfs) (USGS 2017). As shown on **Figure 1**, USGS data indicate that stream flows in the lower Dry Fork were perennial when data were collected at USGS Gage 09095400 from 1974 through 1982 (Adams et al. 1986). During that period, daily streamflow records indicate several instances of minimal flows during drought years in 1975 and 1977. The average daily flow for the period of record is 5 cfs, but peak flows as high as 784 cfs (October 1974) have been recorded (USGS 2017). The lowest flows occur during the winter months (**Figure 1**).

Data for suspended sediment concentrations (SSC) in Dry Fork from samples collected simultaneously with flow data (discharge) indicate a direct relationship between SSC and instream flow; i.e., higher sediment loads occur with higher flows (USGS 2017). Stream flows in upper Dry Fork drainage are also perennial in most years, as measured at USGS Gage 09095300; however, during the summers from 2001 to 2004, flows were minimal or non-existent for some weeks. The average daily flow for the period of record from 1995 through 2004 is 2 cfs, but peak flows as high as 2,660 cfs (August 2001) have been recorded (USGS 2017).

The headwaters of Roan Creek are north of the project area. Roan Creek has numerous named and unnamed tributaries upstream of the confluence with Dry Fork of Roan Creek. The downstream part of the Roan Creek Outlet subwatershed, downstream of the confluence with Dry Fork is adjacent to the HDU. Two main access roads to the project area also traverse the Roan Creek Outlet subwatershed. Roan Creek is perennial, with flows measured between 1 cfs (October 2003) and 45 cfs (November 1983) at its mouth before the confluence with the Colorado River (USGS 2017). Flows are highest in the spring, during snowmelt, and are lower during the irrigation season, when flows are diverted into ditches. Roan Creek Ditch Number 2 and Reservoir Ditch start on Roan Creek just downstream of the confluence with Dry Fork Roan Creek. There are numerous unnamed tributaries to Roan Creek downstream of the confluence with Dry Fork Roan Creek, but there are no named tributaries.

All drainages in the project area are within Stream Segment COLCLC14c, “Mainstem of Roan Creek including all tributaries and wetlands, from a point immediately below the confluence with Kimball Creek to the confluence with the Colorado River,” which has the following beneficial use classifications (CDPHE 2017a and CDPHE 2017b):



**Figure 1.**  
**Average Monthly Flows in Dry Fork of Roan Creek**

**Agriculture.** Includes suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous for ingestion by livestock.

**Aquatic Life Warm 1.** Includes waters (1) currently capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) that could sustain such biota but for correctable water quality conditions. Waters are considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.

**Recreation Class P – Potential Primary Contact Use.** Includes waters with the potential to be used for primary contact recreation. This classification is assigned to water segments for which no use attainability analysis (UAA) has been performed demonstrating that a recreation class N classification is appropriate, if a reasonable level of inquiry has failed to identify any existing primary contact uses of the water segment, or where the conclusion of a UAA is that primary contact uses may potentially occur in the segment, but there are no existing primary contact uses.

**Water Supply.** Includes waters suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent), these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements.

The Clean Water Act requires states to compile a list of waterbodies, known as the 303(d) list, that do not fully support their beneficial uses. The 2016 303(d) list and 305(b) Integrated Water Quality Monitoring and Assessment Report that the CDPHE provides to the EPA under the Clean Water Act shows that the portion of Stream Segment 14c pertinent to the project is listed as a Category 5, waterbodies requiring Total Maximum Daily Loads (TMDLs), due to selenium and manganese concentrations (CDPHE 2017c). This segment will remain in Category 5 until TMDLs for all pollutants are complete and approved by the EPA. According to the CDPHE, this segment is a low priority for TMDL development. Additionally, Stream Segment 14c is on the Colorado Monitoring and Evaluation list for total arsenic.

According to the Colorado Department of Natural Resources (CDNR) water rights database, there are 33 permitted water rights in the project area, eight ditches, three springs, and one well, primarily used for irrigation stock watering and wildlife. Twenty-one of the surface rights are associated with ponds located in Section 10 on High Lonesome Ranch. None of the water rights is for water within 1 mile of the proposed well pads, gathering pipelines, or roads (CDNR 2017a).

## **Environmental Consequences**

### **Proposed Action**

Potential impacts to surface water from the Proposed Action are associated with surface-disturbing activities, water use, road use, waste management, and the use, storage and transportation of fluids (i.e., chemicals and produced water). Surface-disturbing activities associated with the well pads, roads, and pipelines result in loss of vegetation cover, soil compaction and displacement, increased volume and velocity of runoff, and increased sedimentation and impacts to overall surface water quality.

Stormwater management of the roads and pads would reduce erosion. As proposed, these measures would include limiting cut slope steepness, crowning road surfaces, installing culverts and drainage systems, and applying gravel to all upgraded roads in the project area to a compacted thickness of 6 inches (**Appendix A**).

Fresh water would be obtained from approved commercial water sources and would be trucked to the new wells to augment drilling. Water used for well completions would be sourced primarily from the

operator's water recycling and water line delivery systems (De Beque Pumping Station, De Beque Pipeline, and HDU Pipelines).

Oil and gas waste management practices have the potential to contaminate soils and surface water. Contamination of soils could cause long-term reduction in site productivity, resulting in increased erosion and potential sediment and contaminant delivery to nearby waterways during runoff. The use, storage, and transportation of fluids, such as produced water, and hydraulic fracturing fluids have an associated risk of spills that could affect water resources. Elements of the Proposed Action are designed to minimize and mitigate risks to surface waters associated with the release and migration of drilling fluids, produced water, and condensate. A closed-loop drilling system would be implemented. Drill cuttings would be collected from the drill rig shaker system, mixed with drying agents, tested and either deposited in the cuttings trench or hauled offsite.

In addition to individual containment measures, each pad would have berms to contain an accidental release. In the event of an accidental release, produced water would be confined for cleanup in a containment area to prevent migration to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure-tested to detect leakage prior to use. Implementation of COAs for mitigating impacts to surface waters (**Appendix A**) during development and production activities, including activities on the well pads as well as the access roads and pipelines.

#### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting surface water would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipeline operation and maintenance, access road use and maintenance, recreation, and grazing.

### **3.21.2 Waters of the U.S.**

#### **Affected Environment**

The Proposed Action may affect two potential jurisdictional Waters of the U.S. These potentially jurisdictional waters include one intermittent stream (South Dry Fork) and one unnamed ephemeral drainage without an ordinary high water mark. Section 404 of the Clean Water Act requires a Department of the Army permit from the U.S. Army Corps of Engineers (USACE) prior to discharging dredged or fill material into Waters of the U.S. as defined by 33 CFR Part 328. Both potentially jurisdictional waters were dry during survey efforts in summer 2016 and are expected to contain water only during protracted wet periods or intensive rainstorm events.

#### **Environmental Consequences**

##### Proposed Action

Both of the potentially jurisdictional Waters of the U.S. would be crossed by the gathering pipeline associated with the HDU 13-21-99 well pad. Impacts to Waters of the U.S. would be minimized by installing the pipeline to an adequate depth across these features when they are dry.

Impacts to Waters of the U.S. from the planned features of the Proposed Action would be addressed by the USACE through the agency's permitting system. A COA listed in **Appendix A** requires that the operator obtain a formal jurisdictional determination by the USACE prior to any construction that could affect Waters of the U.S. and verification that the impacts do not require a permit or are covered by an

existing Nationwide Permit. Neither of the impacts to potential Waters of the U.S. would be expected to require an Individual Permit.

### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting Waters of the U.S. would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipeline operation and maintenance, access road use and maintenance, recreation, and grazing.

### **3.21.3 Groundwater**

#### **Affected Environment**

The Mesaverde aquifer, part of the Colorado Plateau aquifer system, is the major bedrock aquifer in the southern half of the project area. In the project area, the Mesaverde Group predominantly consists of sandstone with interbedded shale and coal (Robson and Banta 1995).

The Uinta-Animas aquifer part of the Colorado Plateau aquifer system is the major bedrock aquifer in northern half of the project area, overlaying the Mesaverde aquifer. The Uinta-Animas aquifer primarily is composed of Lower Tertiary aged strata of the Uinta Formation and the Parachute Creek Member of the Green River Formation. The Uinta Formation consists of silty sandstone, siltstone and marlstone. Much of the interstitial (pore) space in these rocks has been filled by sodium and calcium bicarbonate cements, but fractures are numerous and produce substantial permeability. The Parachute Creek Member primarily consists of dolomitic marlstone. The lower part of the Green River Formation and the Wasatch Formation form most of the lower confining unit of the aquifer (Robson and Banta 1995).

Substantial usable groundwater resources in the project area are contained in Quaternary alluvium in valleys within the Roan Creek watershed. Most of the alluvial groundwater is recharged from snowmelt at higher elevations. Precipitation occurring from convective summer thunderstorms can also be a substantial source of groundwater recharge beneath ephemeral stream channels and near-stream alluvial deposits. The valley fill alluvium in the Roan and Upper Jerry Creek subwatersheds consists generally of unconsolidated gravel, sand, and silt, with occasional boulders originating from cliffs and caprocks. Based on valley profiles, the alluvium in Roan Creek may be as thick as 100 feet. The depth to water in shallow wells in the alluvial aquifer along Roan Creek downstream from its confluence with Dry Fork ranges from 11 to 41 feet (USGS 2017). Substantial groundwater is also found in the alluvium along the Colorado River. Colorado River alluvium is sandy gravel of substantial width in the Horseshoe Canyon subwatershed of the Colorado River, but has limited extent in De Beque Canyon in the Roberts Canyon subwatershed of the Colorado River (Topper et al. 2003), where the river is incised across the west flank of the Piceance structural basin.

According to the CDNR well permit database (CDNR 2017b), 13 registered well permits are located within a 1-mile buffer of proposed project disturbance. Seven of the wells have been constructed, of which four are domestic water wells owned by #10 Enterprises LLC, with listed well depths between 10 and 110 feet and water yields ranging between 10 to 15 gallons per minute (gpm). Other wells identified within the buffer are listed as monitoring wells, or were canceled or denied. Surface deposits within the HDMDP project area are primarily alluvium and colluvium, so it is likely the wells are completed in alluvial aquifers, typical for this part of the basin.

## Environmental Consequences

### Proposed Action

Potential impacts to groundwater resources from the proposed development would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents. Hydraulic fracturing (HF) would be incorporated to create additional pathways to facilitate gas production. Agents called “proppants,” used to prop open the fractures, are mixed with both fresh water and produced water. These typically include sand, aluminum, glass, or plastic beads, with less than 1% of other compounds such as corrosion-, friction-, and scale-inhibitors (EnerMax Inc. 2007). Hydraulic fracturing is used to create secondary porosity fractures, held open by proppants, allowing the otherwise trapped gas to migrate up the borehole for production.

Hydraulic fracturing would be conducted at 5,000 feet or more below ground surface (bgs). Drilling scenarios are developed to prevent fluids and produced hydrocarbons from migrating upward into fresh water zones. Geologic and engineering reviews are conducted to ensure that the cementing and casing programs are adequate to protect all downhole resources. With proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers is anticipated to result from the project (see Downhole COAs in **Appendix A**).

Potential Impacts of Hydraulic Fracturing. Oil and gas companies and independent geophysicists have, for many decades, monitored microseismic activity—defined as a “faint” or “very slight” tremor—during HF operations to help them optimize well completions and to gather information about fracture dimensions and propagation (Warpinski 2011). These data give an indication of the magnitude of seismic activity associated with HF, dimensions of resultant (induced) fractures in geologic formations, and probability for induced fractures to extend into nearby aquifers, if present. Microseismic activity created by HF typically occurs at Richter magnitude 1.0 or less (Warpinski et al. 2012). In comparison, a magnitude 3 earthquake is the threshold that can be felt at the ground surface. In 2012, the National Academy of Sciences (NAS) reviewed more than 100,000 oil and gas wells and waste water disposal wells around the world and concluded that “incidences of felt induced seismicity appear to be very rare,” with only one such documented occurrence, with a magnitude of 3.6 (NAS 2012; Ellsworth 2013).

More recently, earthquakes with magnitude 2.1 to 3.0 were recorded in Ohio in 2014. These were subsequently attributed to HF using large volumes of water in proximity to highly fractured Precambrian basement rocks (Skoumal et al. 2015). No significant damage has been documented as a result of the small number of induced earthquakes attributable to HF (Abdulaziz 2014). In comparison, wastewater disposal wells have a greater potential for felt earthquakes due to the larger volumes and longer durations of fluid injection into bedrock. Recent increases in felt earthquakes in hydrocarbon-producing regions of the central and eastern U.S. have been associated almost exclusively with wastewater disposal wells (e.g., see Ellsworth 2013).

The dimensions of induced fractures have been measured with field monitoring equipment and in laboratory tests and compared to three-dimensional (3D) hydraulic fracture models. Researchers have successfully validated these models for fracturing in “tight-gas” reservoirs, including those beginning to be developed in western Colorado. Results of the analyses show that fractures resulting from completions of oil and gas wells can be predicted (Zhai and Sharma 2005; Green et al. 2009; Palisch et al. 2012; Ellsworth 2013) and that the length of fractures in relation to well depth can be estimated.

Hydraulically induced fracture orientation in relation to the wellbore depends on the downhole environment (i.e., rock mechanics, minimum and maximum principal stress directions, rock physical properties, etc.) and the wellbore trajectory. In vertical or normal directional wells such as in the Mesaverde Formation—the predominant hydrocarbon-producing formation in the CRVFO area—fracture



growth is primarily lateral or outward from the wellbore, with minimal secondary fractures extending at some angle from the lateral fractures.

In horizontal wells such as those being used to develop deepwater marine shales, fracture growth from the wellbore is mainly determined by the orientation of the wellbore in relation to the principal stresses of the rock. Fracture growth toward the surface is limited by barriers such as variations in stress and lithology, as is also the case in vertical and normal directional wells. In some horizontal wells, fracture growth is similar to that in vertical or normal directional wells due to wellbore trajectory along the maximum principal stress direction. Analysis of data from thousands of wells indicates fracture extent (length) of less than 350 feet in the large majority of cases, with outliers of 1,000 to 2,000 feet (Maxwell 2011; Davies et al. 2012) in thick deposits of lithologically uniform marine shales.

The potential height of hydraulically induced fractures in horizontal drilling is reduced in layered sediments in which a propagating fracture encounters a change in rock type or a bedding plane within a formation or a contact between formations. When these features are encountered, the fracture either terminates or to a lesser extent reorients along the generally horizontal bedding plane or formation contact instead of continuing upward across it. In western Colorado, natural gas production is primarily from vertically stacked, lenticular tight sands of the Mesaverde Formation using vertical and directional wells. These tight-sand lenses are a few tens of feet thick or less. More recently, advances in horizontal drilling technology have allowed enhanced development of deeper marine shales such as the Niobrara (Mancos) Formation. These tight-shale deposits are typically a few hundreds or thousands of feet thick in western Colorado compared to many thousands of feet in some other gas-producing regions. The somewhat lesser thickness of hydrocarbon-bearing strata in this area limits the vertical growth of primary and secondary fractures resulting from hydraulic stimulation.

Review of available information on microseismic monitoring and fracture dimensions (Fisher and Warpinski 2011; Stone et al. 2016) indicates that fractures from deep horizontal wells are not a threat to propagate across the long vertical distances (thousands of feet) needed to reach fresh-water aquifers much closer to the surface. This conclusion applies to much of western Colorado and is also applicable to much shallower potable groundwater sources consisting of unconsolidated alluvium (streambed deposits) associated with the Colorado River and major tributaries. In general, alluvial water wells in the project vicinity extend to depths of less than 200 feet. Impacts to water quality of shallow freshwater wells are highly improbable as a result of HF, which occurs at depths of greater than 5,000 feet below ground surface.

In addition to vertical separation between the upper extent of fractures and fresh-water aquifers are requirements by the BLM and COGCC for proper casing and cementing of wellbores to isolate the aquifers penetrated by the bore. BLM requires that surface casing be set from 500 to 1,500 feet deep, and potentially deeper, based on a geological review of the formations, aquifers, groundwater, and proximity to surface waters. Cement is then pumped into the space between the casing and surrounding rock to prevent fluids from moving up the wellbore and casing annulus and coming in contact with shallow rock layers, including fresh-water aquifers. BLM petroleum engineers review well and cement design and final drilling and cementing logs to ensure that the cement has been properly placed. When penetration of groundwater and freshwater aquifers is anticipated, BLM inspectors may witness the cementing of surface casing and pressure testing to ensure that the space between the casing and borehole wall is sealed.

No single list of chemicals currently used in HF exists for western Colorado, and the exact combinations and ratios used by operators are considered proprietary. However, the general types of compounds and relative amounts used are well known and relatively consistent (**Table 28**). Because HF operations are tailored to the downhole environment, and companies are aware of the concerns involving its use, the chemicals listed in **Table 28** may or may not be used, and the information is provided solely as general information.

**Table 28. Constituents of Typical Hydraulic Fracturing Operations in Tight Gas Formations**

<i>Additive Type*</i>	<i>Typical Example*</i>	<i>Percent by Volume**</i>	<i>Function*</i>	<i>Common Use of Example Compound</i>
Acid	Hydrochloric acid	0.123	Dissolves mineral cement in rocks and initiates cracks	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	0.001	Eliminates bacteria in the water that produce corrosive or poisonous by-products	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	0.010	Allows delayed breakdown of the gel	Used in hair coloring, as a disinfectant, and in manufacture of household plastics
Clay stabilizer	Potassium chloride	0.060	Creates a brine carrier fluid that prohibits fluid interaction with formation clays	Used in low-sodium table salt substitutes, medicines, and IV fluids
Corrosion inhibitor	Formic acid	0.002	Prevents corrosion of the well casing	Used as preservative in livestock feed; used as lime remover in toilet bowl cleaners
Crosslinker	Borate salts	0.007	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps, and cosmetics
Friction reducer	Polyacrylamide	0.088	“Slicks” the water to minimize friction	Used as a flocculant in water treatment and manufacture of paper
Gelling agent	Guar gum	0.056	Thickens the water to help suspend the sand propping agent	Used as a thickener, binder, or stabilizer in foods
Iron control	Citric acid	0.004	Prevents precipitation of metal oxides	Used as flavoring agent or preservative in foods
Surfactant	Lauryl sulfate	0.085	Increases the viscosity of the fluid	Used in soaps, shampoos, detergents, and foaming agents
pH adjusting agent	Sodium hydroxide, acetic acid	0.011	Adjusts pH of fluid to maintain the effectiveness of other components	Sodium hydroxide used in soaps, drain cleaners; acetic acid used as chemical reagent, main ingredient of vinegar
Scale inhibitor	Sodium polycarboxylate	0.043	Prevents scale deposits in the pipe	Used in dishwashing liquids and other cleaners
Winterizing agent	Ethanol, isopropyl alcohol, methanol	--	Added as necessary as stabilizer, drier, and anti-freezing agent	Various cosmetic, medicinal, and industrial uses
<b>Total Additives</b>		<b>0.49</b>		
<b>Total Water and Sand</b>		<b>99.51</b>		

Source: Ground Water Protection Council and the Interstate Oil and Gas Compact Commission 2017; U.S. Department of Energy (DOE) 2009.

Although a variety of chemicals are used in HF—the examples in **Table 28** being drawn from a total of 59 listed on the FracFocus website—the bulk of fluid injected into the formation during the process is water mixed with sand, representing 99.51% of the total by volume in the typical mixture shown in **Table 28**. The sand listed in the table is used as a proppant to help keep the newly formed fractures from closing.

Following completion of fracturing activities, the pressure differential between the formation - a result of several thousand feet of overlying bedrock - and the borehole that connects with the surface causes most of the injected fluids to flow toward the borehole and then upward to the surface along with the hydrocarbon fluids released from the formation. The composition of this mixture, called flowback water, gradually shifts over a period of several days to a few months as injected fluids that have not yet migrated back to the wellbore or reacted with the native rock are carried out of the formation.

In 2011, the COGCC published an analysis of the use in Colorado of HF technology and potential risks to human health and the environment. The introduction to that report included the following paragraph:

“Hydraulic fracturing has occurred in Colorado since 1947. Nearly all active wells in Colorado have been hydraulically fractured. The COGCC serves as first responder to incidents and complaints concerning oil and gas wells, including those related to hydraulic fracturing. To date, the COGCC has not verified any instances of groundwater contaminated by hydraulic fracturing.”

Various authors (e.g., Shonkoff et al. 2014) have described the potential for contamination of groundwater via HF-induced fractures, but no such contamination has been demonstrated. Based on the information summarized above, the BLM has concluded that use of HF technology in completions of oil and gas wells for the purpose of facilitating recovery of Federal fluid minerals does not represent a significant risk of impacts to human health and the environment.

#### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting groundwater would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

### **3.22 WILDLIFE – AQUATIC AND TERRESTRIAL**

#### **3.22.1 Aquatic Organisms**

##### **Affected Environment**

The project area is within the Roan Creek drainage. Dry Fork, a perennial stream, and South Dry Fork, an intermittent stream, occur in the project vicinity and are tributaries to Roan Creek. Non-native brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss*) are present in Roan Creek. It is possible that these trout and any other fishes could move upstream into South Dry Fork during periods of high flow, but this movement would be limited in distance and duration. Dry Fork, although perennial, was not found to contain fish during sampling in 1996. Limiting factors include small flows, and generally poor structural habitat, and high dissolved solids (salinity) (Deacon and Mize 1997). See **Section 3.17** regarding special status fishes associated with the Colorado River.

##### **Environmental Consequences**

###### **Proposed Action**

Native fish could be directly or indirectly affected by water depletions in the Colorado River system, similar to those described above for endangered Colorado fish species (see **Section 3.17**). Also, native fish species could be affected during construction of the gathering pipeline to HDU 13-21-99 that would cross two drainages. Construction across two drainages could increase sedimentation downstream, if

water is present, or could alter aquatic habitats. The drainages would be crossed when they are dry, which would reduce potential effects. Accidental release of hazardous materials (diesel fuel, lubricants, and herbicides) in aquatic habitats could also have potential effects downstream. Implementation of the operator's stormwater plan and stormwater BMPs would minimize impacts to native fish.

### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting aquatic organisms would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

### **3.22.2 Migratory Birds**

#### **Affected Environment**

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements treaties for the protection of migratory birds. Executive Order (EO) 13186, issued in 2001, directed actions that would further implement the MBTA. As required by the MBTA and EO 13186, BLM signed a Memorandum of Understanding (MOU) with the USFWS in April 2010. The MOU is intended to strengthen migratory bird conservation efforts by identifying and implementing strategies to promote conservation and reduce or eliminate adverse impacts on migratory birds. The focus of BLM's conservation efforts is on migratory species listed as Birds of Conservation Concern (BCC). BCC species have been identified by the USFWS (2008b) for different Bird Conservation Regions (BCR) in the United States. The Proposed Action is in BCR 16, the Southern Rockies/Colorado Plateau.

Migratory bird species Federally listed under the ESA, as amended, or classified by the BLM as sensitive species, are addressed under the section on Special Status Wildlife and Fish Species (**Section 3.17**). This section focuses on BCC species, non-BCC species, and raptors.

The HDMDP project area is primarily a mix of sagebrush shrublands and pinyon-juniper woodlands that provide nesting and foraging habitat for migratory and resident bird species at various times of the year. Two BCC species were observed in pinyon-juniper woodlands and sagebrush during onsite surveys near well pad HDU 5-34 (WestWater Engineering 2016): pinyon jay (*Gymnorhinus cyanocephalus*) and juniper titmouse (*Baeolophus ridgwayi*). Sagebrush habitats in the project area could support nesting by Brewer's sparrow (*Spizella breweri*), a sagebrush-obligate migrant, but none was observed in the project area and vicinity. Other BCC species that may occur in the area include gray vireo (*Vireo vicinior*) and Cassin's finch (*Haemorhous cassinii*).

Several non-BCC migratory bird species were also observed during surveys in the project area (WestWater Engineering 2016) and would be expected to forage and potentially nest in or near the project area. These were the American robin (*Turdus migratorius*), black-headed grosbeak (*Pheucticus melanocephalus*), blue-gray gnatcatcher (*Poliophtila caerulea*), chipping sparrow (*Spizella passerina*), common raven (*Corvus corax*), house finch (*Haemorhous mexicanus*), mountain bluebird (*Sialia currucoides*), mourning dove (*Zenaidura macroura*), rock wren (*Salpinctes obsoletus*), spotted towhee (*Pipilo maculatus*), turkey vulture (*Cathartes aura*), vesper sparrow (*Pooecetes gramineus*), and western meadowlark (*Sturnella neglecta*).

The project area and vicinity may also support nesting and/or foraging by raptors (birds of prey), including three species that are listed as BCC species: the golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*), and prairie falcon (*Falco mexicanus*). In 2014, 2015, and 2016, WestWater

Engineering (2016) conducted raptor surveys within 0.25 mile of proposed well pads and road and pipeline alignments, extended to 0.5 mile from well pads where potential cliff-nesting habitat was present. Four raptor nests were documented in the project area (WestWater Engineering 2016), including one occupied, long-eared owl (*Asio otus*) nest within 165 feet of the proposed pipeline to HDU 13-21-99 in cottonwoods along South Dry Fork. The other three nests were documented farther than 0.25 mile from proposed project components (WestWater Engineering 2016). These included one occupied great horned owl (*Bubo virginianus*) nest, one nest occupied by another pair of owls (believed to be long-eared owls (*Asio otus*), and one unoccupied nest believed to have been used by common ravens). Raptors observed flying or perched in the survey areas include the American kestrel (*Falco sparverius*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), and red-tailed hawk (*Buteo jamaicensis*) (WestWater Engineering 2016). A golden eagle nest was documented more than 4 miles east of the project area (WestWater Engineering 2016).

Winter roosting and foraging habitat for the bald eagle (*Haliaeetus leucocephalus*) – both a BCC species and a BLM sensitive species – has been mapped along CR 200 on the north end of the HDU. Some use of the project area by bald eagles could occur during winter months (CPW 2014).

## **Environmental Consequences**

### **Proposed Action**

Construction of the Proposed Action could affect migratory birds primarily through habitat loss, habitat fragmentation, direct mortality, and interference with life-history functions.

**Habitat Loss.** Removal of vegetation used for nesting or foraging reduces the number and, potentially, the diversity of birds occupying an area. This loss may consist of physical removal of vegetation for pads, roads, and pipelines, or effective habitat loss due to changes that make an area less suitable or unsuitable for one or more species. Effective habitat loss may include changes in vegetation, such as from invasion by noxious or other non-native plants. For species likely to use habitats within the basin big sagebrush, greasewood, and saltbush habitats where vegetation loss would be concentrated, the loss of 21 acres would represent a relatively small number of breeding pairs and result in impacts at the level of individuals instead of populations. In addition, habitat types where project components would be located do not typically support sue by three BCC habitat specialists—the pinyon jay and juniper titmouse in pinyon-juniper woodlands and the Brewer's sparrow in Wyoming sagebrush shrublands—and impacts to these species would therefore be minimal.

**Habitat Fragmentation.** Loss or modification of vegetation results not only in less habitat for nesting or foraging, and fewer food sources such as seeds, fruits, and invertebrate prey, but also in habitat fragmentation if it occurs in relatively large, unbroken blocks of continuous habitat. Sensitive bird species often are habitat specialists, such as the pinyon jay and Brewer's sparrow, that require relatively large habitat blocks instead of more fragmented habitat mosaics. Habitat fragmentation is generally accompanied by decreased numbers of specialists and greater numbers of generalists able to use multiple habitat types, and typically consisting of more abundant and widespread species. For the HDMDP, habitat fragmentation is expected to be a minor impact due to the location adjacent to a regularly used county road and an existing habitat mosaic associated with a valley floor and nearby ranching operations.

**Direct Mortality.** Direct mortality of nesting birds could occur primarily by construction activities that result in destruction of nests containing eggs or nestlings. Loss of eggs or nestlings could also occur due to abandonment by one or both parents as a result of noise, operation of large vehicles nearby, human activity, and loss or modification of a portion of a nesting territory. To reduce these impacts, a COA would be applied to prevent vegetation removal in potential nesting habitat during the core nesting season of May 15 to July 15 (**Appendix A**). However, because this Timing Limitation (TL) does not include the entire nesting season for all species, some destruction or other loss of active nests is likely.

An additional, potential source of mortality is increased predation by corvids (jays, magpies, crows, and ravens) and small carnivores (skunks, raccoons, foxes, and coyotes), which are attracted to areas of human occupation and use (Marzluff and Neatherlin 2006). Because the project area is in proximity to an active ranch headquarters along a disturbed valley floor, it is unlikely that the development of the two well pads would add discernibly to the existing risk. However, to reduce potential increases in predation, the operator would confine all trash in a covered container, and would promptly remove and haul it to an authorized disposal site.

**Interference with Life-History Functions.** Noise produced by machinery and other human activities can interfere with bird vocalizations used for territory establishment, mate attraction and selection, food begging, and predator alarms (Marler 2004). Operation of heavy equipment could also displace birds from preferred habitats for a short time due to noise and human presence. Construction-generated noise and human presence could disturb nesting within an area extending beyond the project components, depending on equipment used and local conditions such as topography and tree cover.

While these impacts may affect nesting by small birds, they are of greater concern in relation to birds of prey, which are less abundant, require larger home ranges to meet their foraging requirements, and generally more sensitive to disturbance. Noise-related impacts to birds of prey would be limited primarily to periods of construction, drilling, and completion activities, and of greatest concern relative to nesting by birds of prey to as far as 0.25 or 0.5 mile from the developments (**Table 29**).

**Table 29. Timing and Buffer Recommendations for Active Raptor Nests**

<i>Common Name (Scientific Name)</i>	<i>Buffer Width</i>	<i>Seasonal Restriction</i>
American kestrel ( <i>Falco sparverius</i> )	0.25 mile	March 1 – August 15
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	0.50 mile	November 15 – July 31
Burrowing owl ( <i>Athene cunicularia</i> )	0.25 mile	March 1 – August 15
Cooper’s hawk ( <i>Accipiter cooperii</i> )	0.25 mile	April 1 – August 15
Ferruginous hawk ( <i>Buteo regalis</i> )	0.50 mile	February 1 – July 15
Flammulated owl ( <i>Psiloscops flammeolus</i> )	0.25 mile	April 1 – August 1
Golden eagle ( <i>Aquila chrysaetos</i> )	0.50 mile	December 15 – July 15
Great horned owl ( <i>Bubo virginianus</i> )	0.25 mile	February 1 – August 15
Long-eared owl ( <i>Asio otus</i> )	0.25 mile	March 1 – July 15
Northern goshawk ( <i>Accipiter gentilis</i> )	0.50 mile	March 1 – September 30
Northern harrier ( <i>Circus cyaneus</i> )	0.25 mile	April 1 – August 15
Northern saw-whet owl ( <i>Aegolius acadicus</i> )	0.25 mile	March 1 – July 15
Osprey ( <i>Pandion haliaeetus</i> )	0.25 mile	April 1 – August 31
Peregrine falcon ( <i>Falco peregrinus</i> )	0.50 mile	March 15 – July 31
Prairie falcon ( <i>Falco mexicanus</i> )	0.50 mile	March 15 – July 31
Red-tailed hawk ( <i>Buteo jamaicensis</i> )	0.33 mile	February 15 – July 15
Sharp shinned hawk ( <i>Accipiter striatus</i> )	0.25 mile	April 1 – August 15
Swainson’s hawk ( <i>Buteo swainsoni</i> )	0.25 mile	April 1 – July 15
Source: BLM 2015a.		

Before initiating these activities during the general raptor nesting season (December 15 to August 15), raptor surveys would be required to confirm whether nest structures identified during previous surveys are active or inactive, and to search for and determine the status of additional nests. For the HDU 13-21-99 well pad and access road/pipeline, which would be authorized by a ROW grant under the GJFO RMP (BLM 2015a), a TL stipulation would be applied to prevent initiation of construction, drilling, and completion within the specified buffer distances from any active nest. For the HDU 5-34 pad, with protections primarily under BLM's regulatory authority in association with the underlying Federal lease, the BLM would apply a 60-day raptor nesting TL, with specific dates based on the particular species. See **Appendix A** regarding restrictions in relation to raptor nesting. In both situations, documentation that a nest structure is not active in a given year would be the basis for granting an exception to the TL.

### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting migratory birds would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

### **3.22.3 Other Terrestrial Species**

#### **Affected Environment**

**Mammals.** A variety of terrestrial mammal species are known to occur in the project area. These include four big game species: the mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus nelsoni*), black bear (*Ursus americanus*), and mountain lion (*Puma concolor*).

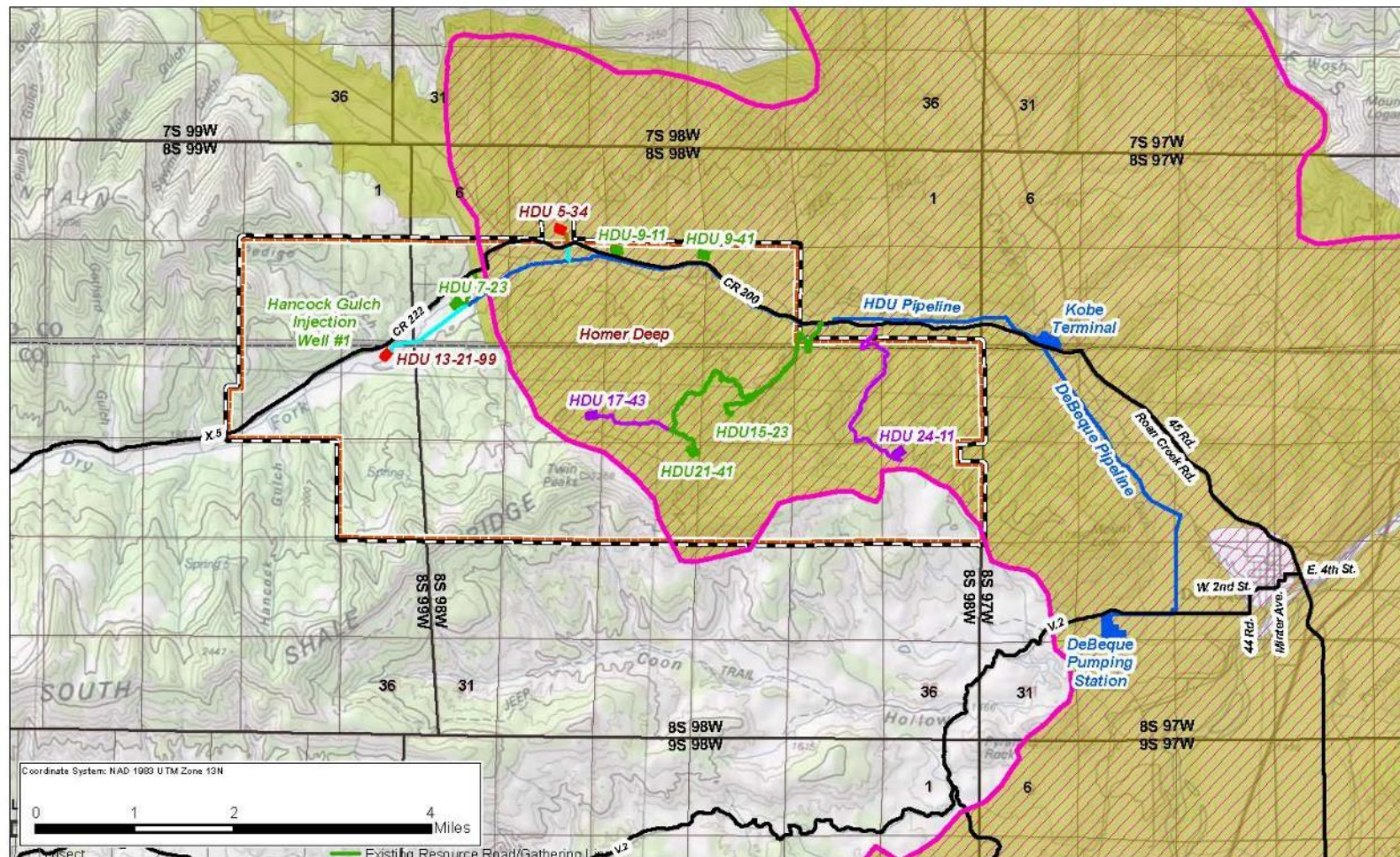
The Proposed Action is located within overall range for both mule deer and elk. In addition, a winter concentration areas and severe winter range have been delineated for mule deer in much of the project vicinity (**Map 6**). CPW (2012b) has defined the categories of winter use as follows:

- Winter range is utilized by 90% of the population during an average five out of ten winters.
- Winter concentration areas are smaller areas within winter range where animal densities are (at least) 200% greater than the density on surrounding winter range during an average five of ten winters.
- Severe winter ranges are sub-areas within winter range where wintering animals are highly concentrated (severe winter ranges support 90% of the population) during the most severe two out of ten winters (when snowpack depths are greatest and/or temperatures are lowest).

Elk and mule deer are likely to be present on winter ranges from the first heavy snowfall (November or December) to spring green-up, usually April to May. The conditions of winter range in the project vicinity are generally in poor condition, likely attributable to historic grazing practices, drought, and invasion by non-native plant species (CPW 2012a).

Black bear fall concentration areas coincide with HDU 13-21-99. Mountain lions are present primarily from fall through spring, when deer (their preferred prey) are concentrated along the valley floors and nearby slopes. Other mammals that have been observed or could occur in the project vicinity based on available habitats include medium-size and small predators such as the coyote (*Canis latrans*), bobcat (*Lynx rufus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilis*), raccoon (*Procyon lotor*), and ringtail (*Bassariscus astutus*).





- Project Area Boundary
- Unit Boundary
- Project Area Boundary
- Mule Deer Winter Concentration Area
- Mule Deer Severe Winter Range
- Proposed Well Pad
- Proposed Upgraded Road / Gathering Line
- Proposed New Road / Gathering Line
- Proposed New Road
- Proposed New Gathering Line
- Existing Facilities
- Existing Pipeline
- Approved Well Pad – Not Constructed
- Approved Resource Road/Gathering Line
- Existing Resource Road/Gathering Line

Homer Deep Master Development Plan  
 Mule Deer Ranges  
 Map 6



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This project was developed through digital means and may be updated without notice.



Lagomorphs likely to occur are the desert cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit (*Lepus californicus*). Small rodents expected to occur include the desert woodrat (*Neotoma lepida*), rock squirrel (*Otospermophilus variegatus*), golden-mantled ground squirrel (*Callospermophilus lateralis*), least chipmunk (*Neotamias minimus*), bushy-tailed woodrat or packrat (*Neotoma cinerea*), deer mouse (*Peromyscus maniculatus*), and long-tailed vole (*Microtus longicaudus*).

Several bat species may roost in trees, rock outcrops, and cliff faces in the project vicinity and forage on aerial insects. Among bats most likely to occur are the California myotis (*Myotis californicus*), western small-footed myotis (*M. ciliolabrum*), little brown myotis (*M. lucifugus*), long-legged myotis (*M. volans*), Yuma myotis (*M. yumanensis*), western pipistrelle (*Pipistrellus hesperus*), and big brown bat (*Eptesicus fuscus*). See **Section 3.17** regarding BLM sensitive bat species potentially present in the vicinity.

**Birds.** In addition to the species described above in the subsection on Migratory Birds are two gamebird species. The non-native chukar (*Alectoris chukar*), introduced to provide hunting opportunities, occupies arid, rocky terrain dominated by herbaceous plants or low shrubs. The wild turkey (*Meleagris gallopavo*), a native species, is reported by CPW (2017) to use the area near the proposed HDU 13-21-99 well pad in the winter (CPW 2014). However, more widespread use by the turkey, including for nesting, seems likely in areas with patches of relatively dense cover and, especially, with Gambel's oaks or native fruit-bearing trees (e.g., chokecherries, hawthorns) as sources of food. Turkeys also feed on pinyon pine nuts and juniper cones (berries), especially when the woody vegetation has a well-established understory of native grasses and forbs.

**Amphibians and Reptiles.** Among amphibians, the area is within the known range of Woodhouse's toad (*Anaxyrus woodhousii*), barred tiger salamander (*Ambystoma maculatum*), and western chorus frog (*Pseudacris triseriata*), all of which may occur in seasonally or permanently inundated areas along drainages and in stockponds in the project vicinity. The northern leopard frog, a BLM sensitive species that requires a permanent water source with good-quality water, has been observed in the project vicinity (see **Section 3.17**).

The project area is within the elevational range of a variety of reptiles. Species that have been observed or are likely to occur include the plateau lizard (*Sceloporus undulatus*), tree lizard (*Urosaurus ornatus*), short-horned lizard (*Phrynosoma hernandesi*), western whiptail (*Aspidoscelis tigris*), plateau striped whiptail (*Aspidoscelis velox*), collared lizard (*Crotaphytus collaris*), western fence lizard (*Sceloporus occidentalis*), and sagebrush lizard (*Sceloporus graciosus*). Snakes potentially present include the gopher snake (bullsnake) (*Pituophis catenifer*), yellow-bellied racer (*Coluber constrictor*), western terrestrial garter snake (*Thamnophis elegans*), striped whipsnake (*Masticophis taeniatus*), and smooth green snake (*Opheodrys vernalis*). The midget faded rattlesnake, a BLM sensitive species addressed in **Section 3.17**, is known to occur in the project area.

## **Environmental Consequences**

### **Proposed Action**

Construction of the Proposed Action could directly or indirectly affect terrestrial wildlife through one or more of the causes described below. Overall, the location of the project adjacent to existing access roads and near ranching and existing oil and gas development would reduce the potential for additional impacts.

**Habitat Loss.** The Proposed Action would remove approximately 21 acres of mostly basin big sagebrush habitat potentially used by big game, upland and small game, and other wildlife species. The entire project would be located within mule deer and elk winter ranges, including a mule deer winter concentration area and severe winter range. In addition to this direct habitat loss could be reduced habitat quality of nearby areas by spread or colonization of weedy plant species (**Section 3.18**, Vegetation), mostly unpalatable to wildlife (Whitson et al. 1996). To reduce the potential for noxious weeds to be

established, surface disturbance would occur along existing disturbance corridors and promptly revegetated with a BLM-approved, certified weed-free native seed mix. To facilitate successful interim reclamation of the proposed well pads, the operator would fence the pads to BLM standards to exclude livestock until seeded species are firmly established.

Displacement. Development activities, increased traffic, and habitat loss or modification could result in displacement of terrestrial wildlife for varying distances from project components. This displacement would be greatest during construction, drilling, and completion activities, but for some highly sensitive species could result in longer term avoidance, or decreased use, around the pads.

Potential impacts from displacement and avoidance by deer and elk are exacerbated by the presence of a mule deer winter concentration area and severe winter range encompassing the county road access to the project area (**Map 6**). Because the HDU 5-34 pad location is within this sensitive winter range, and the underlying Federal minerals are unleased, the big game winter range TL in the GJFO RMP (GJFO 2015a) would prohibit development from December 1 to April 30 (**see Appendix A**). In contrast, the Federal lease underlying the HDU 13-21-99 pad does not have a TL stipulation, and the pad location is not within sensitive winter range. Therefore, this pad could support development activities year-round, unless precluded by one or more active raptor nests within the species-specific buffers in **Table 29** (see above).

To reduce traffic volumes during long-term production, the operator would use remote telemetry to monitor wells when feasible given the surrounding topography.

Direct Mortality. Increased project-related traffic and operation of heavy equipment could result in wildlife mortalities. Species most susceptible to vehicle-related mortality include those that are inconspicuous (lizards, snakes and small mammals), have limited mobility, spend much of their time in burrows (mice, voles, some reptiles), are nocturnal (active primarily at night), or tend to scavenge along roadsides (small carnivores) or bask on road surfaces (snakes). All of these circumstances result in increased vulnerability to injury or mortality.

The potential for wildlife-vehicle collisions involving large mammals such as mule deer and elk would increase temporarily due to development-related traffic along the county road access to the project area, which is almost entirely contained within sensitive winter range and could support winter activities on the HDU 13-99-21 pad (see above). Strict adherence to posted speed limits on roads would minimize the potential for vehicle collisions with terrestrial wildlife. Also reducing the potential level of these impacts is the fact that existing oil and gas activities, ranching operations, recreational travel, and associated traffic on the county road are likely to have resulted in some habituation or changes in habitat use.

#### No Action Alternative

Under the No Action Alternative, none of the proposed 16 new wells and associated roads and pipelines would be approved, but the 12 Federal wells currently on the six existing well pads would continue to operate using the existing road and pipeline infrastructure on BLM and private lands. No project-related impacts affecting terrestrial species would occur from implementation of the Proposed Action. BLM management and currently permitted activities in the project area, and associated impacts, would continue. These would include activities and impacts associated with oil and gas development, pipelines, access roads, recreation, and grazing.

## **4. CUMULATIVE IMPACTS**

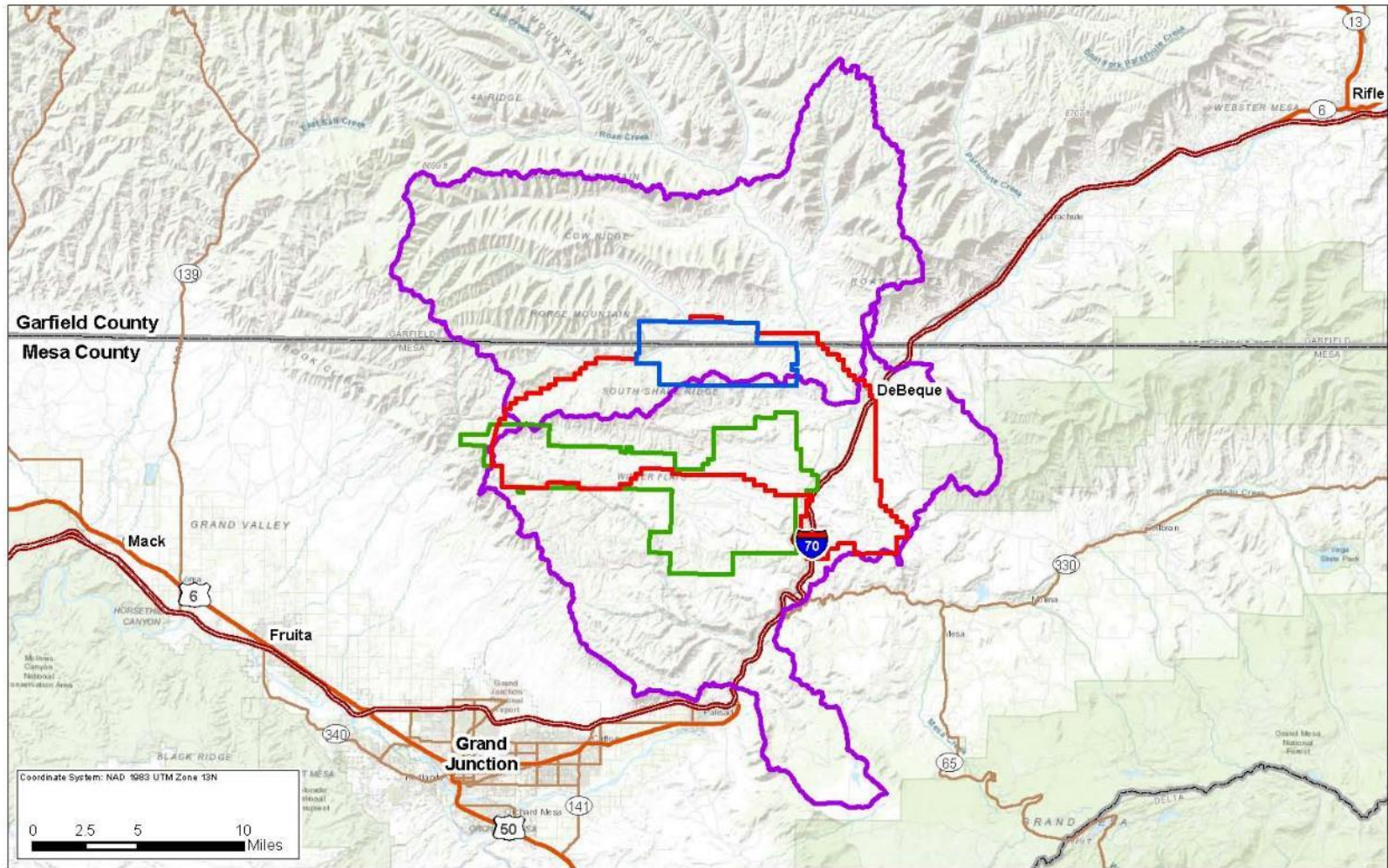
NEPA requires Federal agencies to consider the cumulative effects of proposals under their review. Cumulative effects are defined in the CEQ regulations 40 CFR §1508.7 as "...the impact on the environment that results from the incremental impact of the action when added to other past, present, and

reasonably foreseeable actions .....” The following subsections describe past, present, and reasonable foreseeable oil and gas developments, known to BLM within the broader project vicinity.

This section focuses on future oil and gas projects and related pipelines (**Table 30**) because they include development activities comparable to the limited development to-date in proximity to the Proposed Action (**Map 7**).

**Table 30. Existing, Approved, and Reasonably Foreseeable Pipeline or Well Development Projects**

<i>Project Name</i>	<i>Project Summary</i>	<i>Surface Disturbance (acres)</i>		<i>Comments</i>
		<i>Initial</i>	<i>Long-term</i>	
Well Pad and Pipeline Infrastructure Approved 2010 or earlier	Previously approved (pre-BHDEP) oil and gas activities within the greater project vicinity have included 92 single-well pads with an average of 1.4 acres of long-term disturbance per pad. Ancillary surface facilities caused 44 acres of disturbance. A total of 116 miles of gas pipelines were constructed in 50-foot alignments.	879	176	Within an area of 106,595 acres; encompasses current project area.
Black Hills De Beque Exploratory Proposal (BHDEP) Approved 5/2/13	The BHDEP proposed up to 24 new wells on 12 well pads, each pad averaging 7 acres of initial disturbance, reduced to 3 acres at interim reclamation plus ancillary facilities. Associated facilities analyzed included 12.7 miles of new, upgraded, or rerouted access roads and 25.4 miles of gas gathering, water supply, and produced water pipelines as well as ancillary facilities.	300	79	Within an area of 79,700 acres; encompasses current project area
De Beque Pipeline EA Approved 7/28/14	Three operators—BHPP, RRG, and Bluestone—requested BLM ROWs for a collocated 12-inch gas gathering pipeline, 8-inch produced water pipeline, and 24-inch raw water pipeline, with a length of 10.6 miles. Total temporary disturbance width to accommodate all three pipelines was 73 feet.	94	0	South of De Beque
HSC 4-28 Buried Pipelines EA Approved 7/24/15	BHPP has constructed a 1.51-mile natural gas gathering line and collocated water pipelines south of the Colorado River and I-70. Temporary disturbance width was 50 feet.	15	0	East of Colorado River
Winter Flats Pipeline Project EA Approved 4/14/16	RRG proposes to construct 21.94 miles of varying diameter buried steel natural gas pipelines with collocated buried steel water pipelines that would be owned by BHPP. The natural gas and water pipelines would service existing Federal oil and gas leases.	209	<1	Within the Winter Flats Federal Unit south of South Shale Ridge
De Beque Southwest Master Development Plan (DSMDP) In preparation	The DSMDP proposes development of up to 104 new horizontal oil and gas wells on 13 new well pads. BHPP currently operates 10 wells, some drilled as early as 1982 by a predecessor operator. Each new pad would encompass approximately 7 acres initially, reduced to 3 acres at interim reclamation. Associated facilities would include 11.9 miles of new or upgraded access roads and collocated pipelines, with a combined initial disturbance width of 75 feet and long-term road width of 30 feet.	220	83	Within an area of 36,200 acres
<b>TOTAL</b>		<b>1,717</b>	<b>339</b>	



- Legend**
- Black Hills DeBeque Exploratory Proposal
  - Black Hills Homer Deep Master Development Plan
  - Black Hills DeBeque Southwest Master Development Plan
  - Black Hills DEP Cumulative Impact Analysis Boundary

**Homer Deep Master Development Plan  
 Cumulative Impact Assessment Area**

**Map 7**



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This project was developed through digital means and may be updated without notice.

Future cumulative impacts could also accompany the continuation of more dispersed and longer term activities, including livestock grazing and recreational use, which have had and will continue to have impacts on certain resources and uses.

Impacts of the Proposed Action would also be cumulative to adverse impacts resulting from wildland fires. This includes the nearby Pine Ridge Fire, which burned approximately 14,000 acres of mostly public lands during a period of 9 days in 2012. Future fires are likely and would be expected to have similar impacts, with potentially greater impacts on special-status species, depending on location, intensity, duration, and timing. However, these variables cannot be assessed in terms of cumulative impacts for the currently proposed project.

#### **4.1 EXISTING AND REASONABLY FORESEEABLE OIL AND GAS DEVELOPMENTS**

The HDMDP is part of a larger area west of De Beque in which oil and gas development and pipeline construction and operation have been ongoing for more than 30 years, and in which substantial new development is planned.

Few other types of surface impacts occur in the project vicinity. Industrial, commercial, and residential development has occurred at a relatively low level. Expansion of transportation and public utility networks associated with both local and regional population growth have added considerable habitat loss and habitat fragmentation and increased recreational visitation. Other impacts are mostly associated with ranching and recreational activities, typically at relatively low levels of activity across larger areas, but with more substantial impacts along major travel routes and in areas where livestock tend to congregate at water sources or where they are kept in enclosed areas.

The approximately 21 acres of initial surface disturbance during construction of the Proposed Action would be cumulative to previous habitat loss or fragmentation and to concurrent surface-disturbing activities and elevated human presence. Long-term changes, primarily to vegetation communities, persisting beyond construction and early stages of revegetation would be cumulative to those associated with prior and reasonably foreseeable projects having similar impacts. The proximity of the current project to the existing, approved, or reasonably foreseeable projects listed in the table would tend to increase the level of both short-term and long-term cumulative impacts.

On BLM-administered public lands, impacts are mostly associated with livestock grazing, off-highway motorized and mechanized travel, and historic surface coal mining. On nearby private lands, other types of surface disturbance and increased human activity have included conversion of native habitats to agricultural lands (primarily for hay production) or sand and gravel operations along the Colorado River.

Adverse cumulative impacts typically associated with the types of oil and gas development and pipeline projects described in **Table 30** include:

- Direct habitat loss, habitat fragmentation, and decreased habitat effectiveness
- Increased risk of adverse impacts to special status plant and animal species
- Expansion of noxious weeds and other invasive species
- Increased potential for runoff, erosion, and sedimentation of surface waters
- Increased potential for adverse impacts on fresh-water aquifers and water wells
- Increased fugitive dust from construction of well pads, roads, and pipelines
- Increased gaseous emissions, including VOCs and priority pollutants, from vehicles, compressors, and other internal combustion sources and from oil and gas production facilities



- Increased potential for spills and other releases of chemical pollutants
- Increased traffic on local roads
- Increased noise, especially along access and haul roads
- Increased risk of damage to cultural and paleontological resources
- Decreased solitude and scenic quality

Other cumulative impacts include the increased availability of a valuable and important commodity, increased direct and indirect employment, and enrichment of Federal, State, and County/Local coffers from royalties, Payments in Lieu of Taxes (PILTs), property taxes, and/or sales taxes. Cumulative impacts associated with the Proposed Action would include those noted above for previous oil and gas projects in the GJFO area and nearby portions of the CRVFO. It should also be noted that new technologies and increasingly stringent Federal and State requirements have reduced the impacts of oil and gas developments in recent years.

## **4.2 PROJECT-SPECIFIC RESOURCE CONSIDERATIONS**

### **Air Quality**

As part of the adaptive management strategy for managing air resources within the BLM planning areas, the BLM conducted a regional air modeling study to evaluate potential impacts on air quality from future mineral development in Colorado and northern New Mexico. The CARMMS (BLM 2017) assesses predicted impacts on air quality and AQRVs from projected oil and gas development. The CARMMS includes potential impacts using projections of oil and gas development out to year 2025 that reflect realistic estimations of development and technological improvements.

The CARMMS includes cumulative air quality and AQRV impact assessments from future year (year 2025) oil and gas development on BLM-administered (Federal) lands and other (non-Federal) lands within eight western Colorado BLM planning areas, four subareas of the Royal Gorge Field Office Planning Area, the Mancos Shale in the Tres Rios Field Office and the Farmington New Mexico Field Office planning areas, as well as mining within the planning areas. The oil and gas emissions on Southern Ute Indian Tribe (SUIT) lands in Colorado were also included. In addition, CARMMS includes emissions from other regional sources, including oil and gas emissions throughout the modeling domain, which encompasses all of Colorado, western Arizona, western Utah, and north-central New Mexico and extends into southern Wyoming, western Nebraska, western Kansas, western Oklahoma, and northwest Texas.

The CARMMS uses the Comprehensive Air-quality Model with extensions (CAMx) photochemical grid model (PGM) to estimate air quality and AQRV impacts for both a base case year (2011) and future year 2025. Emissions from all source types (anthropogenic and natural) are included in the CAMx modeling.

As part of CARMMS, future year 2025 emissions estimates were developed for three development scenarios for the Colorado and New Mexico planning areas. These include year 2025 high, medium, and low oil and gas development scenarios. Modeling results from CARMMS are applicable for use in estimating potential ozone formation from regional emissions and project emissions, and for determining the maximum contribution of project sources to regional ozone formation. The CARMMS results are also applicable for project cumulative air quality and AQRV analyses. Given the level of oil and gas development that has occurred within the Colorado BLM planning areas since 2011 and the projected future development through year 2025, the CARMMS 2025 low oil and gas development scenario is most representative of the expected future oil and gas development within the planning areas and is used to describe the potential ozone formation from the HDMDP project area sources and for summarizing the cumulative air quality and AQRV analyses.

The CARMMS includes the following BLM planning areas in Colorado and northern New Mexico:

- Roan Plateau portion of the Colorado River Valley Field Office (CRVFO)
- CRVFO outside of the Roan Plateau
- Grand Junction Field Office (GJFO)
- Kremmling Field Office
- Little Snake Field Office
- Royal Gorge Field Office (includes four separate areas)
- Tres Rios Field Office
- Mancos Shale (includes portions of Tres Rios CO and Farmington NM field offices)
- Uncompahgre Field Office
- White River Field Office

The oil and gas emissions from wells on BLM-administered (Federal) lands, non-Federal lands, and totals for Colorado BLM planning areas (the CARMMS 2025 Low Development Scenario) and SUIIT lands are shown in **Table 31**. The maximum future year field-wide development and production emissions from project sources are as follows: 166.1 tpy NO<sub>x</sub>, 13.5 tpy VOCs, 98.5 tpy CO, 0.6 tpy SO<sub>2</sub>, 10.3 tpy PM<sub>10</sub>, and 4.7 tpy PM<sub>2.5</sub>. These emissions are included as part of the GJFO planning area emissions and in the total Colorado BLM planning areas emissions shown in **Table 31**.

**Table 31. Oil and Gas Emissions from the Colorado BLM Planning Areas, SUIIT Land and Mancos Shale for CARMMS 2025 Low Development Scenario**

<i>Scenario</i>	<i>NO<sub>x</sub> (tpy)</i>	<i>VOC (tpy)</i>	<i>CO (tpy)</i>	<i>SO<sub>2</sub> (tpy)</i>	<i>PM<sub>10</sub> (tpy)</i>	<i>PM<sub>2.5</sub> (tpy)</i>
Federal Wells	12,353	26,954	11,814	308	2,865	833
Non-Federal Wells	68,783	151,472	95,804	200	34,326	7,122
All Wells	81,136	178,426	107,618	509	37,190	7,955

The CARMMS included estimates of future year regional ozone impacts using two analysis methods. One method uses the change in the PGM concentrations between the base year (DVB) (Year 2011) and future year (DVF) (Year 2025) simulations to scale observed ozone concentrations from monitoring sites to obtain projected future year ozone concentrations. This method utilized EPA’s Modeled Attainment Test Software (MATS) (Abt Associates 2012) projection tool with the CAMx 2011 Base Year and 2025 High Development Scenario ozone concentrations to estimate ozone impacts. The second method uses the absolute modeling results from the CAMx model to estimate ozone impacts.

As for the CAMx predicted ozone concentrations using MATS, the DVBS indicate areas of ozone exceedances of the NAAQS (70 parts per billion [ppb]) in and around Denver, places in Utah, Arizona, New Mexico, and Texas, with a maximum DVB of 109.6 ppb next to the AZ/NM boarder that is found to be caused by natural wild fire emissions. The DVBS also indicate that areas in the GJFO planning area within and nearby the project area are below the NAAQS. For the 2025 Low Development Scenario, the area of 2025 ozone DVF exceedances is substantially reduced from the base year with a peak DVF of 108.8 ppb (resulting from wild fires) near the AZ/NM border. The 2025 DVF – 2011 DVB difference shows the largest ozone reductions in the Denver metropolitan area. Widespread ozone reductions in the 1.0 ppb to 4.0 ppb range have been documented in the project vicinity and throughout the GJFO area.

The CAMx absolute modeling results estimated ozone impacts. For the 2011 Base Case, ozone exceedance areas occur in Colorado, eastern Utah, southern Wyoming, northeast Arizona, New Mexico, and Texas. The maximum ozone concentrations are estimated along the NM/AZ boarder and near Los Alamos of NM (resulting from natural fires). The 2011 Base Case also indicates that areas within and near the project area in the GJFO planning area are below the 70 ppb NAAQS. There are areas to the east of the project area in Garfield and Mesa counties (within the CRVFO planning area) that exceed the ozone NAAQS. In the 2025 Low Development Scenario, the areas of ozone exceedances are reduced. The 2025 – 2011 ozone differences show decreases in almost all areas, with a reduction of 9.2 ppb near Denver. In areas within and near the project area, there are ozone reductions in the 2 ppb to 4 ppb range.

As indicated in the CARRMS report, the maximum contribution to year 2025 regional ozone formation from the GJFO planning area Federal oil and gas sources is 0.2 ppb. Given that the GJFO planning area oil and gas emissions include 1,080 tpy NO<sub>x</sub> and 1,234 tpy VOCs and that the maximum future year emissions from project sources include 166.1 tpy NO<sub>x</sub> and 13.5 tpy VOCs, the contribution to regional ozone from project sources would likely be less.

The CARMMS 2025 low oil and gas development modeling analysis presented a scenario that included future year 2025 projected Federal and non-Federal oil and gas emissions throughout the 4-km grid CARMMS domain plus mining on BLM-administered lands in Colorado. This scenario, which includes future year oil and gas emissions from the 13 Colorado BLM planning areas plus the Mancos Shale area in Northern New Mexico and SUIT lands in Colorado, is presented herein to describe cumulative impacts for the project. For the project cumulative analysis, these cumulative oil and gas emissions and mining emissions are considered reasonably foreseeable development (RFD) emissions.

The CARMMS included impact assessments at 26 PSD Class I and 58 sensitive Class II areas, and at 58 lakes throughout the CARMMS modeling domain, which included each of the Class I and Class II areas and lakes that have been included in the project's CALPUFF impacts analyses. For the project cumulative assessment, the CARMMS impacts are presented for the PSD Class I and sensitive Class II areas and lakes that were included in the CALPUFF analyses.

The concentrations of NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> at Class I and sensitive Class II areas resulting from cumulative RFD source emissions were modeled. All values are well below the PSD Class I and Class II increments.

Visibility impacts due to RFD oil and gas emissions and mining emissions were examined following the procedures provided by the USFWS and National Park Service (NPS) (USFWS and NPS 2012). From the 2011 Base Year to the 2025 Low Development Scenario Future Year, the worst 20 (W20) percent visibility metric is estimated to improve at each of the Class I and sensitive Class II areas. The biggest improvement is a reduction of 0.28 dv that occurs at Colorado National Monument and at the Flat Tops, Maroon Bells-Snowmass, Raggeds, and West Elk wilderness areas, changing from 8.47 dv in 2011 to 8.19 dv in 2025. RFD emissions are estimated to contribute a maximum of 0.04 dv to the 2025 W20 percent days visibility at these areas.

Cumulative visibility results at Class I and sensitive Class II areas for the best 20 (B20) percent days were estimated. From 2011 to 2025, the B20 percent days visibility is estimated to improve in all Class I and sensitive Class II areas. The largest B20 percent visibility improvement is a 0.25 dv reduction that occurs at Colorado National Monument and at the Flat Tops, Maroon Bells-Snowmass, Raggeds, and West Elk wilderness areas, changing from 0.51 dv in 2011 to 0.26 dv in 2025. The maximum contribution from RFD sources to 2025 B20 percent visibility metrics is 0.03 dv at these areas.

Potential atmospheric deposition impacts within Class I and sensitive Class II areas were calculated for cumulative RFD sources. The maximum direct total (wet and dry) N and S depositions are predicted to be well below the cumulative analysis thresholds of 2.3 kg/ha-yr for nitrogen and 5 kg/ha-yr for sulfur at



all Class I and sensitive Class II areas. The maximum total nitrogen and sulfur deposition rates are approximately 2 percent and 0.04 percent of the cumulative analysis thresholds, occurring at the Flat Tops Wilderness Area.

Potential changes in ANC from baseline conditions resulting from potential N and S deposition from cumulative RFD source emissions were calculated for nine sensitive lakes within the Class I and sensitive Class II wilderness areas. The estimated changes in ANC are all predicted to be below the applicable significance thresholds (less than a 10% change in ANC for lakes with ANC values greater than 25 µeq/L, and a 1.0 µeq/L change in ANC for lakes with background ANC values equal to or less than 25 µeq/L). The greatest percent change for lakes with ANC values greater than 25 µeq/L is 1.1 percent at Lower Packtrail Pothole. The greatest ANC change for lakes with background ANC values equal to or less than 25 µeq/L is 0.35 µeq/L at Deep Creek Lake.

Continued field development, operation of well site equipment, and associated vehicle traffic would result in minor cumulative contributions to atmospheric GHGs. Oil produced under the Proposed Action would be refined to produce a wide range of fuel products for consumer or commercial use. The combustion of these fuels would generate GHGs, which would be controlled through applicable GHG emission control regulations (emissions standards) or by applicable air permit requirements.

Other industrial operations in the area would also contribute to GHG emissions through the use of carbon fuels (natural gas, liquefied petroleum gas, and diesel), and through the use of electricity produced using carbon fuels. Other anthropogenic activities, such as residential wood and open burning, as well as biogenic sources, also contribute GHGs to the atmosphere. These would be more dispersed, but also more sustained, than the emissions from this oil and gas development, which has a finite lifespan.

While significance levels exist to determine PSD applicability and emissions control requirements for GHGs, policies regulating specific GHG concentration levels and their potential for significance with respect to regional or global impacts have not been established for GHGs. As previously stated, the maximum GHG emissions resulting from the Proposed Action are estimated as 28,082 metric tpy (0.028 MMT) of CO<sub>2e</sub>. To place the project GHG emissions in context, the calculated GHG emissions in year 2015 from oil and gas production in Mesa County and the State of Colorado were approximately 1.77 MMT and 145.2 MMT of CO<sub>2e</sub>, respectively (COGCC 2018, ONRR 2017, EPA 2014, and IPCC 2013). Thus, the Proposed Action's maximum GHG emissions from development and production would be approximately 1.6% of Mesa County's and 0.02% of Colorado's oil and gas production emissions. In addition, 0.028 MMT is approximately equivalent to 0.001% of the total 2015 U.S. calculated CO<sub>2e</sub> emissions from oil and gas production, 3,284 MMT.

The downstream GHG emissions (resulting from combustion of all project-produced natural gas at facilities and activities that are not associated with the project and are not foreseeable future actions) were estimated assuming an average annual natural gas production rate of 8.5 bcf per year (170 bcf produced over a 20-year life-of-project). The maximum annual downstream CO<sub>2e</sub> emissions are calculated to be 0.431 MMT per year. These maximum annual downstream CO<sub>2e</sub> emissions would be comparable to the following 2015 oil and gas production emissions: 24% of Mesa County, 0.3% of Colorado, and 0.01% of total U.S. (COGCC 2018, ONRR 2017, EPA 2014, and IPCC 2013). These downstream GHG emissions effects are discussed further in Section 3.2.

According to ONRR U.S. Department of the Interior data, the country's total Federal (onshore) oil and gas production in 2015 was approximately 177 million bbl of oil and 3,420,000 MMCF of natural gas, which accounted for 5.1% and 10% of the nation's total production (combined Federal and non-Federal), respectively (ONRR 2017). Similarly, Colorado's Federal oil and gas production represented 0.66% and 14% of the nation's Federal oil and gas production, and 0.15% and 2.0% of the nation's total production (Federal and non-Federal). It is reasonable to assume that all of the oil and gas produced in the U.S. is

combusted in some way, shape, or form and most likely within the broader parts of the economy (electricity generation, transportation, industry).

The U.S. produced 6,587 MMT of CO<sub>2</sub>e emissions in 2015 according to EPA’s Inventory of U.S. Greenhouse Gas Emissions and Sinks (2017c). The calculated CO<sub>2</sub>e emissions from Federal oil and gas development in Colorado (38.4 MMT) and across the nation (186 MMT onshore and 264 MMT onshore and offshore combined) represent 0.58%, 2.8% (onshore), and 4%, respectively, of the nation’s total GHG emissions (ONRR 2017, EPA 2014, IPCC 2013).

At a global scale, the U.S. and the world produced 6,344 MMT and 53,530 MMT, respectively, of CO<sub>2</sub>e emissions in 2012 (The World Bank Group 2017). In other words, the U.S. produced 12% of the global GHG emissions.

## 5. PERSONS AND AGENCIES CONSULTED

BHPP – Jessica Donahue, Brett Hurlbut, Lance Nelson, David Gremel, and Chanse Brackett  
 LE – Wayne Bankert  
 WestWater Engineering -- Amie Wilsey  
 P.E. Grosch Construction, Inc. – Aaron Grosch

## 6. INTERDISCIPLINARY REVIEW

BLM staff who participated in the preparation of this EA are listed alphabetically by last name under each of the two BLM field offices (CRVFO and GJFO) in **Table 32**. Participation by these individuals variously included visiting the site, reviewing resource data maintained by the BLM, reviewing results of resource surveys conducted by BHPP’s environmental consultants, evaluating impacts likely to occur from implementation of the Proposed Action, identifying appropriate COAs to be attached and enforced by the BLM (see **Appendix A**), and authoring or reviewing individual sections of the EA.

**Table 32. BLM Interdisciplinary Team Authors and Reviewers**

<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
<b>Colorado River Valley Field Office</b>		
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Jim Byers	Natural Resource Specialist	EA Project Lead, Access & Transportation, Socioeconomics, Visual Resources, Wastes, Hazardous or Solid
Vanessa Caranese	Geologist	Geology and Minerals, Paleontology
Stephen Garcia	Petroleum Engineer	Downhole COAs
Laura Millard	Realty Specialist	Realty Authorizations
Allen Crockett, Ph.D., J.D.	Planning and Environmental Coordinator	NEPA Review, Technical Review
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special Status Species Animals, Aquatic and Terrestrial Wildlife
Carmia Woolley	Physical Scientist	Air Quality, Noise, Soils, Surface Water, Waters of the U.S., Groundwater

<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
<b>Grand Junction Field Office</b>		
Natalie Clark	Archaeologist	Cultural Resources, Native American Religious Concerns
Erick Eckberg	Geologist	Geology, Paleontology
Kevin Hyatt	Hydrologist	Soil, Air, Water Resources
Anna Lincoln	Ecologist	Special Status Plants, Vegetation
Bob Price	Range Ecologist	Range and Grazing Management
Heidi Plank	Wildlife	Special Status Animals, Wildlife
Andy Windsor	Outdoor Recreation Specialist	Access and Transportation, Visual Resources, Recreation

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**APPENDIX A**

**Surface-Use Conditions of Approval Applicable to the  
HDU 5-34 Well Pad, Access Road, and Pipelines  
and the  
HDU 13-99-21 Well Pad, Access Road, and Pipelines**

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## APPENDIX A

### **SURFACE-USE CONDITIONS OF APPROVAL Homer Deep Master Development Plan DOI-BLM-CO-N040-2015-0025-EA**

#### **General Surface-Use COAs**

The following surface-use COAs shall be implemented, where applicable and feasible, to reduce impacts from project activities. Where the surface landowner specifically requests deviation from one or more of these general COAs, the desired deviation shall be brought to the attention of the BLM project lead. Although landowner preferences are accommodated when appropriate, the BLM remains responsible for ensuring that oil and gas activities are conducted in a manner to minimize adverse impacts to other resources and resource uses for which a Federal nexus exists. This includes minimizing impacts to BLM lands and to Federally protected resources both within and outside the private parcel.

1. **Administrative Notification.** The operator shall notify the BLM representative at least 48 hours prior to initiation of construction. If requested by the BLM representative, the operator shall schedule a pre-construction meeting, including key operator and contractor personnel, to ensure that any unresolved issues are fully addressed prior to initiation of surface-disturbing activities or placement of production facilities.
2. **Well Pad Construction.** The well pad and its related facilities including the access road and buried 12-inch water line shall be built or installed per construction layout plat(s) and Surface Use Plan of Operations (SUPO) shown in the Application for Permit to Drill (APD) and any related Plan of Development submitted for the specific right-of-way grant.
3. **Road Construction and Maintenance.** Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards and road specifications and plats included in the APD package. Initial gravel application shall be a minimum of 6 inches. The operator shall provide timely year-round road maintenance and cleanup on the access roads. A regular schedule for maintenance shall include, but not be limited to, blading, ditch and culvert cleaning, road surface replacement, and dust abatement. When rutting within the traveled way becomes greater than 6 inches, blading and/or gravelling shall be conducted as approved by the BLM.
4. **Buried Pipeline Installation and Operation.** The 12-inch welded steel water pipeline shall be collocated with Red Rock Gathering's 12-inch gas gathering line in the same trench during the same installation period. The pipelines shall be installed and operated per descriptions provided in the Plan of Development and any construction plats and drawings submitted with the SF-299 Right-of-Way application.
5. **Construction Staking.** The road centerline shall be flagged and staked prior to the start of tree/brush clearing and/or earthwork within the planned disturbance corridor. The edges of disturbance for the road and pipeline would be established with flagging before the clearing work is completed. Any stakes that are disturbed, displaced, or removed shall be repositioned or replaced (as needed) as construction proceeds. Stakes shall be visible from one to the next and no farther than 100 feet apart.
6. **Dust Abatement.** The operator shall implement dust abatement measures as needed to prevent fugitive dust from vehicular traffic, equipment operations, or wind events. The BLM may direct the operator to change the level and type of treatment (watering or application of various dust agents, surfactants, and road surfacing material) if dust abatement measures are observed to be insufficient to prevent fugitive dust.

7. Drainage Crossings and Culverts. Construction activities at perennial, intermittent, and ephemeral drainage crossings (e.g. burying pipelines, installing culverts) shall be timed to avoid high flow conditions. Construction that disturbs any flowing stream shall utilize either a piped stream diversion or a cofferdam and pump to divert flow around the disturbed area.

Culverts at drainage crossings shall be designed and installed to pass a 25-year or greater storm event. On perennial and intermittent streams, culverts shall be designed to allow for passage of aquatic biota. The minimum culvert diameter in any installation for a drainage crossing or road drainage shall be 24 inches. Crossings of drainages deemed jurisdictional Waters of the U.S. pursuant to Section 404 of the Clean Water Act may require additional culvert design capacity. Due to the flashy nature of area drainages and anticipated culvert maintenance, the U.S. Army Corps of Engineers (USACE) recommends designing drainage crossings for the 100-year event. Contact the USACE Colorado West Regulatory Branch at 970-243-1199 ext. 12.

Pipelines installed beneath stream crossings shall be buried at a minimum depth of 4 feet below the channel substrate to avoid exposure by channel scour and degradation. Following burial, the channel grade and substrate composition shall be returned to pre-construction conditions.

8. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the U.S. Army Corps of Engineers (USACE) prior to discharging fill material into Waters of the U.S. in accordance with Section 404 of the Clean Water Act. Waters of the U.S. are defined in 33 CFR Section 328.3 and may include wetlands as well as perennial, intermittent, and ephemeral streams. Permanent impacts to jurisdictional waters may require mitigation. Contact the USACE Colorado West Regulatory Branch at 970-243-1199 ext. 12. Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.
9. Wetlands and Riparian Zones. The operator shall restore temporarily disturbed wetlands or riparian areas. The operator shall consult with the BLM Colorado River Valley Field Office to determine appropriate mitigation, including verification of native plant species to be used in restoration.
10. Reclamation. Specific measures to follow during interim reclamation are described below.
- a. Reclamation Plans. In areas that have low reclamation potential or are especially challenging to restore, reclamation plans will be required prior to APD approval. The plan shall contain the following components: detailed reclamation plans, which include contours and indicate irregular rather than smooth contours as appropriate for visual and ecological benefit; timeline for drilling completion, interim reclamation earthwork, and seeding; soil test results and/or a soil profile description; amendments to be used; soil treatment techniques such as roughening, pocking, and terracing; erosion control techniques such as hydromulch, blankets/matting, and wattles; and visual mitigations if in a sensitive VRM area.
- b. Deadline for Interim Reclamation Earthwork and Seeding. Interim reclamation to reduce a well pad to the maximum size needed for production, including earthwork and seeding of the interim reclaimed areas, shall be completed within 6 months following completion of the last well planned to be drilled on that pad as part of a continuous operation. If a period of greater than one year is expected to occur between drilling episodes, BLM may require implementation of all or part of the interim reclamation program.

Reclamation, including seeding, of temporarily disturbed areas along roads and pipelines, and of topsoil piles and berms, shall be completed within 30 days following completion of construction. Any such area on which construction is completed prior to **December 1** shall be seeded during the remainder of the early winter season instead of during the following spring, unless BLM approves otherwise based on weather. If road or pipeline construction occurs discontinuously (e.g., new segments installed as new pads are built) or continuously but with a total duration



greater than 30 days, reclamation, including seeding, shall be phased such that no portion of the temporarily disturbed area remains in an unreclaimed condition for longer than 30 days. BLM may authorize deviation from this requirement based on the season and the amount of work remaining on the entirety of the road or pipeline when the 30-day period has expired.

If requested by the project lead NRS for a specific pad or group of pads, the operator shall contact the NRS by telephone or email approximately 72 hours before reclamation and reseeding begin. This will allow the NRS to schedule a pre-reclamation field visit if needed to ensure that all parties are in agreement and provide time for adjustments to the plan before work is initiated.

The deadlines for seeding described above are subject to extension upon approval of the BLM based on season, timing limitations, or other constraints on a case-by-case basis. If the BLM approves an extension for seeding, the operator may be required to stabilize the reclaimed surfaces using hydromulch, erosion matting, or other method until seeding is implemented.

- c. Topsoil Stripping, Storage, and Replacement. All topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil shall be implemented for well pad construction whenever topography allows.
- d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

If directed by the BLM, the operator shall implement measures following seedbed preparation (when broadcast-seeding or hydroseeding is to be used) to create small depressions to enhance capture of moisture and establishment of seeded species. Depressions (pocking) shall be no deeper than 1 to 2 inches and shall not result in piles or mounds of displaced soil. Excavated depressions shall not be used unless approved by the BLM for the purpose of erosion control on slopes. Where excavated depressions are approved by the BLM, the excavated soil shall be placed only on the downslope side of the depression.

If directed by the BLM, the operator shall conduct soil testing prior to reseeding to identify if and what type of soil amendments may be required to enhance revegetation success. At a minimum, the soil tests shall include texture, pH, organic matter, sodium adsorption ratio (SAR), cation exchange capacity (CEC), alkalinity/salinity, and basic nutrients (nitrogen, phosphorus, potassium [NPK]). Depending on the outcome of the soil testing, the BLM may require the operator to submit a plan for soil amendment. Any requests to use soil amendments not directed by the BLM shall be submitted to the CRVFO for approval.

- e. Seed Mixes. A seed mix developed from BLM Menu-based Native Reclamation Seed Mixes consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project.

For private surfaces, the operator shall use a BLM-approved native seed mix unless specified otherwise by the private landowner.

The seed shall contain no prohibited or restricted noxious weed seeds and shall contain no more than 0.5% by weight of other weed seeds. Seed may contain up to 2.0% of “other crop” seed by weight, including the seed of other agronomic crops and native plants; however, a lower percentage of other crop seed is recommended. Seed tags or other official documentation shall be submitted to BLM at least 14 days before the date of proposed seeding for acceptance. Seed that does not meet the above criteria shall not be applied to public lands.

- f. Seeding Procedures. Seeding shall be conducted no more than 24 hours following completion of final seedbed preparation.

Where practicable, seed shall be installed by drill-seeding to a depth of 0.25 to 0.5 inch. Where drill-seeding is impracticable, seed may be installed by broadcast-seeding at twice the drill-seeding rate, followed by raking or harrowing to provide 0.25 to 0.5 inch of soil cover or by hydroseeding and hydromulching. Hydroseeding and hydromulching shall be conducted in two separate applications to ensure adequate contact of seeds with the soil.

An exception to these seeding requirements shall be made for seeding of sagebrush. Sagebrush seeding shall occur prior to winter snowfall, or on top of snow. Sagebrush may be sown either by broadcast seeding, or, if not on snowpack, by placing the seed in the fluffy seed box of a seed drill, with the drop tube left open to allow seed to fall out on the ground surface.

If interim revegetation is unsuccessful, the operator shall implement subsequent reseeding until interim reclamation standards are met.

- g. Mulch. Mulch shall be applied within 24 hours following completion of seeding in project areas within pinyon-juniper, sagebrush shrubland, and/or salt-desert shrub habitat types. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil.

NOTE: Mulch is not required in areas where erosion potential mandates use of a biodegradable erosion-control blanket (straw matting).

- h. Erosion Control. Cut-and-fill slopes shall be protected against erosion with the use of water bars, lateral furrows, or other BMPs approved by the BLM. Additional BMPs such as biodegradable wattles, weed-free straw bales, or silt fences shall have be employed as necessary to reduce transport of sediments into the drainages. The BLM may, in areas with high erosion potential, require use of hydromulch or biodegradable blankets/matting to ensure adequate protection from slope erosion and offsite transport of sediments and to improve reclamation success.
- i. Site Protection. Well pads shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species will be considered firmly established when at least 50% of the new plants are producing seed. The pad shall be fenced in a stock tight manner using BLM approved range/wildlife fencing standards to reduce conflicts with livestock grazing and restrict livestock grazing from adversely affecting interim reclamation efforts. The BLM will approve the type of fencing.
- j. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as “operator reclamation in progress” and shall submit an annual monitoring report of these sites, including a description of the monitoring methods used, to the BLM by **December 31** of each year. The annual monitoring report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by the BLM.

11. Weed Control. Before mobilization of equipment onto public land, the operator shall perform inspections to ensure that all construction equipment and vehicles are clean and free of soil, mud, and plant material. Operators of vehicles and other mobile equipment shall avoid driving through or parking on weed infestations.

The operator shall regularly monitor and promptly control noxious weeds and other undesirable plant species as set forth in the Grand Junction Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports, including GPS shapefiles of treatment areas and Pesticide Application Records (PARs) (see the letter provided to operators dated February 27, 2014), for the ROW alignments shall be submitted to BLM, CRVFO by **December 1** of each year.

12. Big Game Winter Range Timing Limitation. For the HDU 5-34 well pad, road, and pipelines, no construction, drilling, or completion activities shall occur during a Timing Limitation (TL) period from **December 1 through April 30**, since the HDU 5-34 pad lies within sensitive big game winter range. Since the HDU 13-21-99 pad, access road, and pipelines would be located outside deer and elk sensitive winter range, and no specific TL is stated on the Federal lease, no TL will be applied to these project components.

13. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to “take” of either eagle species. Under the Eagle Act, “take” includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, should be coordinated with the BLM project lead, BLM wildlife biologist, and the USFWS representative to the BLM Field Office at 970-243-2778 x 28.

14. Raptor Nesting. Raptor nest surveys in the project vicinity resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad, access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to prohibit initiation of construction, drilling, or completion from **April 15 to June 15**. The BLM may grant an exception to the TL if surveys conducted during the nesting season when construction is planned to be initiated document that the identified nest and any additional nests are inactive (not occupied and not being tended by adults in preparation for nesting).

If project-related activities are initiated within the specified buffer distance of any active nest, even if outside the 60-day TL period specified in this COA, the operator remains responsible for compliance with the MBTA with respect to a “take” of birds or of active nests (those containing eggs or young), including nest failure caused by human activity (see COA for Migratory Birds).

15. Migratory Birds – Nesting Habitat. Pursuant to BLM Instruction Memorandum 2008-050, all vegetation removal or surface disturbance in previously undisturbed lands providing potential nesting habitat for migratory birds is prohibited from **May 15 to July 15**. An exception to this TL may be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no migratory bird species are nesting within 30 meters (100 feet) of the area to be disturbed. Nesting shall be deemed to be occurring if a territorial (singing) male is present within the distance specified above. Nesting surveys shall include an audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified

breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying migratory birds. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 15 and continue into the 60-day period at the same location.

16. Migratory Birds – General. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to “take” of migratory bird species, which includes injury and direct mortality resulting from human actions not intended to have such result. To minimize the potential for the take of a migratory bird, the operator shall take reasonable steps to prevent use by birds of fluid-containing pits associated with oil or gas operations, including but not limited to reserve pits, produced-water pits, hydraulic fracturing flowback pits, evaporation pits, and cuttings trenches. Liquids in these pits—whether placed or accumulating from precipitation—may pose a risk to birds as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation.

Based on low effectiveness of brightly colored flagging or spheres suspended over a pit, the operator shall install netting with a mesh size of 1 to 1.5 inches, and suspended at least 4 feet above the fluid surface, on all pits into which fluids are placed, except for storage of fresh water in a pit that contains no other material. The netting shall be installed within 24 hours of placement of fluids into a pit. The requirement for netting does not apply to pits during periods of continuous, intensive human activity at the pad, such as drilling and hydraulic fracturing phases or, as pertains to cuttings trenches, during periods of active manipulation for cuttings management, remediation of contaminated materials, or other purposes.

In addition to netting of pits, oil slicks and oil sheens shall be promptly skimmed off the fluid surface. The requirement for prompt skimming of oil slicks and oil sheens also applies to cuttings trenches in which precipitation has accumulated. All mortality or injury to birds shall be reported immediately to the BLM project lead and to the USFWS representative to the BLM Field Office at 970-243-2778 x28 and visit <http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm>.

17. Range Management. Range improvements (fences, gates, reservoirs, pipelines, etc.) shall be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements.

Where the proposed access road bisects an existing livestock fence, a steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.

The pad shall be fenced in a stock tight manner using BLM approved range/wildlife fencing standards to reduce conflicts with livestock grazing and restrict livestock grazing from adversely affecting interim reclamation efforts.

The operator shall minimize the length of pipeline trenches remaining open. Trenches remaining open overnight while cattle are grazing in the area shall have temporary construction fencing or other means of reducing the risk to livestock. Soft plugs of excavated material with ramps on either shall be provided at well-defined livestock trails to allow access across the trench and provide a means of escape for livestock that may fall into the trench. The sides of trenches left open shall be shored to reduce the risk of collapse.

18. Paleontological Resources. All persons associated with operations under this authorization shall be informed that any objects or sites of paleontological or scientific value, such as vertebrate or scientifically important invertebrate fossils, shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization any of the above resources are

encountered, the operator shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM of the findings. The discovery must be protected until notified to proceed by the BLM.

Where feasible, the operator shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM of any finds. The BLM will, as soon as feasible, have a BLM-permitted paleontologist check out the find and record and collect it if warranted. If ground-disturbing activities cannot be immediately suspended, the operator shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

19. Cultural Education/Discovery. All persons in the area who are associated with this project shall be informed that if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons would be subject to prosecution.

If subsurface cultural values are uncovered during operations, all work in the vicinity of the resource will cease and the Authorized Officer with the BLM notified immediately. The operator shall take any additional measures requested by the BLM to protect discoveries until they can be adequately evaluated by the permitted archaeologist. Within 48 hours of the discovery, the SHPO and consulting parties will be notified of the discovery and consultation will begin to determine an appropriate mitigation measure. The BLM, in cooperation with the operator, will ensure that the discovery is protected from further disturbance until mitigation is completed. Operations may resume at the discovery site upon receipt of written instructions and authorization by the Authorized Officer.

Pursuant to 43 CFR 10.4(g), the operator must notify the Authorized Officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony on Federal land. Further, pursuant to 43 CFR 10.4 (c) and (d), the operator must stop activities in the vicinity of the discovery that could adversely affect the discovery. The operator shall make a reasonable effort to protect the human remains, funerary items, sacred objects, or objects of cultural patrimony for a period of 30 days after written notice is provided to the Authorized Officer, or until the Authorized Officer has issued a written notice to proceed, whichever occurs first.

Antiquities, historic ruins, prehistoric ruins, and other cultural or paleontological objects of scientific interest that are outside the authorization boundaries but potentially affected, either directly or indirectly, by the Proposed Action shall also be included in this evaluation or mitigation. Impacts that occur to such resources as a result of the authorized activities shall be mitigated at the operator's cost, including the cost of consultation with Native American groups.

Any person who, without a permit, injures, destroys, excavates, appropriates or removes any historic or prehistoric ruin, artifact, object of antiquity, Native American remains, Native American cultural item, or archaeological resources on public lands is subject to arrest and penalty of law (16 USC 433, 16 USC 470, 18 USC 641, 18 USC 1170, and 18 USC 1361).

20. Visual Resources. All applications for permit to drill (APDs) shall include a detailed, site-specific description outlining how the proposed action will meet the VRM Class of the area where the action is proposed. The specific location of the proposed action, including pads, roads, and pipelines, shall be shown on a map and shall include associated cut-and-fill data (location, horizontal and vertical extent, slope length, and steepness).

Production facilities shall be placed to avoid or minimize visibility from travel corridors, residential areas, and other sensitive observation points—unless directed otherwise by the BLM due to other resource concerns—and shall be placed to maximize reshaping of cut-and-fill slopes and interim reclamation of the pad.

To the extent practicable, existing vegetation shall be preserved when clearing and grading for pads, roads, and pipelines. The BLM may direct that cleared trees and rocks be salvaged and redistributed over reshaped cut-and-fill slopes or along linear features.

Aboveground facilities shall be painted with BLM Standard Environmental color **Shale Green** to minimize contrast with adjacent vegetation or rock outcrops.

On the HDU 5-34 and HDU 13-23-99 pads, **low profile storage tanks shall be installed** to store fluids generated from the operating wells to minimize visual impacts along the County Road.

To minimize upward light scattering/pollution, all drill rig and well test facility lights shall be limited to those required for safe operations. Where safety is not compromised, lighting shall be downcast and focused on work areas only. Permanent lights shall be shielded, downcast, and/or otherwise directed in a manner that targets the work area.

Gravel used to surface roads and pads shall avoid high color and textural contrast with native soil and rock materials (e.g., no river cobbles or pit run).

21. Windrowing of Topsoil. Topsoil shall be windrowed around the pad perimeter to create a berm that limits and redirects storm water runoff and extends the viability of the topsoil per BLM Topsoil Best Management Practices (BLM 2009 PowerPoint presentation available upon request from BLM - CRVFO). Topsoil shall also be windrowed, segregated, and stored along pipelines and roads for later spreading across the disturbed corridor during final reclamation. Topsoil berms shall be promptly seeded to maintain soil microbial activity, reduce erosion, and minimize weed establishment.
22. Escape Ramps (Open Pits and Cellars, Tanks, and Trenches). The operator shall construct and maintain pits, cellars, open-top tanks, and trenches to exclude livestock, wildlife, and humans (except authorized personnel) and, in the event of inadvertent entry, to escape from these below-grade areas. At a minimum, the operator shall construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape from each pit, cellar, open-top tank, and trench. Ramps must be secured and properly positioned to allow wildlife to escape.
23. Noise. To limit the impact of noise on nearby residents or users of nearby public and private lands, construction shall occur during daytime hours to the extent practicable. All equipment shall have sound-control devices no less effective than those provided by the manufacturer. All equipment shall have muffled exhausts. The use of engine braking by trucks shall not be allowed on BLM roads or on roads across private surface used to access the project site for project-related activities.
24. Noise Abatement for Compressors, Generators, and Pumps. Any production equipment operated for extended periods on a Federal oil and gas lease and/or BLM-administered public land shall adhere to the Residential/Agricultural/Rural Zone standard established in Colorado Oil and Gas Conservation Commission (COGCC) Regulation No. 802, Noise Abatement. Under this provision, the noise level shall not exceed 50 A-weighted decibels (dBA) between 7:00 p.m. and 7:00 a.m. (nighttime) and 55 dBA between 7:00 a.m. and 7:00 p.m. (daytime) at a distance of 350 feet from the noise source. This standard shall apply even in remote locations where the COGCC would consider the Light Industrial to be sufficient (i.e., no residences in proximity to the noise source). BLM's objective for noise abatement is to reduce noise impacts to the existing solitude that is typical on BLM-leased lands, and particularly to reduce impacts that could have an adverse impact on wildlife.

Noise control techniques to be considered for such production-related equipment shall include, but not be limited to, enclosure within a sound-insulated structure, installation of an improved muffler system, some combination of these, or potentially the use of electrical power. Methods for safe ventilation of sound-insulated buildings shall be a key consideration in building design to avoid open

doors or windows that defeat the intended noise controls. Any noise-abating structure shall use the same BLM-approved color as used on other production facilities on the pad.

If the BLM determines that the required Residential/Agricultural/Rural noise standard is not being met under normal conditions, the operator may be required to suspend use of the noise-producing equipment or implement additional noise abatement measures.

25. **Recreation.** During construction, drilling, and completion activities, warning signs shall be posted on the county road and near pad access road junctions to alert recreationists/landowners of heavy truck traffic, trucks entering the road, and slow-moving equipment. The operator shall also provide notice to landowners and BLM-authorized guides and outfitters of construction schedules, and of road closures, to minimize conflicts with dispersed recreation users.
26. **Fire.** The operator shall adhere to its *fire safety and evacuation plan* and shall implement such additional measures as necessary to prevent fires on public and private land and may be held responsible for the costs of suppressing fires on public land that result from the actions of its employees, contractors, or subcontractors. Range or forest fires caused or observed by the operator's employees, contractors, or subcontractors shall be reported immediately to the BLM Grand Junction dispatch 970-257-4800. All fires or explosions that cause damage to property or equipment, loss of oil or gas, or injuries to personnel shall be reported immediately to the BLM Colorado River Valley Field Office at 970-876-9000. During conditions of extreme fire danger, surface-use operations may be restricted or suspended in specific areas, or additional measures may be required by the BLM.

Any welding, acetylene, or other open flame shall be operated in an area barren or cleared of all flammable materials and no closer to vegetation than at least 10 feet.

All precautions shall be taken to prevent wildfires. During conditions of extreme fire danger (e.g., National Weather Service issued Red Flag warning), surface use operations may be limited or suspended in specific areas.

Internal combustion engines shall be equipped with approved spark arrestors, and vehicles shall be parked in designated areas without fire/fuels hazards.

### **Site-Specific-Surface Use COAs for the Homer Deep Master Development Plan**

On January 18, 2018, the USFWS provided a letter concurring with BLM's analysis of effects to the threatened plants species and endangered fish species associated with the project and concurring with the implementation of the following conservation measures (#1, #2, #3).

1. **Colorado Hookless Cactus (Threatened)**
  - a. If ground-disturbing activities occur after 2018, conduct botanical surveys prior to ground-disturbing activities during the appropriate survey season (Colorado hookless flowering season – April through May) to verify absence within 50 meters of proposed disturbance (BLM 2015a).
  - b. Revegetate disturbed areas with native seed mixes approved by the BLM CRVO on BLM-administered lands or private landowner on private lands that are certified weed-free. Well pad reclamation and gathering pipeline revegetation must be established within 1 year after pipeline construction and well completion.
  - c. Monitor the effectiveness of site restoration annually, including presence of noxious weeds until restoration is considered successful by the BLM ecologist. Noxious weeds would be controlled and other undesirable plant species within disturbed areas that may out-compete Colorado hookless cactus documented within the vicinity of the project area. An annual monitoring report would be submitted each year to the BLM by December 1.

- d. Control fugitive dust (water, no additives) on CR 200 within 200 meters of Colorado hookless cactus plants during the flowering season (April through May) to minimize effects to cactus along CR 200 that could result from an increase in traffic during construction of the Proposed Action.
- e. Anchor hay wattles on the edge of CR 200 within 20 meters each side of Colorado hookless cactus plants that are downslope of the road to reduce the potential to change hydrology in adjacent habitats and minimize the potential for invasive species to become established.

2. De Beque Phacelia (Threatened)

- a. Monitor the effectiveness of site restoration annually, including presence of noxious weeds until restoration is considered successful by the BLM ecologist. Noxious weeds would be controlled and other undesirable plant species within disturbed areas that may out-compete De Beque phacelia documented within the vicinity of the project area. An annual monitoring report would be submitted each year to the BLM.
- b. During construction of well pad HDU 5-34, control fugitive dust (water, no additives) on well pad HDU 5-34 to minimize potential effects to habitat and/or plants from fugitive dust within 155 meters of well pad disturbance.
- c. Control fugitive dust (water, no additives) on CR 200 within 200 meters of De Beque phacelia habitat during the flowering season (April through late June) to minimize effects to suitable phacelia habitat along CR 200 that could result from an increase in traffic during construction of the Proposed Action.
- d. Anchor hay wattles on the edge of CR 200 within 100 meters each side of De Beque phacelia habitat areas that are downslope of the road to reduce the potential to change hydrology in adjacent habitats and minimize the potential for invasive species to become established.

3. Colorado Pikeminnow, Humpback Chub, Bonytail Chub, and Razorback Sucker (Endangered)

If the operator or its contractors withdraws water directly from the Colorado River or other perennial stream, the following measures shall be followed to reduce the risk of loss of eggs, larvae, or small individual fish:

- a. Pump intakes shall be screened with 0.25-inch (or finer) mesh.
- b. Ends of hoses or pipes used for direct withdrawals from the Colorado River, adjacent connected surface waters, and other perennial streams shall be placed into swiftly flowing water, if present, instead of slow-flowing water or areas of standing water.
- c. When possible, water shall be withdrawn from off-channel locations without a connection to the Colorado River or other perennial stream, such as ditches with headgates or ponds maintained by subsurface instead of surface inflow (e.g., gravel pits).
- d. Water shall not be withdrawn from the Colorado Department of Transportation (CDOT) pond near Interstate 70 that is used as rearing habitat for razorback suckers.

See also Site-Specific COA #3, below, requiring reporting of water use. That COA and the four COAs listed in the bullets above are mandatory conservation measures in the Programmatic Biological Opinion (2008, 2017) issued by the USFWS for BLM-authorized oil and gas activities in the Colorado River Basin of western Colorado.

4. Water Use

The Operator shall provide the volumes of fresh water and reused/recycled water used during project development using the following table. The volumes per well shall be identified by each development phase (construction, drilling, and completion) and by activity (e.g., dust abatement,



pipeline hydrostatic testing, drilling, and completion operations). The water volumes shall be identified in an attachment to the BLM Form 3160-4, “Well Completion or Recompletion Report and Log” (completion report) submitted to the BLM Field Office. All volumes shall be reported in barrels per well. For reporting the water used during construction of a multi-well pad, the total water used for construction shall be submitted with the first completion report.

<b>Well Name/No.:</b>		<b>API No.:</b>			
<b>County:</b>		<b>Well Pad:</b>			
<b>Operator:</b>					
<b>Activity</b>	<b>Water Use (barrels)</b>				
	<b>Construction</b>	<b>Drilling</b>		<b>Completion</b>	
	<b>Fresh</b>	<b>Fresh</b>	<b>Reused/ Recycled</b>	<b>Fresh</b>	<b>Reused/ Recycled</b>
Road/Pipeline/Pad Dust Abatement					
Pipeline Hydrostatic Testing					
Cementing					
Mud					
Acid Wash/ Hydraulic Fracturing					

5. Use of Modular Large Volume Tanks for Fresh Water Storage.

- a. The mobilization, installation, operation, and demobilization of the 40,000 barrel Modular Large Volume Tank (MLVT) shall strictly adhere to specifications, and standard operating procedures identified in the following documents submitted by BHPP via email on April 12, 2017:
  - Stephen N. Valero, P.E Transmittal Letter dated March 20, 2017 (4 pp.)
  - Rockwater’s Standard Operating Procedures for Above Ground Storage Tanks with Secondary Containment (58 pp. and dated 12/10/2013)
  - Well Water Solutions & Rentals’ Engineering and Standard Operating Procedures (QA/QC) for the Above Ground Storage Tanks (AST) also known as Modular Large Volume Tanks (MLVT) ( 67 pp.)
- b. A minimum 2-foot freeboard level shall be maintained at all times during operation of the MLVT.
- c. The expected time frame for active use of the MLVT during well completion operations is between May 15 and July 15 with tank demobilization from the site by August 1.
- d. A 72-hour hydrostatic test of the MLVT and associated surface pipe connections shall be required prior to commencement of well completion operations.
- e. A storm water plan addressing secondary containment plans for the HDU 7-23 well pad shall be submitted to BLM for review and approval prior to use of the MLVT.
- f. The MLVT shall be netted with 1-inch heavy weight (60 # per mesh) poly barrier net during its use and operation.
- g. As stated in the Sundry Notice, only fresh water shall be stored in the MLVT.

6. Additional Surveys for Sensitive and Federally Listed Plant Species

If construction, drilling, or completion activities on the HDU 5-34 or HDU 13-21-99 pads does not occur until 2019 or later, the BLM may require additional plant surveys for the Colorado hookless cactus, for the De Beque phacelia or its suitable habitat, and any sensitive plant species. Current guidance from the USFWS is that surveys for these species are valid for 2 years, which expire at the end of 2018. Surveys conducted in 2014, 2015, and 2016 in proximity to the Homer Deep MDP project revealed small areas of marginal De Beque phacelia habitat near the exterior edge of the survey buffer for the HDFU 5-34 pad. The most recent review of the marginal habitat was conducted in 2016. Although the plant surveys revealed negative findings for the remaining portions of the project area for both species, new occurrences of individuals or populations, new understandings of suitable habitat for the De Beque phacelia, and/or expanded survey distances required by the USFWS are potential future occurrences.

7. VRM Class II Mitigation Practices for HDU 5-34 Pad

To minimize impact to visual resources during construction of the HDU 5-34 pad and achieve the visual resource objectives for VRM Class II, the operator would implement the following construction design and mitigation measures that were developed during onsite field visits with the BLM:

- a. Generally raise and undulate the topsoil berm height along the edge of the pad disturbance closest to CR 200 to create a vegetation buffer that would help hide the facilities located on the well pad;
- b. Brush to be removed during the pad clearing work would be placed on the topsoil berms and pad fill slope to reduce visual contrast, create shade and a favorable growing space for establishing vegetation and blend the well site with the surrounding landscape;
- c. Selectively excavate small (< 12-foot tall) juniper trees within the disturbance area and “plant” the trees in the topsoil berm and fill-slope to maintain the vertical appearance of trees in the landscape even though the trees are likely to die. The transplanted trees would help maintain the appearance of junipers across the landscape;
- d. Extend the length of the pad fill-slope thereby reducing its grade to encourage accelerated vegetation establishment and store any excess material associated with the pad construction; and
- e. Extend the length of the road entrance at the southwest corner of the proposed pad to help “soften” the typical color contrast associated with the graveled roadway.

8. Cuttings Management

Prior to being buried or stacked on-site within the existing pad footprint, the cuttings generated from the drilling operations of the proposed wells shall be mixed with soils developed from an excavated vault (if necessary), tested for constituents of concern listed in COGCCs Table 910-1, and meet Table 910-1 concentration levels and standards (or obtain COGCC's approval of said testing results). If the cuttings, or any portion of the cuttings, are unable to satisfy Table 910-1 concentration levels or gain COGCC approval of the test results, said cuttings shall be hauled off-site to an approved disposal facility. The operator shall provide load tickets and/or chain of custody records for such hauling operations upon request from the BLM.

9. Landowner Surface Use Agreements

Prior to any BLM approval of the project components, the operator shall certify they have an executed Surface Use Agreement with the appropriate surface owner.

**APPENDIX B**

**U.S. Fish and Wildlife Service Informal Consultation Concurrence Letter  
January 18, 2018**

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# United States Department of the Interior



BUREAU OF LAND MANAGEMENT  
Colorado River Valley Field Office  
2300 River Frontage Road  
Silt, Colorado 81652  
Phone (970) 876-9000, Fax (970) 876-9090

December 15, 2017

In Reply Refer To:  
CON040/3160, COC72921X

## Memorandum

To: Ann Timberman, Assistant Field Supervisor  
From: Allen Crockett, Supervisory Natural Resource Specialist  
Subject: Request for Informal Consultation on the Homer Deep Master Development Plan, Mesa and Garfield Counties, Colorado

U.S. FISH AND WILDLIFE SERVICE	
<input type="checkbox"/> NO CONCERNS	
<input checked="" type="checkbox"/> CONCUR NOT LIKELY TO ADVERSELY AFFECT	
<input type="checkbox"/> NO COMMENT	
Ann Tub	1/18/18
WESTERN COLORADO SUPERVISOR	(DATE)

TAILS #: DL024110-2018-I-0110

Black Hills Plateau Production, LLC (BHPP) proposes to construct two oil and well pads and associated access spur roads and collocated pipelines on BLM-administered public land and private land approximately 10 miles west-northwest of the town of De Beque, Colorado. BHPP wishes to develop eight Federal oil and gas wells on each of the two pads across a 4-year period. Surface disturbance associated with the project would include 12.32 acres for the two pads; 1.23 acres along 0.25 mile of new spur roads; and 7.48 acres along 1.29 miles of new or existing roads. Initial disturbance area would be reduced to 5.31 acres for long-term operations.

Biological surveys conducted in 2014, 2015, and 2016 identified no threatened Colorado hookless cactus plants within 150 meters of proposed surface disturbance. However, surveys identified 0.1 acre of habitat for the threatened DeBeque phacelia habitat, at a distance of 155 meters from proposed surface disturbance and outside the mapped critical habitat. These survey results, in combination with proposed conservation measures, have led to an effects determination by the BLM of "May Affect, Not Likely to Adversely Affect" for both species. Additional occurrences of the cactus and of phacelia habitat were identified in 2012 along the main access road to the pads, Garfield County Road 200. That project, the Black Hills DeBeque Exploratory Proposal, underwent ESA Section 7 Consultation, and the USFWS concurred with BLM's determination of "May Affect, Not Likely to Adversely Affect" based on project design and mandatory conservation measures.

Because this project is for the development of Federal oil and gas resources, this BA is tiered to the 2008 Programmatic Biological Opinion (PBO) related to depletions of flows in the Colorado River Basin and associated impacts on the endangered Colorado pikeminnow, bonytail chub, humpback chub, and razorback sucker. Conservation measures associated with that PBO would be applied to the currently proposed project. When the revised PBO currently being prepared by USFWS is made final and implemented, any additional conservation measures would be applied to the project.

The BLM has also made a determination of "No Effect" for the yellow-billed cuckoo, western distinct population segment, based on site surveys, and for other threatened or endangered species potentially present in the region based on known geographic ranges and lack of suitable habitat in the project area.

With submittal of the attached Biological Assessment, the BLM hereby requests informal consultation with the USFWS pursuant to Section 7 of the Endangered Species Act. Please contact Anna Lincoln (970-244-3019) or me (970-876-9005) with any questions. Thank you.

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**APPENDIX C**

**Public Comments and BLM Responses**

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## APPENDIX C

### PUBLIC COMMENTS AND BLM RESPONSES Homer Deep Master Development Plan DOI-BLM-CO-N040-2015-0025-EA

The BLM posted a letter and location map describing the project on the BLM website on March 30, 2015. At the same time, copies of the letter and map were mailed to nearby landowners and other interested parties. In addition, the BLM placed a more detailed Proposed Action on the project website and invited public comment for a 30-day period from March 30 through April 29, 2015. A legal notice was published in the Glenwood Springs *Post Independent* on March 30, 2015; April 6, 2015; and April 13, 2015.

One comment letter for the Homer Deep MDP was received, submitted by High Lonesome Ranch in De Beque, Colorado. High Lonesome Ranch's comments were as follows:

***Comment:** HLR is concerned about how this proposal will impact the property, mineral, and grazing rights and the current and future operation of HLR.*

**Response:** The Environmental Assessment (EA) addresses resource impacts associated with Geology and Minerals, and Grazing and Rangeland Management, and provides appropriate mitigation for these resources in the suite of Conditions of Approval listed in Appendix A.

***Comment:** HLR is concerned about how future development of HLR minerals will be affected and the possibility of drainage of HLR minerals*

**Response:** The Environmental Assessment specifically addresses development of the Federal mineral estate including Federal leases and the Homer Deep Federal Unit within the MDP boundary. Petroleum engineering and adjudication reviews are conducted prior to issuance of any Application for Permit to Drill to ensure that Federal mineral interests are protected, and in doing so, such reviews can point to any potential issues or concerns with adjacent fee minerals and reservoir drainage impacts. A mineral owner is notified of potential impacts of proposed drilling through the required COGCC notification process. This notification requirement does not apply for lands committed to a Federal unit as committed unit lands are viewed as one lease.

***Comment:** Access across HLR lands and in close proximity to HLR headquarters and guest accommodations is a high priority concern. HLR requests that considerable attention be given to impacts to hunting and fishing operations on and adjacent to the proposed development area, as well as the quality of wildland experience we provide to our clients (i.e., effect of traffic, dust, noise).*

**Response:** Garfield and Mesa County Roads will provide direct access to both proposed well pads, spur roads and ancillary gas and water pipelines analyzed in the HDMDP. Traffic use on these county roads are subject to county regulations including speed limits and permits for overweight/oversize vehicles, driveways including road upgrades at proposed county intersections, and utilities such as buried pipelines. The EA specifically addresses impacts and mitigation for Access and Transportation and Recreation Resources.

***Comment:** The HLR is an active ranch providing recreational, agricultural, and educational activities. We provide many activities that could be impacted from the proposal including, but not limited to, hunting, fishing, horseback riding, cattle grazing, crop production, meeting and banquet facilities, and other recreational activities. The increased activity, noise, dust, and water use could potentially impact these valuable HLR resources.*

**Response:** The EA addresses resource impacts associated with Recreation, Wildlife including Aquatic Organisms, Migratory Birds and Other Terrestrial Species, Grazing and Rangeland Management, Noise, Air Quality, and Water Resources. The EA describes appropriate mitigation for these resources in the suite of Conditions of Approval listed in Appendix A.

*Comment:* The protection of surface and sub-surface water is of great concern for the HLR. Impacts from surface diversion and depletions, sub-surface drawdown, contamination, and other impacts from development, including hydraulic fracturing should be clearly evaluated and protections in place to safeguard HLR water resources.

**Response:** The EA addresses resource impacts associated with Water Resources including Surface Water Quality, Waters of the United States, and Groundwater. Specific analysis for the hydraulic fracturing process and its potential impacts are addressed in the Groundwater resource section. The EA describes appropriate mitigation for these resources in the suite of Conditions of Approval listed in Appendix A.

*Comment:* Impacts to wildlife including evaluations using the best available science for sage grouse, mule deer, elk, and other western Colorado species should be used. This includes including recommendations from the CO Division of Wildlife and Parks and the Western Association of Fish and Wildlife Agencies Mule Deer Working Group and Sage Grouse Working Group. Impacts to sensitive habitats, movement and migration corridors, and parturition (birthing) areas should be included. There may be alternative locations (on public or private lands) that are better suited for well pad locations to avoid or minimize impacts to wintering wildlife, particularly mule deer.

**Response:** The EA addresses resource impacts associated with Recreation, Wildlife including Aquatic Organisms, Migratory Birds and Other Terrestrial Species; sage grouse are not directly impacted by the HDMDP. Minimizing impacts to wintering wildlife was a consideration in the location of one pad outside the critical winter range for mule deer and the other well pad situated in proximity to a county road where traffic, noise and air quality impacts are typically concentrated. The EA describes appropriate mitigation for these resources in the suite of Conditions of Approval listed in Appendix A.

*Comment:* It is our understanding that Black Hills will be revising its voluntary mitigation agreement (VMA) with the CPW in relation to this proposal. The agreement should be included for inclusion into the EA and commitments should be considered as part of the decision record for the project (or Record of Decision if an EIS is completed). This can provide incentive to Black Hills to complete the mitigation and should give some incentive to permit processing (APD or ROW) and restrictions to development (seasonal restriction on winter range).

**Response:** The status of the Wildlife Habitat Mitigation Plan developed between CPW and BHPP is uncertain, given BHPP's sale of its assets to Laramie Energy. Moreover, such plans do not involve the BLM and are not enforced by the BLM. However, any desire by the operator to drill/complete wells year-round is subject to the big game winter habitat timing limitation identified in the Federal lease or, for ROW grants, available under the 2015 GJFO Resource Management Plan. Consideration of wildlife habitat mitigation would be a component of BLM's evaluation, in collaboration with CPW, of requests for exceptions to the big game winter timing limitation for all or part of any given winter season.

*Comment:* Additionally, BLM should follow recently revised guidance and policy for mitigation requirements for use during a Finding of No Significant Impact (FONSI) completed by the Council of Environmental Quality in 2011. Specific mitigation requirements should be clearly outlined in the EA and provisions for successful implementation identified (including how mitigation will be monitored and changed if not working).

**Response:** The EA describes appropriate mitigation, including any monitoring requirements, for the various impacted resources in the suite of Conditions of Approval listed in Appendix A.

*Comment:* The White River Field Office has released its draft Resource Management Plan amendment for expanded oil and gas development, and this proposal should conform to the proposed RMP. The RMP is the primary opportunity for the BLM to consider private surface owners concerns during oil and gas leasing (per Instruction Memorandum No. 2007-165).

**Response:** The HDMDP project as a whole, and specifically the ROW stipulations addressing mitigation for the well pad, road, and pipelines authorized by ROW grants, are grounded in the Grand Junction Resource Management Plan/EIS land use plan decisions approved in 2015.

*Comment:* We recommend that the BLM address the likelihood of development beyond the proposed wells and infrastructure on adjacent public lands in this proposal. BLM must include actions that are “reasonably certain to occur” and given that development will likely continue in this area it is prudent that BLM address mitigation or compensation as part of a look at cumulative impacts.

**Response:** Cumulative impacts analysis is addressed in the HDMDP. Furthermore, the 2015 Grand Junction RMP/EIS provides a thorough cumulative impact analysis for the oil and gas program.

*Comment:* BLM should fully implement the energy reforms instituted by the Department of Interior in 2010. This includes implementation of Master Lease Planning, new guidelines for the use of Categorical Exclusions, inclusion of the public in projects, and a commitment to use the latest, best available science.

**Response:** BLM has implemented these various practices per BLM, Washington Office guidance, including Best Management Practices that encourage operators to use in real-world applications to help mitigate impacts for a wide range of resources.

*Comment:* The potential to directly and adversely impact these HLR rights warrants that the HLR be given higher consideration than the general public during the development of this project. We request the equivalent of “cooperating agency status” for this proposal to adequately protect HLR property rights, increase coordination of the development of energy resources, and improve collaboration in the protection and conservation of natural resources.

**Response:** Public scoping was conducted initially with the Proposed Action for the Homer Deep MDP Project in June 2015 with the goal of addressing the various comments received. The EA was written to analyze the project’s impacts and identify various mitigation measures (either Conditions of Approval for APDs or stipulations for ROW grants) to be included in the permitting actions for the HDMDP. The High Lonesome Ranch letter, containing the only comments received, essentially provided the public scoping focus used in the preparation of the project EA.

The public scoping letter and location map sent on March 30, 2015, are included on the following pages. Note the much more extensive project proposal initially considered, as shown on the following map, before resource surveys led the BLM to eliminate proposed new pads in central and eastern portions.





## United States Department of the Interior

BUREAU OF LAND MANAGEMENT  
Colorado River Valley Field Office  
2300 River Frontage Road  
Silt, CO 81652



IN REPLY REFER TO:  
LLCON040/3160  
COC12727, COC52686, COC67560, COC69072

March 30, 2015

Dear Interested Public,

The Bureau of Land Management (BLM) Colorado River Valley Field Office is initiating an environmental assessment (EA) for the Homer Deep Master Development Plan (HDMDP) for oil and gas exploration and development. The Proposed Action for the HDMDP, prepared by Black Hills Plateau Production, LLC, describes development of 36 horizontal oil and gas wells distributed among four new and one existing well pad located generally northwest of the town of De Beque. Each pad would encompass approximately 7 acres. Construction and operation of the HDMDP would allow for additional production of up to 306 billion cubic feet (bcf) of natural gas over the life-of-the-project which is estimated to be 20 years. Black Hills currently operates five horizontal wells on three pads. These are indicated by green squares on the attached Map.

The Project Area consists of the Homer Deep Unit (HDU), which encompasses roughly 33,000 acres of Federal, private, and split-estate (private surface/Federal minerals) lands described as follows: Northwest of De Beque via Roan Creek Road (Mesa County 45 Road) to Mesa County Road 200, including all or portions of Sections 7-10 and 13-24, T8S R98W; Sections 11-15, and 24, T8S R99W, and Section 6, T8S R98W, Sixth Principal Meridian (see Map).

Although the HDMDP project area lies within the administrative boundaries of BLM's Grand Junction Field Office (GJFO) and contains existing oil and gas well pads, wells, and other infrastructure approved by that field office, the HDMDP is being managed by BLM's Colorado River Valley Field Office (CRVFO) in Silt, Colorado. This change in BLM management of the project is part of a consolidation of the GJFO oil and gas program into the CRVFO, which became effective on October 1, 2014.

The BLM is preparing the EA to disclose the direct, indirect, and cumulative environmental impacts of the development plan and a No Action alternative. As a starting point in the assessment, the BLM is soliciting input on the issues that would be considered in the preparation of the HDMDP. At this time, you are encouraged to provide any comments, concerns, or issues that you may have with regard to the proposed development plan.

*Comments will be most helpful if received by April 29, 2015. Written comments and questions should be directed to the Colorado River Valley Field Office at 2300 River Frontage Road, Silt, CO 81652, or submitted electronically to [blm\\_co\\_si\\_mail@blm.gov](mailto:blm_co_si_mail@blm.gov).*

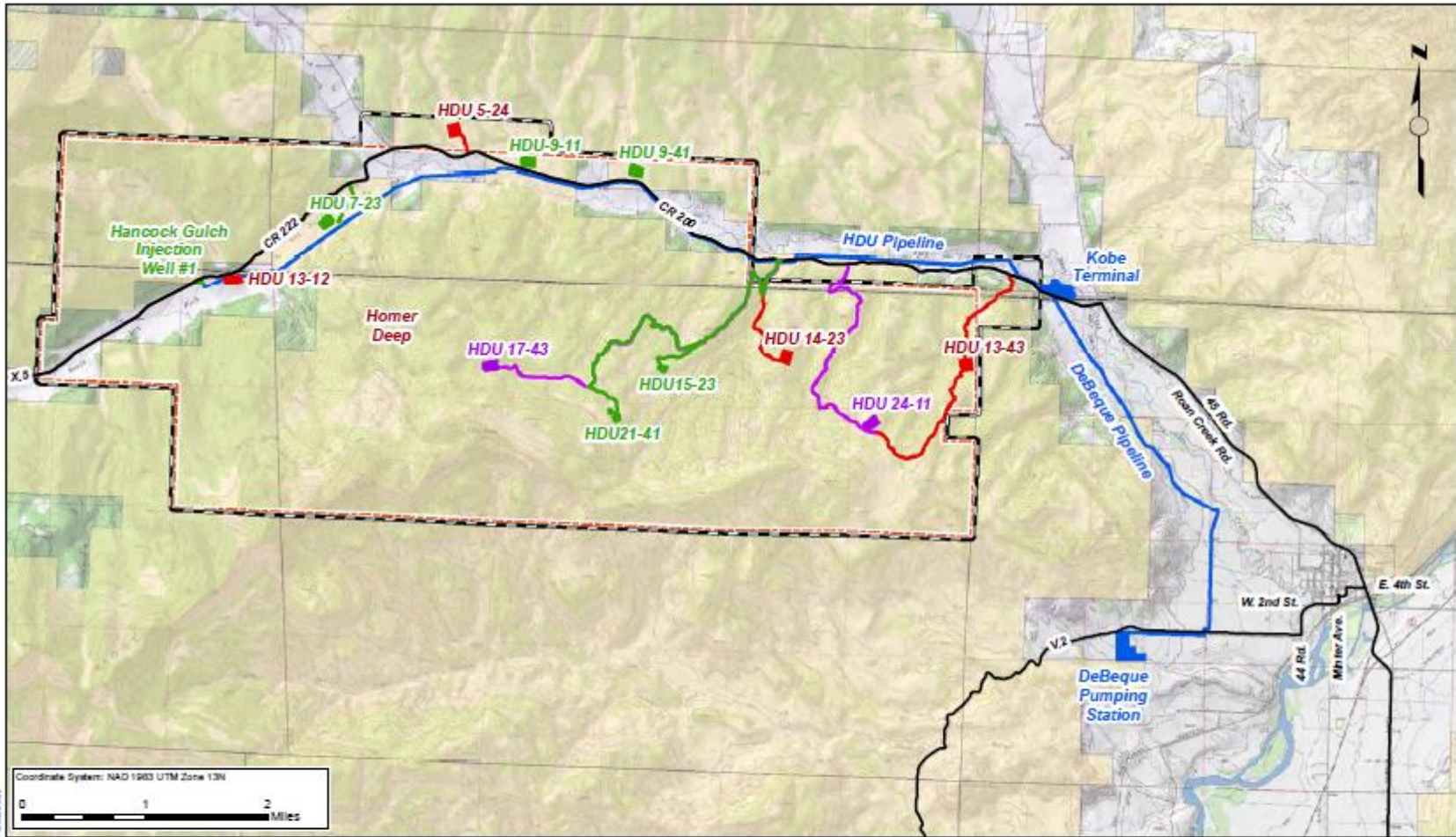
Copies of the proposed action that further detail the proposed oil and gas development are available for review at the BLM Colorado River Valley Field Office and online at:  
[https://www.blm.gov/epl-front-office/eplanning/lup/lup\\_register.do](https://www.blm.gov/epl-front-office/eplanning/lup/lup_register.do).

Sincerely,

Allen B. Crockett, Ph.D.  
Supervisory Natural Resource Specialist

Enclosure – Project Map






Coordinate System: NAD 1983 UTM Zone 13N  
 0 1 2 Miles

- Legend**
- Unit Boundary
  - Project Area Boundary
  - Existing Well Pad
  - Existing Resource Road/Gathering Line
  - Existing Facilities
  - Existing Pipeline
  - Approved Well Pad – Not Constructed
  - Approved Resource Road/Gathering Line
  - Proposed Well Pad
  - Proposed Resource Road/Gathering Line

Project: Black Hills Plateau Production, LLC

Title: **Homer Deep Master Development Plan**



Black Hills Plateau Production

Project No:	005-30	File No.	
GIS:	JST	06/2015	Scale = 1:75,000
Check:	MAB		Rev 0
Review:	MAB		<b>Map 1</b>

United States Department of the Interior  
Bureau of Land Management  
Grand Junction Field Office, Colorado

**FINDING OF NO SIGNIFICANT IMPACT**

**Black Hills Plateau Production, LLC  
Homer Deep Master Development Plan  
DOI-BLM-CO-N040-2015-0025-EA**

Based on the analysis of potential environmental impacts contained in the attached Environmental Assessment, and considering the significance criteria in 40 CFR 1508.27, I have determined that the Proposed Action will not have a significant effect on the human environment. An environmental impact statement is therefore not required.

**BACKGROUND**

The Bureau of Land Management, Colorado River Valley Field Office (CRVFO), has prepared an Environmental Assessment (EA) that analyzes the effects of constructing two well pads with associated access roads and buried natural gas and water pipelines for the purpose of drilling, completing, and producing 16 Federal oil and gas horizontal wells. The project area would be located on unleased BLM land and private land with underlying Federal minerals located approximately 8 to 10 air-miles northwest of De Beque, Colorado, in the Dry Fork of Roan Creek drainage, tributary to the Colorado River, with portions of the proposal occurring in Garfield and Mesa Counties. The project was posted on the CRVFO and GJFO NEPA websites in March 30, 2015, for a 30-day scoping period. Two comment letters were received.

**INTENSITY/SEVERITY**

I have considered the potential intensity/severity of the impacts anticipated to accompany implementation of the Proposed Action in relation to each of the ten areas suggested for consideration by the CEQ:

- 1. Impacts that may be both beneficial and adverse.** This project would have short-term impacts to soils, vegetation, wildlife, and air quality during construction, drilling, and completion activities. These impacts are not significant and would decrease during long-term production activities. This project would have a long-term benefit from the production of natural gas for public use, from employment, and from generation of revenue in the form of Federal oil and gas royalties and a variety of State and local taxes.
- 2. The degree to which the Proposed Action affects public health and safety.** The Proposed Action is not expected to have significant adverse impacts on public health and safety.
- 3. Unique characteristics of the geographic area such as proximity of historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.** The Proposed Action would not result in significant impacts to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. The project has been designed to avoid impacts or minimize impacts to other resources and uses. The project area does not include municipal water supplies and is not expected to impact groundwater aquifers used for domestic or agricultural purposes.
- 4. The degree to which effects on the quality of the human environment are likely to be highly controversial.** Because of its relatively small scale and the short duration of construction, drilling, and completion activities, environmental effects are not expected to be controversial.

**5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.** The construction of well pads, access roads and pipelines and the drilling, completion, and production of oil and gas wells are common activities in the project vicinity, and currently unknown risks are not anticipated.

**6. The degree to which the Proposed Action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.** This decision is similar to many that have previously been made and will continue to be made by the BLM regarding the development of valid Federal oil and gas leases in the GJFO area. The decision is within the scope of the applicable Resource Management Plan. The decision does not represent a decision in principle about a future consideration.

**7. Whether the Proposed Action is related to other actions with individually insignificant but cumulatively significant impacts.** The Proposed Action would have no significant cumulative effects on the environment, either when combined with the effects created by past and concurrent projects, or when combined with the effects from natural changes taking place in the environment or from reasonably foreseeable future projects.

**8. The degree to which the Proposed Action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historic resources.** The Proposed Action would have no adverse impacts to the above resources.

**9. The degree to which the Proposed Action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.** The Proposed Action incorporates an analysis for Federally listed, proposed, or candidate threatened or endangered animal species and would have "No Effect" on any such plant or terrestrial wildlife species. However, the determination of impacts for four species of endangered big-river fishes is "May Affect, Likely to Adversely Affect" based on a Programmatic Biology Opinion (PBO) issued by the U.S. Fish and Wildlife Service in 2008 for BLM oil and gas projects in Colorado. Pursuant to the PBO, a one-time mitigation Fee would be paid for each approved Federal well as a method for offsetting adverse impacts resulting from depletions of flows in the Colorado River drainage basin.

**10. Whether the Proposed Action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.** This decision complies with other Federal, State, or local laws and requirements imposed for the protection of the environment.

#### **FINDING OF NO SIGNIFICANT IMPACT**

On the basis of the information contained in the EA, and all other information available to me, it is my determination that: 1) the implementation of the Proposed Action or alternatives will not have significant environmental impacts beyond those already addressed in the "Record of Decision and Resource Management Plan," (August 2015); (2) the Proposed Action is in conformance with the Resource Management Plan; and (3) the Proposed Action does not constitute a major Federal action having a significant effect on the human environment. Therefore, an Environmental Impact Statement (EIS) or a supplement to the existing environmental impact statement is not necessary and will not be prepared.

This finding is based on my consideration of Council on Environmental Quality (CEQ) criteria for significance (40 CFR 1508.27) with regard to both the context and the intensity of the impacts described in the EA.

  
Kathryn A. Stevens, Field Manager  
Grand Junction Field Office

5/7/2018  
Date



United States Department of the Interior  
Bureau of Land Management  
Grand Junction Field Office, Colorado

**DECISION RECORD**

**Black Hills Plateau Production, LLC  
Homer Deep Master Development Plan  
DOI-BLM-CO-N040-2015-0025-EA**

**DECISION:** It is my decision to authorize the Proposed Action as described Section 2 of the attached EA (effects of constructing the new HDU 5-34 and HDU 13-21-99 well pads; drilling, completing, and producing the proposed 16 Federal oil and gas wells from the HDU 5-34 and HDU 13-21-99 well pads; and constructing and operating buried pipelines and ancillary surface facilities including new natural gas pipelines operated by Red Rock Gathering, LLC and new water pipelines operated by Black Hills Plateau Production LLC) located in the 6<sup>th</sup> P.M., Sections 5, 7, and 8, Township 8 South, Range 98 West and Section 12 and 13, Township 8 South, Range 99 West.

This decision is contingent on meeting all mitigation measures and monitoring requirements presented in Appendix A (Surface-Use Conditions of Approval) of the EA. The project was noticed to the public by posting on the CRVFO and GJFO NEPA websites on March 30, 2015 for a 30-day period.

The EA resulted in a Finding of No Significant Impact (FONSI) for the Proposed Action. Consequently, an Environmental Assessment Statement (EIS) is not required.

**RATIONALE:** The bases for this decision are as follows:

1. Approval of the Proposed Action is validating the rights granted with Federal oil and gas leases (COC12733A, COC12735, COC12736, COC12747, COC14176, COC52686, and COC67159) to develop the leaseholds to provide commercial commodities of oil and gas.
2. The project would allow natural gas and associated liquid hydrocarbons ("oil") to be delivered to markets for the use and benefit of the public.
3. Environmental impacts would be avoided, minimized, or offset with the mitigation measures incorporated into the Proposed Action or attached and enforced by BLM as COAs.
3. This Decision does not authorize the initiation of construction or drilling activities associated with any Federal oil and gas well. Initiation of activities related to the proposed new Federal oil and gas wells may commence only upon approval by BLM of an APD for that well. Initiation of construction activities related to the proposed HDU 5-34 well pad, access road, and natural gas and water pipelines, and the gas and water pipelines for the HDU 13-21-99 site, may commence only upon approval by the BLM of a ROW for the well site or pipelines. However, this decision provides the BLM's Authorized Officer (AO) with an analysis upon which to base approval of the APD and ROW.

**MITIGATION MEASURES AND MONITORING:** If an APD for any of the wells sought by the proponent is approved as an outcome of this decision, the Surface-Use COAs provided in Appendix A of the EA would be attached to the APD and enforced by the BLM. These protections would be in addition to any design features and best management practices to which the proponent committed in the Surface Use Plan of Operations (SUPO) included with the APD. Furthermore, if a well site and/or linear pipeline ROW is approved as an outcome of this decision, the Surface-Use COAs provided in Appendix A of the attached EA would be attached to the ROW and enforced by the BLM.

**PROTESTS AND APPEALS:** In accordance with 43 CFR 3165.3, any adversely affected party contesting this decision may request an administrative review of this decision, before the State Director, either with or without oral presentation. This request, including all supporting documentation, shall be submitted in writing within 20 business days of the date this decision was received, or considered to have been received, by the party and shall be sent to Colorado State Director, 2850 Youngfield Street, Lakewood, Colorado 80215-7076. The decision of the State Director may then be appealed to the Interior Board of Land Appeals in accordance with 43 CFR 3165.4. BLM Colorado will not accept a request for State Director Review or a notice of appeal transmitted electronically (e.g., by email, facsimile, or social media means).

**NAME OF PREPARER:** Jim Byers, Natural Resource Specialist, Colorado River Valley Field Office

**NAME OF ENVIRONMENTAL COORDINATOR:** Allen Crockett, Supervisory NRS, Colorado River Valley Field Office.

**DATE REVIEWED:** May 3, 2018

**SIGNATURE OF AUTHORIZED OFFICIAL:**



Kathryn A. Stevens, Field Manager  
Grand Junction Field Office

**DATE SIGNED:**

5/7/2018