

**U.S. Department of the Interior
Bureau of Land Management
Colorado River Valley Field Office
2300 River Frontage Road
Silt, Colorado 81652**

ENVIRONMENTAL ASSESSMENT

NUMBER

DOI-BLM-CO-N040-2011-0117-EA

CASEFILE NUMBER

Bottomholes for all Federal wells are located within Federal Lease COC15976.

PROJECT NAME

Proposal to Drill up to 39 Wells from the Proposed Federal NENW-26-692 Well Pad on BLM Land and the Proposed Dixon SENW-23-692 and Dixon SWNW-23-692 Well Pads on Private Lands South of Silt, Garfield County, Colorado.

PAD LOCATION

Township 6 South (T6S), Range 92 West (R92W), Sections 23 and 26, NENW, SENW, and SWNW, Sixth Principal Meridian

APPLICANT

Bill Barrett Corporation, Contact: Mary Pobuda, 1099 Eighteenth Street, Suite 2300, Denver, CO 80202.

PROPOSED ACTION

Bill Barrett Corporation (BBC) proposes to drill and develop up to 39 new oil and gas wells (Table 1) from three proposed pads located approximately 2 miles south of Silt, Colorado. Two of the proposed pads would be constructed on private, or "Fee" surface, with one pad constructed on Bureau of Land Management (BLM) surface (Figure 1). The wells would be drilled directly or directionally from the pad locations into Federal Lease COC15976. Lease terms applicable to the proposed Federal wells are presented in the Lease Stipulations section.

Cuttings generated during drilling would be managed partially on the surface of the pad and within the COGCC (Colorado Oil and Gas Conservation Commission)-permitted cuttings trench area along the cut slopes of the pad. In cases where emergencies such as weather conditions, safety concerns, or operational constraints exist, cuttings may be temporarily stored at another location in accordance with COGCC waste management and CDPHE stormwater regulations. The cuttings trench would be constructed to be free from leaks and would not be located on natural drainages. Wastewater or discharge would not be allowed to enter any drainage. Pipelines would primarily be located along proposed roads. All production equipment would be located on the NENW pad and SENW pads, but partially outside the well pad disturbance area for the SWNW pad (Figures 2 through 4, respectively). Another private pad shown on Figure 1, the Epperly NWSW-23-692, has been constructed by BBC for access to Fee minerals.

Table 1. Surface and Bottomhole Locations of Proposed Federal Wells

<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottomhole Locations</i>
NENW-26-692 (Federal Surface)	21A-26-692	T6S R92W, Section 26 NENW, 1,135 feet FNL, 1,666 feet FWL	T6S R92W, Section 26 NENW 1,140 feet FNL, 1,996 feet FWL
	21B-26-692	T6S R92W, Section 26 NENW, 1,135 feet FNL, 1,658 feet FWL	T6S R92W, Section 26 NENW 815 feet FNL, 1,996 feet FWL
	21C-26-692	T6S R92W, Section 26 NENW, 1,135 feet FNL, 1,650 feet FWL	T6S R92W, Section 26 NENW 490 feet FNL, 1,996 feet FWL
	21D-26-692	T6S R92W, Section 26 NENW, 1,135 feet FNL, 1,642 feet FWL	T6S R92W, Section 26 NENW 165 feet FNL, 1,996 feet FWL
	11A-26-692	T6S R92W, Section 26 NENW	To be determined
	11B-26-692	T6S R92W, Section 26 NENW	To be determined
	11C-26-692	T6S R92W, Section 26 NENW	To be determined
	11D-26-692	T6S R92W, Section 26 NENW	To be determined
	12A-26-692	T6S R92W, Section 26 NENW	To be determined
	12B-26-692	T6S R92W, Section 26 NENW	To be determined
	12C-26-692	T6S R92W, Section 26 NENW	To be determined
	12D-26-692	T6S R92W, Section 26 NENW	To be determined
	22B-26-692	T6S R92W, Section 26 NENW	To be determined
	22C-26-692	T6S R92W, Section 26 NENW	To be determined
22D-26-692	T6S R92W, Section 26 NENW	To be determined	
SENW-23-692 (Fee Surface)	22A-23-692	T6S R92W Section 23 SENW 1,932 feet FNL, 2,470 feet FWL	T6S R92W, Section 22 SENW 2,499 feet FNL, 1,994 FWL
	22B-23-692	T6S R92W Section 23 SENW 1,924 feet FNL, 2,470 feet FWL	T6S R92W, Section 22 SENW 2,161 feet FNL, 1,994 FWL
	22C-23-692	T6S R92W Section 23 SENW 1,916 feet FNL, 2,470 feet FWL	T6S R92W, Section 22 SENW 1,823 feet FNL, 1,994 FWL
	22D-23-692	T6S R92W Section 23 SENW 1,908 feet FNL, 2,470 feet FWL	T6S R92W, Section 22 SENW 1,485 feet FNL, 1,994 FWL
	32A-23-692	T6S R92W Section 23 SENW 1,931 feet FNL, 2,480 feet FWL	T6S R92W, Section 22 SWNE 2,526 feet FNL, 1,994 FEL
	32B-23-692	T6S R92W Section 23 SENW 1,923 feet FNL, 2,480 feet FWL	T6S R92W, Section 22 SWNE 2,179 feet FNL, 1,994 FEL
	32C-23-692	T6S R92W Section 23 SENW 1,915 feet FNL, 2,480 feet FWL	T6S R92W, Section 22 SWNE 1,832 feet FNL, 1,994 FEL
	32D-23-692	T6S R92W Section 23 SENW 1,907 feet FNL, 2,480 feet FWL	T6S R92W, Section 22 SWNE 1,485 feet FNL, 1,994 FEL
SWNW-23-692 (Fee Surface)	11A-23-692	T6S R92W Section 23 SWNW 1,494 feet FNL, 366 feet FWL	T6S R92W, Section 23 SWNW 1,494 feet FNL, 366 feet FWL
	11B-23-692	T6S R92W Section 23 SWNW 1,494 feet FNL, 358 feet FWL	T6S R92W, Section 23 SWNW 1,494 feet FNL, 358 feet FWL
	11C-23-692	T6S R92W Section 23 SWNW 1,495 feet FNL, 350 feet FWL	T6S R92W, Section 23 SWNW 1,495 feet FNL, 350 feet FWL
	11D-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW

Table 1. Surface and Bottomhole Locations of Proposed Federal Wells			
<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottomhole Locations</i>
		1,495 feet FNL, 342 feet FWL	1,495 feet FNL, 342 feet FWL
	12A-23-692	T6S R92W Section 23 SWNW 1,505 feet FNL, 342 feet FWL	T6S R92W, Section 23 SWNW 1,505 feet FNL, 342 feet FWL
	12B-23-692	T6S R92W Section 23 SWNW 1,505 feet FNL, 350 feet FWL	T6S R92W, Section 23 SWNW 1,505 feet FNL, 350 feet FWL
	12C-23-692	T6S R92W Section 23 SWNW 1,504 feet FNL, 358 feet FWL	T6S R92W, Section 23 SWNW 1,504 feet FNL, 358 feet FWL
	12D-23-692	T6S R92W Section 23 SWNW 1,504 feet FNL, 366 feet FWL	T6S R92W, Section 23 SWNW 1,504 feet FNL, 366 feet FWL
	41A-22-692	T6S R92W Section 23 SWNW 1,496 feet FNL, 310 feet FWL	T6S R92W, Section 22 NENE 1,191 feet FNL, 660 feet FWL
	41B-22-692	T6S R92W Section 23 SWNW 1,496 feet FNL, 318 feet FWL	T6S R92W, Section 22 NENE 862 feet FNL, 660 feet FEL
	41C-22-692	T6S R92W Section 23 SWNW 1,495 feet FNL, 326 feet FWL	T6S R92W, Section 22 NENE 534 feet FNL, 660 feet FEL
	41D-22-692	T6S R92W Section 23 SWNW 1,495 feet FNL, 334 feet FWL	T6S R92W, Section 22 NENE 205 feet FNL, 660 feet FEL
	42A-22-692	T6S R92W Section 23 SWNW 1,505 feet FNL, 334 feet FWL	T6S R92W, Section 22 SENE 2,505 feet FNL, 660 feet FEL
	42B-22-692	T6S R92W Section 23 SWNW 1,505 feet FNL, 326 feet FWL	T6S R92W, Section 22 SENE 2,176 feet FNL, 660 feet FEL
	42C-22-692	T6S R92W Section 23 SWNW 1,506 feet FNL, 318 feet FWL	T6S R92W, Section 22 SENE 1,848 feet FNL, 660 feet FEL
	42D-22-692	T6S R92W Section 23 SWNW 1,506 feet FNL, 310 feet FWL	T6S R92W, Section 22 SENE 1,519 feet FNL, 660 feet FEL

For completions, hydraulic fracturing (“fracing”) would occur on the pad from a constructed completions pit. The frac water would be supplied from BBC’s own water system or purchased from private landowners. Drilling fluids would be recycled. The site would be kept free of trash and debris.

Initial pad sizes would range from 4.3 to 5.8 acres. Interim reclamation would reduce pad sizes through standard earthwork and reclamation practices to less than 2 acres during long-term production of wells on the pad. Total surface disturbance for the three pads, roads, and pipeline construction would amount to 18.7 acres. The total disturbance occurring on BLM surface would be 4.8 acres, representing approximately 25% of the surface disturbance planned for the project. Approximately 14 acres of disturbance would occur on Fee surface. Long-term disturbance for roads, pipelines, and pads would be approximately 5.5 acres.

Topsoil conservation practices would be implemented during pad construction to salvage as much suitable growth medium as practical and to segregate the topsoil and suitable subsoil media around the pad perimeter, where topography allows, in a windrow. Windrowing of topsoil is intended to enhance viability of the soil during storage by facilitating the infiltration of moisture and maintaining an aerobic condition. The windrow would also serve as stormwater retention structure for the pad.

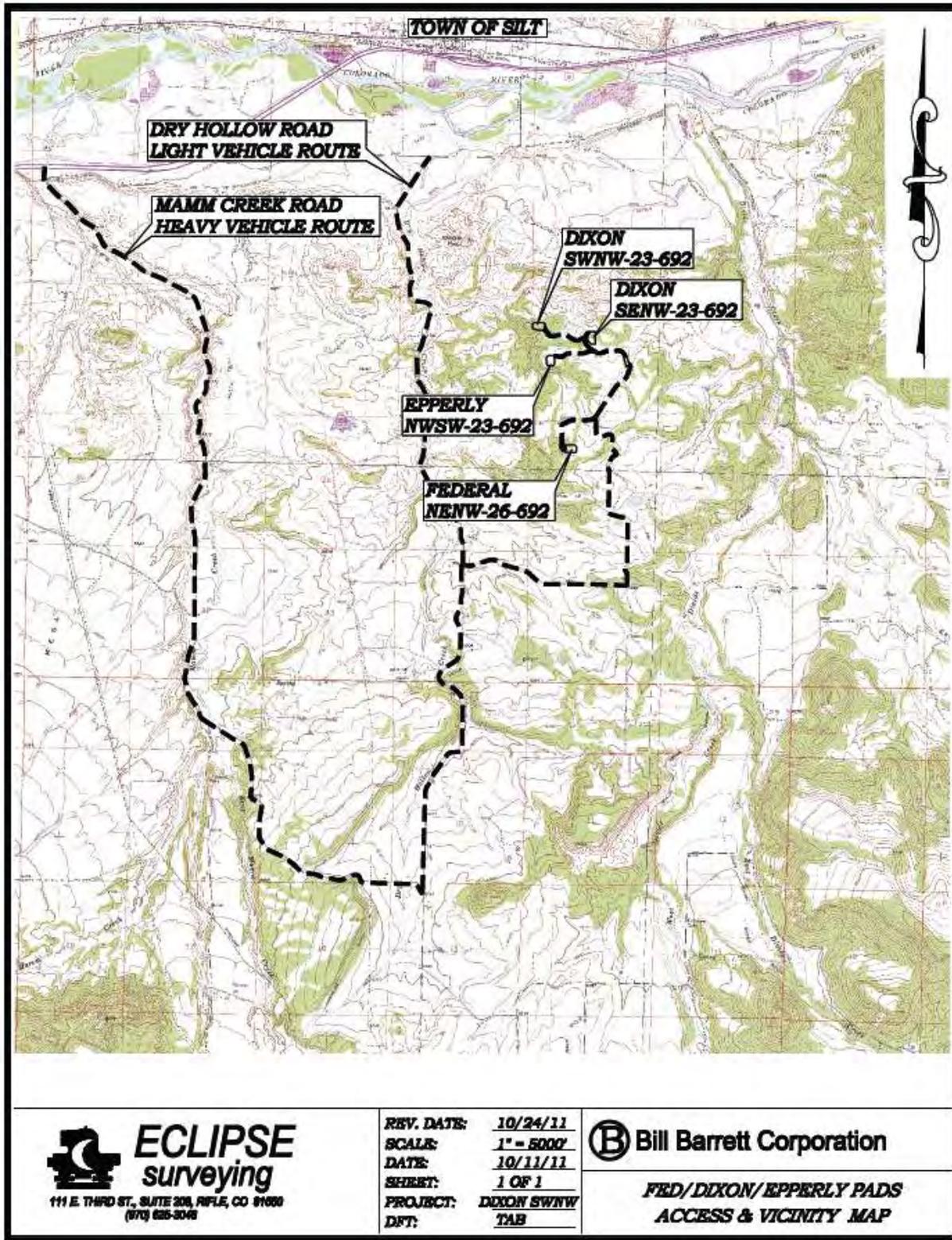


Figure 1. Location Map showing Three Proposed and One Existing Pad.

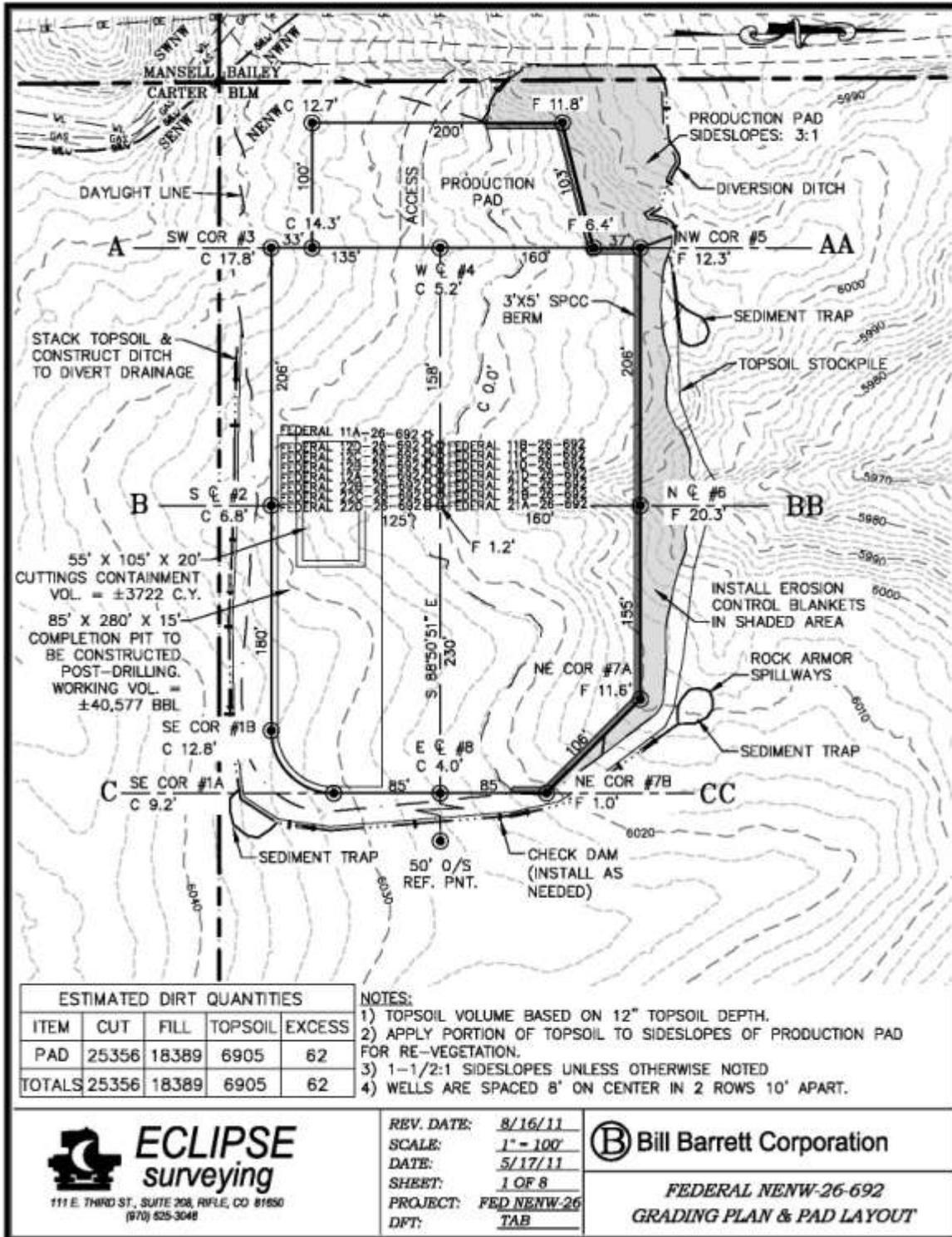


Figure 2. Federal NENW-26-692 Pad Construction Layout (BLM Surface).

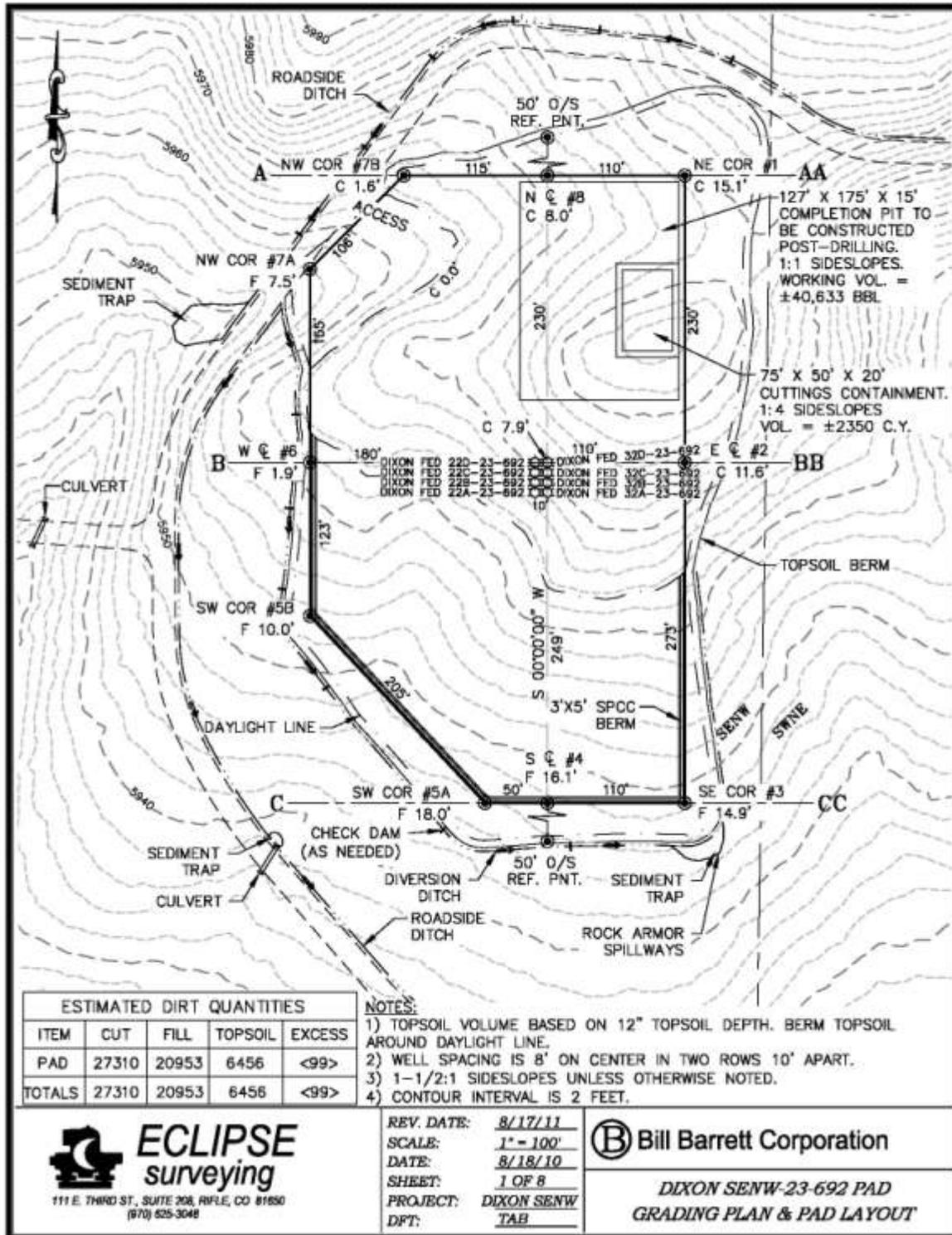


Figure 3. Dixon SENW-23-692 Pad Construction Layout (Private Surface).

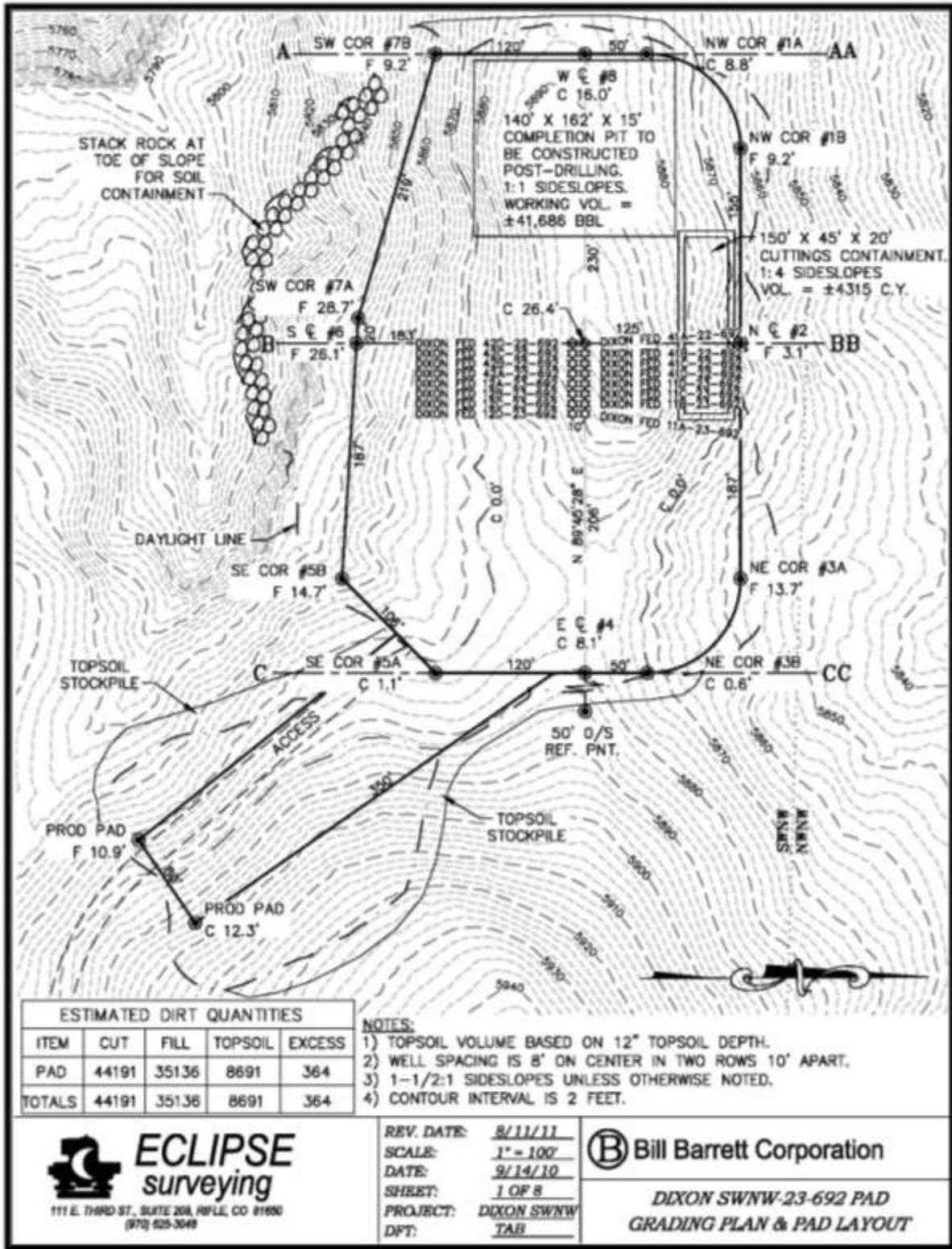


Figure 4. Dixon SWNW-23-692 Pad Construction Layout (Private Surface).

Cuttings generated from the well bores would be worked through a shaker system on the drill rig, mixed with sawdust in a steel cuttings bin, and piled on location against the cutslope for later burial during the interim reclamation earthwork.

The road, pipeline, and pad construction work would follow the guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development* (USDI and USDA 2007). A road maintenance program would be required during the production phase of the wells which includes, but is not limited to, blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. Roads would be maintained in a safe and usable condition.

The Proposed Action would include drilling and completion, production of natural gas and associated liquid condensate, proper handling and disposal of produced water, and interim and final reclamation. The Proposed Action would be implemented consistent with Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the Applications for Permit to Drill (APDs). Appendix A lists the specific Surface Use Conditions of Approval (COAs) that would be implemented as mitigation measures for this project. The operator would be responsible for continuous inspection and maintenance of the access roads, pads and pipelines.

NO ACTION ALTERNATIVE

The Proposed Action involves the drilling of up to 39 Federal wells from BLM and Fee surface into the underlying subsurface minerals encumbered with Federal oil and gas lease COC15976. Although BLM cannot deny the right to drill and develop the leasehold, individual APDs can be denied to prevent unnecessary and undue degradation.

The No Action Alternative constitutes denial of the Federal APD(s) described in the Proposed Action. In so doing, none of the planned developments outlined in the Proposed Action would occur, since the authorizations would be denied for drilling on the BLM parcel. For the No Action Alternative, no surface disturbance would occur on BLM land, and the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids BLM surface. Therefore, impacts of the No Action Alternative on access and transportation would be less than under the Proposed Action but not eliminated.

The need to construct new roads or new pipelines would not arise. The No Action Alternative would yield no new surface disturbance.

PURPOSE AND NEED FOR THE ACTION

The purpose of the action is to develop oil and gas resources on Federal lease COC15976 consistent with existing Federal lease rights. The action is needed to increase the development of oil and gas resources for commercial marketing to the public.

SUMMARY OF LEASE STIPULATIONS

The Federal wells would be drilled directly or directionally from the proposed pads located on BLM and Fee land into Federal lease COC15976. No specific lease stipulations are associated with Federal lease COC15976. However, site-specific COAs developed during the APD/EA review and onsite field consultation would apply to all pads and would be attached to the Federal APDs (see Appendix A).

PLAN CONFORMANCE REVIEW

The Proposed Action and No Action Alternative are subject to and have been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

Name of Plan: The current land use plan is the *Glenwood Springs Resource Management Plan (RMP)*, approved in 1984 and revised in 1988 (BLM 1984). Relevant amendments include the *Oil and Gas Plan Amendment to the Glenwood Springs Resource Management Plan (BLM 1991)* and the *Oil & Gas Leasing & Development Record of Decision and Resource Management Plan Amendment (BLM 1999a)*.

Decision Language: The 1991 Oil and Gas Plan Amendment (BLM 1991) included the following at page 3: “697,720 acres of BLM-administered mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations” (BLM 1991, page 3). This decision was carried forward unchanged in the 1999 ROD and RMP amendment at page 15 (BLM 1999b): “In areas being actively developed, the operator must submit a Geographic Area Proposal (GAP) [currently referred to as a Master Development Plan, MDP] that describes a minimum of 2 to 3 years of activity for operator controlled leases within a reasonable geographic area.”

Discussion: The Proposed Action is in conformance with the 1991 and 1999 RMP amendments cited above because the Federal mineral estate proposed for development is open to oil and gas leasing and development. The 1999 RMP amendment requires multi-year development plans for lease development over a large geographic area. However, the 1999 RMP amendment also provides exceptions to that requirement for individual or small groups of exploratory wells drilled in relatively undrilled areas outside known high production areas. The Proposed Action is therefore in conformance with the exception to the requirement to require operators to submit MDPs, previously known as Geographic Area Plans (GAPs).

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

During its internal scoping process for this Environmental Assessment (EA), pursuant to the National Environmental Policy Act (NEPA), BLM resource specialists identified the following elements of the natural and human environment as present in the project vicinity and potentially affected by the project:

Access and Transportation	Socioeconomics
Air Quality	Soils
Cultural Resources	Special Status Species
Geology and Minerals	Vegetation
Invasive Non-Native Plants Migratory Birds	Visual Resources
Native American Religious Concerns	Wastes, Hazardous and Solid
Noise	Water Quality, Surface and Ground
Realty Authorizations	Wildlife, Aquatic and Terrestrial

Access and Transportation

Affected Environment

The project area would be located approximately 2 miles south of Silt, Garfield County, Colorado. Although easily access from Silt, the County-designated haul route for oil and gas traffic is from highway I-70 at the Garfield County Airport exit (Exit 94) by traveling south along Mamm Creek Road (County

Road [CR] 315) approximately 5 miles to Jenkins Cutoff Road (CR336) on the left, proceeding east along Jenkins Cutoff Road approximately 2.5 miles to an intersection with Dry Hollow Road (CR331) on the left, proceeding north approximately 2.8 miles to the intersection with Chipperfield Lane (CR326) on the right, proceeding east along Chipperfield Lane approximately 1.3 miles to an intersection with a gravel road on the left, and then proceeding generally north along the winding gravel road approximately 1.6 miles to an intersection with 6 Lazy K Road. To reach the NENW pad on BLM land, proceed east along 6 Lazy K Road approximately 0.4 mile to the proposed access road on the left. To reach the SENW pad on private land, proceed 0.5 mile along 6 Lazy K Road to the Wilson well pad, and proceed from the Wilson pad approximately 0.5 mile west. To reach the SWNW pad, also on private land, proceed approximately 0.75 mile from the Wilson pad along the proposed access road.

No public access exists to the site; the existing access road is predominantly on Fee land (approximately 2.6 miles). Only a small segment of the access road (47 feet) is located on lands administered by the BLM. Construction, maintenance, and reclamation would conform to guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development (USDI and USDA 2007)*.

A road maintenance program would be required during the drilling, completion and production phases which includes, but is not limited to blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. The access road would be maintained in a safe and usable condition. Surface and subsoil materials within the proposed construction areas would be used. Gravel or pit lining material (if required) would be obtained from Federal or Fee lands in conformance with applicable regulations.

Environmental Consequences

Proposed Action

The Proposed Action would result in a substantial increase in truck traffic related to the eventual development of 39 wells. The largest increase in truck use would be during rig-up, drilling, and completion activities. Data indicate that approximately 1,160 truck trips over a 30-day period would be required to support the drilling and completion of each well (Table 2). Once the wells are producing, traffic would decrease to occasional visits for monitoring or maintenance activities. Each well may have to be recompleted once per year, requiring three to five truck trips per day for approximately 7 days.

Table 2. Traffic Associated with Drilling and Completion Activities		
<i>Vehicle Class</i>	<i>Trips per Well</i>	<i>Percent of Total</i>
16-wheel tractor trailers	88	7.6%
10-wheel trucks	216	18.6%
6-wheel trucks	452	39.0%
Pickup trucks	404	34.8%
Total	1,160	100.0%
Source: BLM 2006. Note: Trips by different vehicle types are not necessarily distributed evenly during the drilling process. Drilling and completion period is approximately 30 days per well.		

Degradation of field development roads may occur due to heavy equipment travel and fugitive dust and noise would be created. Mitigation measures (Appendix A) would be required as COAs to ensure that adequate dust abatement and road maintenance occur.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM land, and the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids BLM surface. Therefore, impacts of the No Action Alternative on access and transportation would be less than under the Proposed Action but not eliminated.

Air Quality

Affected Environment

Colorado Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based criteria for the maximum acceptable concentrations of air pollutants in areas of public use. Although specific air quality monitoring has not been conducted within the project area, regional air quality monitoring has been conducted in Rifle and elsewhere in Garfield County. Air pollutants measured in the region for which ambient air quality standards exist include carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ozone (O₃), particulate matter less than 10 microns (μ) in diameter (PM₁₀), and particulate matter less than 2.5 μ in diameter (PM_{2.5}).

The project area lies within Garfield County, which has been described as an attainment area under CAAQS and NAAQS. An attainment area is an area where ambient air pollution quantities are below (i.e., better than) NAAQS standards. As shown in Table 3, regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. Federal air quality regulations are enforced by the CDPHE. The Prevention of Significant Deterioration (PSD) program within CDPHE is designed to limit incremental increases for specific air pollutant concentrations above a legally defined baseline level, as defined by an area's air quality classification. Incremental increases in PSD Class I areas are strictly limited.

Federal air quality regulations adopted and enforced by CDPHE limit incremental emissions increases to specific levels defined by the classification of air quality in an area. The 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.

The project area and surrounding areas are classified as PSD Class II. The PSD Class I areas located within 100 miles of the project area are Flat Tops Wilderness (approximately 25 miles north), Maroon Bells – Snowmass Wilderness (approximately 35 miles south), West Elk Wilderness (approximately 60 miles southeast), Black Canyon of the Gunnison National Monument (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east). Dinosaur National Monument (approximately 120 miles northwest) is listed as a Federal Class II. Regional background pollutant concentrations and applicable standards or limits are listed in Table 3.

Environmental Consequences

Proposed Action

The CDPHE, under its Environmental Protection Agency (EPA)-approved state implementation plan, is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made; those development plans are subject to applicable air

quality laws, regulations, standards, control measures, and management practices. The CDPHE has ultimate responsibility for reviewing and permitting any project’s air quality impacts prior to its operation. Unlike the conceptual “reasonable but conservative” engineering designs used in NEPA analyses, any CDPHE air quality preconstruction permitting required would be based on site-specific, detailed engineering values, which would be assessed in CDPHE’s review of the permit application.

Table 3. Air Pollutant Background Concentrations, Colorado and National Ambient Air Quality Standards, and Prevention of Significant Deterioration Increments.					
<i>Pollutant/Averaging Time</i>		<i>Measured Background</i>	<i>CAAQS/or NAAQS</i>	<i>Incremental Increase Above Legal Baseline</i>	
				<i>Class I</i>	<i>Class II</i>
Carbon Monoxide (CO) ¹	1-hour	4,656 µg/m ³	40,000 µg/m ³ (35 ppm)	n/a	n/a
	8-hour	2,328 µg/m ³	10,000 µg/m ³ (9 ppm)	n/a	n/a
Nitrogen Dioxide (NO ₂) ²	Annual Arithmetic Mean	0.016 ppm	0.053 ppm	2.5 µg/m ³	25 µg/m ³
Ozone ¹	8-hour	0.065 ppm (Rifle)	0.075 ppm	n/a	n/a
Particulate Matter (PM ₁₀) ³	24-hour	67 µg/m ³ (Rifle)	150 µg/m ³	8 µg/m ³	30 µg/m ³
	Annual	25.7 (Rifle)	50 µg/m ³	4 µg/m ³	17 µg/m ³
Particulate Matter (PM _{2.5}) ¹	24-hour	34.5 µg/m ³ (GJ)	35 µg/m ³	2 µg/m ³	9 µg/m ³
	Annual	9.3 µg/m ³ (GJ)	15 µg/m ³	1 µg/m ³	4 µg/m ³
Sulfur Dioxide (SO ₂) ⁴	3-hour	66.7 µg/m ³	700 µg/m ³ (0.27 ppm) ⁵	25 µg/m ³	512 µg/m ³
	24-hour	34.6 µg/m ³	365 µg/m ³ (0.14 ppm)	5 µg/m ³	91 µg/m ³
	Annual	5.3 µg/m ³	80 µg/m ³ (0.03 ppm)	2 µg/m ³	20 µg/m ³
¹ Background data collected in Rifle, 2010 (Chick 2011) ² Background data collected by Encana at site north of Parachute, 2007 (Chick 2008) ³ Background data collected in Grand Junction, 2010 (Chick 2011) ⁴ Background data collected at Unocal site, 1983-1984 (Chick 2008). ⁵ Colorado 3-hour AAQS = 700 µg/m ³ .					

Proposed NENW, SENW, and SWNW pads includes constructing, drilling, completing, and operating up to 28 new Federal wells and 11 Fee wells over the next 5 years. Although impacts to air quality from these wells are disclosed in this EA, the drilling and operation is permitted with the approval of an APD for each well. Individual wells would require approximately 7 to 10 days to drill and approximately 5 to 15 days to complete. Air quality would decrease during construction of access roads, pads, and pipelines, and drilling and completing the wells.

Pollutants generated during construction activities would include combustion emissions and fugitive dust associated (PM₁₀ and PM_{2.5}) with construction equipment and vehicles. Construction activities for the well pad, access road, and pipelines would occur between the hours of 7:00 a.m. and 6:00 p.m. each day. Once construction activities are complete, air quality impacts associated with these activities would also cease. Fugitive dust from mobilization and rigging up the drill rig would also occur however impacts associated would be minor and short lived. Emissions associated with drilling and completing the wells would also be greatly reduced to emissions associated with long term natural gas and condensate production.

A regional air model addressing air quality impacts of current and future oil and gas activities within the Colorado River Valley Field Office (CRVFO) has recently been completed for the BLM by Tetra Tech, Inc. and its subcontractor, URS Corporation. The methods and results of that modeling are presented in an Air Resources Technical Support Document (BLM 2011). The air quality model addressed impacts associated with emissions of greenhouse gases (GHGs), “criteria pollutants” (CO, NO₂, SO₂, ozone, PM₁₀, and PM_{2.5}), hazardous air pollutants including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane.

The modeling also addressed potential impacts on visibility due to particulates and “photochemical smog” (caused by chemical reactions in the atmosphere) and on lake chemistry of selected pristine lakes due to modeled deposition rates of sulfur and resultant impacts on acid neutralizing capacity of the lake waters. The visibility analysis predicted a slight impact (one day per year with a reduction in visibility of 1 deciview or greater) in the Flat Tops Wilderness and no days with 1 deciview or greater reduction in visibility at all other modeled Class I and II receptors. For the remaining pollutants analyzed, modeled levels of future oil and gas development within the CRVFO would have no or negligible long-term adverse impacts on air quality. Since the Proposed Action is within the scope of the future development modeled, no significant adverse impacts on air quality are anticipated.

The air quality model incorporated assumptions about various development and mitigation scenarios, many of which have been integrated into the Proposed Action by BBC or would be imposed by the BLM as COAs (Appendix A). These include use of directional drilling to reduce the number of well pads, piping instead of trucking of fluids to a centralized collection facility, flaring instead of venting of natural gas during well completions, self-contained flare units to minimize emissions to the atmosphere, and use of closed-loop drilling. Closed-loop drilling minimizes emissions by recycling drilling muds and separating fluids and drill cuttings, thus eliminating open pits containing petroleum fluids. In addition to minimizing emissions associated with drilling and completion activities, these mitigation measures would also significantly reduce fugitive dust and vehicle tailpipe emissions by greatly reducing the volume of truck traffic required to support the operations.

Generation of fugitive dust as a result of construction activities and travel on unpaved access roads would be further reduced by BLM’s requirement that BBC apply gravel to a compacted depth of 6 inches on the access road, apply water to the access road during the development phase, and apply a dust suppressant surfactant approved by the BLM throughout the long-term production phase (Appendix A).

Emissions of volatile organic compounds (VOCs) such as the BTEX constituents of condensate vary depending on the characteristics and volume of the condensate and on tank operations. Operators are required to control emissions of VOCs from condensate tanks under CDPHE Regulation 7. If deemed necessary by the State, BBC may be required to install a vapor recovery or thermal destruction system to further reduce VOC concentrations.

Ongoing scientific research has identified the potential impacts of GHGs and their effects on global atmospheric conditions. These GHGs include carbon dioxide, methane, nitrous oxide, water vapor, and several trace gases. Through complex interactions on a global scale, these GHG emissions are believed by many experts to cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the Earth back into space.

In 2001, the Intergovernmental Panel on Climate Change (IPCC) predicted that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (NAS) supports these predictions, but has acknowledged that there are uncertainties regarding how climate change may affect different regions. In 2007, the IPCC also

concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (human-caused) greenhouse gas concentrations” (NAS 2007). Other theories about the effect of GHGs on global climate change exist.

The recent air modeling for the CRVFO inventoried and assessed GHG emissions associated with various scenarios of future oil and gas development. In all scenarios modeled, the GHG emissions would not increase the total US natural gas sector emissions by more than 0.5%. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of climate change on the specific area of the Proposed Action. While any oil and gas development project may contribute GHGs to the atmosphere, these contributions would not have a significant effect on a phenomenon occurring at the global scale believed by some to be due to more than a century of human activities.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM land, and the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on air quality proportionately less than under the Proposed Action.

Cultural Resources

Affected Environment

Three Class III cultural resource inventories (CRVFO# 5411-5, 1111-36 and 1105-15) have covered the proposed project area, with two conducted specifically for this project. The field inventory and pre-field file searches of the Colorado State Historic Preservation Officer (SHPO) database and BLM CRVFO cultural records identified six cultural sites and ten isolated finds within the project area. Four of the sites (5GF4482-5GF4485) were determined to be eligible for the National Register of Historic Places (NRHP), while one site (5GF4472) was not. One site (5GF4478) was determined to be a “need data” site and though it will need additional study to make a determination of eligibility, it will be treated as potentially eligible until such a determination is made. Isolated finds are by definition not eligible for the NRHP. Eligible or potentially eligible sites are referred to in Section 106 of the National Historic Preservation Act as “historic properties.”

Environmental Consequences

Proposed Action

No historic properties will be affected by well pad and access road construction due to pad relocation and project design. Therefore, the BLM made a determination of “**No Historic Properties Affected.**” This determination was made in accordance with the 2001 revised regulations [36CFR 800.4(d)(1)] for Section 106 of the National Historic Preservation Act (16U.S.C 470f), the BLM/State Historic Preservation Officer (SHPO) Programmatic Agreement (1997) and Colorado Protocol (1998)]. As the BLM has determined that the Proposed Action would have no direct impacts to known “historic properties,” no formal consultation was initiated with the SHPO.

A standard Education/Discovery COA for cultural resource protection will be included in COAs attached to the APD's. The importance of this COA should be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered during construction operations.

Although no direct impacts are anticipated, the SWNW-23-692 pad is within the 100 meter buffer (normally recommended for all eligible sites within the CRVFO) around the "need data" site 5GF4478. As a safeguard, the BLM has inserted a COA for this pad outlining additional safety precautions for cultural resources. This COA recommends that safety fencing be erected along the northern boundary of the pad, and that an archaeological monitor be present for all ground disturbance during pad construction.

Indirect, long-term cumulative impacts from increased access and the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the vicinity of the project location. These impacts could range from accidental damage or vandalism to illegal collection and excavation.

No Action Alternative

The Proposed Action involves the drilling of up to 39 wells from BLM and Fee surface. Although BLM cannot deny the right to drill and develop the leasehold, individual APDs can be denied to prevent unnecessary and undue degradation.

The No Action Alternative constitutes denial of the Federal APD(s) described in the Proposed Action. For the No Action Alternative, no surface disturbance would occur on BLM land, and the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on cultural resources would be reduced compared to the Proposed Action but not eliminated.

Fossil Resources

Affected Environment

The predominant bedrock formation present at or near the surface within the proximity of the proposed well pads is the Wasatch Formation (including the Fort Union Formation or equivalent at its base). Isolated areas of Quaternary gravels and alluvium, wind-blown loess and colluvium are interspersed throughout this area and cover older Wasatch formation sediments. 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 a BLM Condition 4 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 age 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 very similar to one another 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, crocodilians, gars and other fishes, freshwater clams, gastropods (snails), and other invertebrates (BLM 1999a).

Environmental Consequences

Proposed Action

Although mapped as the predominant surface formation in the proposed project area, field inspection revealed the Wasatch exposed only in a few outcrops found on mesa sides and summits. The thickness of the Quaternary sediments cannot be accurately determined, but construction activities have the potential to adversely affect important fossils that may be 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 facilities (especially pipeline) construction. In general, alluvium, colluvium, and other unconsolidated sediments are much less likely than bedrock to contain well-preserved fossils.

An examination of the BLM paleontology database indicates that there are no known fossil occurrences within a 2-mile radius of the proposed Dixon pads. Areas covered with vegetation and soil cover do not usually yield fossil resources, but inspections should be conducted for proposed facilities that are located on or within 200 feet of Wasatch Formation bedrock surface exposures. In the event paleontological resources are encountered, a standard paleontological COA would be attached to the APDs.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM land, and the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on fossil resources would be somewhat less overall under than the Proposed Action.

Geology and Minerals

Affected Environment

The development area is located near the eastern margin of the Colorado Plateau physiographic province (Fenneman 1946), a region characterized by dissected plateaus of strong relief. A broad, asymmetric, southeast-northwest trending structural basin, the Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary up to 20,000 feet thick. The Basin lies between the White River uplift to the northeast, the Gunnison uplift to the south, and the Uncompahgre swell to the west (George 1927, Weiner and Haun 1960).

Bedrock exposed within the proposed development project is the Tertiary Wasatch Formation. The Wasatch Formation consists of variegated siltstone, claystone, and sandstones and ranges from 1,000 to 2,500 feet thick. The Wasatch Formation is underlain unconformably by the Mesaverde Group. The Mesaverde Group is composed of mudstones and sandstones with interlayered coal beds and ranges in thickness from about 3,000 to over 7,000 feet. The Mesaverde Group has also been referred to as the Mesaverde Formation, which includes informal subdivisions based on gas productivity characteristics.

In proposed development area, the Wasatch Formation is mantled by unconsolidated sedimentary surface deposits of Quaternary age in the form of alluvium. The thickness of these unconsolidated sediments is uncertain, but the depth to the underlying Wasatch Formation may be determined during construction excavation. Table 4 lists the geologic formations present within the proposed project area.

The Mesaverde Group is the target zone of the proposed drilling program. Composed of the Williams Fork and Iles Formations, the Mesaverde Group consists of marine sandstones and transitional to non-marine beds of coal, shale, and sandstone. These sediments were deposited marginal to the great Cretaceous seaway. The oscillating shoreline of this sea, due to the rise and fall of sea level, left behind a complex of transgressive (encroaching toward land) and regressive (receding away from land) sedimentary sequences of nearshore and offshore sediments that define the Mesaverde Group.

Table 4. Geologic Formations within the Study Area				
<i>Map Symbol</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>Location</i>
Qlo	Loess deposits	Pleistocene	Wind deposited, non-stratified, clayey sandy silt.	Mantles flat to gently sloping surface deposits.
Qsw	Sheet wash deposits	Holocene	Pebbly, silty sand	Gentle to moderate slopes.
Qtt	Oldest terrace deposits	Pleistocene	Stream alluvium. Moderately well-sorted pebbly gravel w/sand matrix.	Underlies terrace remnants.
Two	Wasatch Formation	Eocene, Paleocene	Red, gray, and brown sandstone and siltstone and red, green and gray shale	Base of Mesas and predominant surface exposures both north and south of the Colorado River

Source: Shroba et al. 1994

The proposed drilling program would target the sandstone sequences of the Upper Williams Fork Formation, which provide most of the natural gas production volumes (Lorenz 1989). Upper portions of the Williams Fork include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork includes delta front, distributary channel, lacustrine, and swamp environments (Hemborg 2000), while the sandstones and coalbeds of the Iles Formation were deposited in a wave-dominated coastal setting (Johnson 1989, Lorenz 1989). The source rocks are interbedded and thermally mature gas-prone shales, mudstones, siltstones, and coals. Reservoir rocks are fine to medium-grained Williams Fork sandstone, varying in thickness from less than 10 feet to more than 50 feet (Spencer 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the gas is both stratigraphic, related to vertical and lateral changes in the types of sediments being deposited, and diagenetic (post-depositional), related to changes in chemical and physical changes in the rocks during prolonged burial at great depth.

Environmental Consequences

Proposed Action

If the proposed wells prove 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. Substantial reserves have been known to be trapped within the tight sands of these reservoirs since the late 1950s, but only within the last decade, and particularly within the last few years, has the integrated application of new technologies turned the tight gas sands of the Mesaverde Group into a profitable play

(Kuuskraa 1997). Natural fracture detection, advanced log analysis, more rigorous well completions and recompletions, and denser spacing have increased the amount of recoverable gas within these reservoirs.

Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mesaverde Group in this area, an action that would be consistent with BLM objectives for mineral production. Hydraulic fracturing or “fracing” would be used to create fractures within the formation to allow gas production from the wells. Tight gas sands refer to low permeability sandstone reservoirs that produce primarily dry natural gas. Typically, these reservoirs cannot be produced at economic flow rates or volumes unless the well is stimulated by hydraulic fracture treatment (Holditch 2006). The amount of natural gas that may be potentially produced can only be estimated based on production rates from nearby wells and adjacent fields. Reserves have been estimated to approach 2 billion cubic feet (bcf) of natural gas per well (Vargas and Davis 2006).

Casing programs have been designed to specifically prevent hydrocarbon migration from gas-producing strata penetrated by the wellbore during drilling, initial production, and after completion of the well. Identification of potential fresh-water bearing zones, aquifers, gas-producing zones, and over- and under-pressured zones are incorporated into drilling scenarios for the proposed wells. Estimates of what depth these zones would be encountered are used to determine drilling fluids, fluid densities, surface casing depths, and production planning. If one of these identified zones is encountered during drilling, cement volumes will be adjusted to isolate that zone. This is designed to prevent accidental contamination or leakage of hydrocarbons or fracturing fluids into other productive zones within the wellbore.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on BLM surface, and the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells from a nearby location that avoids BLM surface. Therefore, impacts of the No Action Alternative on geology and minerals would be reduced compared to the Proposed Action but not eliminated.

Invasive Non-Native Plants

Affected Environment

Prior to human occupancy, the project area was a mosaic of sagebrush and pinyon-juniper habitats. At present, both the private and BLM lands show the effect of human use, related primarily to the grazing of livestock. This is much more apparent on the two pads on private land (the SENW and SWNW), which appear to have been mowed or chained to clear the sagebrush and then planted with crested wheatgrass (*Agropyron cristatum*), a non-native perennial grass widely used to increase grass forage in degraded rangeland.

Portions of the private lands that were not cleared of sagebrush contain a high abundance of cheatgrass (*Anisantha tectorum*), a non-native annual grass that is widespread and problematic in disturbed on degraded rangeland throughout the region. Cheatgrass is State-listed as a noxious weed in Colorado. Also present on the private lands are a variety of non-native annual forbs, with Russian-thistle (*Salsola australis*), redstem filaree (*Erodium cicutarium*), desert alyssum (*Alyssum desertoides*), tall tumble-mustard (*Sisymbrium altissimum*), tansy-mustard (*Descurainia* sp.), and vervain (*Verbena bracteata*) being the most prominent. Although not listed as noxious weeds in Colorado, all of these are invasive species. The location of the proposed NENW on BLM land appears less degraded overall but still with non-native crested wheatgrass, cheatgrass, and various weedy non-native forbs. The understory beneath

pinyon-juniper stands on both the BLM and private lands is sparse, as is typical for this habitat type due to dry, rocky soil. Prior grazing use of the areas is reflected by localized infestations of cheatgrass beneath the trees and areas of broom snakeweed (*Gutierrezia sarothrae*), a native subshrub that colonizes degraded lands.

Environmental Consequences

Proposed Action

Surface-disturbing activities provide a niche for the invasion and establishment of invasive non-native species, particularly when these species are already present in the surrounding area. Because invasive non-native species are present in the project area, the potential for weed infestation following construction activities and during reclamation is high. Mitigation measures designed to minimize and control weeds would be attached as COAs to APDs for the Federal wells (see Appendix A). These measures include treatment of infested areas as necessary to ensure successful reclamation and minimize the spread of weeds to adjacent areas.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM land, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce 11 Fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on invasive plants would be slightly less overall than under the Proposed Action.

Migratory Birds

Affected Environment

The Migratory Bird Treaty Act (MBTA) includes native passerines (flycatchers and songbirds) as well as birds of prey, migratory waterbirds (waterfowl, wading birds, and shorebirds), and other species such as doves, hummingbirds, swifts, and woodpeckers. Within the context of the MBTA, “migratory” birds include non-migratory “resident” species as well as true migrants, essentially encompassing virtually all native bird species. For most migrant and resident species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of both nesting sites and food. In addition, because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality of the territory occupied. During non-breeding seasons, birds are generally non-territorial and able to feed across a larger area and wider range of habitats.

Numerous migratory bird species occupy, or have the potential to occupy, the project area. Migratory bird species that are Federally listed under the Endangered Species Act of 1973, as amended, or classified by the BLM as sensitive species, are addressed under the section on Special Status Species. The current section addresses migratory birds that may inhabit the proposed project area. Emphasizing the need to conserve declining species, the U.S. Fish and Wildlife Service (USFWS) has published a list of Birds of Conservation Concern (BCC) that deserve prompt conservation attention to stabilize or increase populations or to secure threatened habitats. This section also addresses species within the project area that listed as BCC species (USFWS 2008). This analysis focuses on BCC species, non-BCC species that are Neotropical (long-distance) migrants, and raptors—three groups highly vulnerable to habitat loss or modification on their breeding grounds.

Species on the BCC list that are potentially present in the project area, based on habitat preferences and known geographic ranges, include the golden eagle (*Aquila chrysaetos*), pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), Brewer's sparrow (*Spizella breweri*), and Cassin's finch (*Carpodacus cassinii*).

No suitable nesting habitat for the golden eagle is present in the project area or vicinity, but golden eagles could occasionally visit the site in search of prey. Any such use would be infrequent and transitory. Habitat appears marginally suitable for Brewer's sparrow—also listed as a BLM sensitive species (see the section on Special Status Species)—based on the limited extent of contiguous habitat and prior chaining of sagebrush on the private lands, but nesting in low numbers is possible. For the other BCC species listed above, all of which are associated almost exclusively with conifers, habitat in the vicinity of the pads is provided by the nearby stands of pinyon-juniper. The pinyon jay and juniper titmouse could nest in pinyon-juniper near the pad sites. Cassin's finch, which typically nests in higher elevation montane or subalpine conifers, often disperses to lower elevation conifers during fall and may remain there until the following spring. Therefore, this species is a potential winter visitor to the project area.

Non-BCC species likely to occur in the pinyon-juniper and sagebrush within the project area or venturing into the area from more extensive habitats nearby include Neotropical migrants such as the black-chinned hummingbird (*Archilochus alexandri*), western kingbird (*Tyrannus verticalis*), Say's phoebe (*Sayornis saya*), mountain bluebird (*Sialis currucoides*), western bluebird (*S. mexicana*), western meadowlark (*Sturnella neglecta*), vesper sparrow (*Pooecetes gramineus*), lark sparrow (*Chondestes grammacus*), chipping sparrow (*Spizella passerina*), and lesser goldfinch (*Spinus psaltria*).

Small raptors potentially present is nearby pinyon-juniper woodlands include the flammulated owl (*Otus flammeolus*) and, less likely, the northern pygmy-owl (*Glaucidium gnoma*). The flammulated owl is listed by BLM as a sensitive species and addressed in the section on Special Status Species. Several species of larger raptors are widespread through the region and potentially present in the project vicinity, both as nesters and as transients in search of prey. Species most likely to nest within or near the project area include the American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipiter striata*), Cooper's hawk (*A. cooperi*), red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk (*B. swainsoni*), and great horned owl (*Bubo virginiana*). Nesting habitat consists primarily of nearby pinyon-juniper woodlands.

Raptor surveys conducted in 2010 located two nests within or near a 0.25-mile radius from the two private pads (SESW and SWSW). One of the nests was occupied by great horned owls in 2010, while the other was unoccupied but assumed to have been constructed and used previously by an unknown hawk species. Surveys in 2011 found the owl nest to be unoccupied, while the hawk nest was no longer present and assumed destroyed, such as by a windstorm. Locations of the two nests are shown on Figure 5. No nests were found in proximity to the NENW pad on BLM land.

Environmental Consequences

Proposed Action

Under the Proposed Action, 18.7 acres of new disturbance would occur as a result of pad, road, and pipeline construction. Following successful interim reclamation, the disturbance would be reduced to 5.5 acres. Removal of pinyon-juniper and sagebrush would reduce nesting sites for birds. Construction, drilling, or completion activities during the nesting season could cause nest abandonment and failure, reducing the productivity of affected species. Construction activity during the nesting season could also result in the destruction of eggs or mortality of nestlings. Although these impacts would affect individual birds, it is not expected to adversely affect populations or species as a whole.

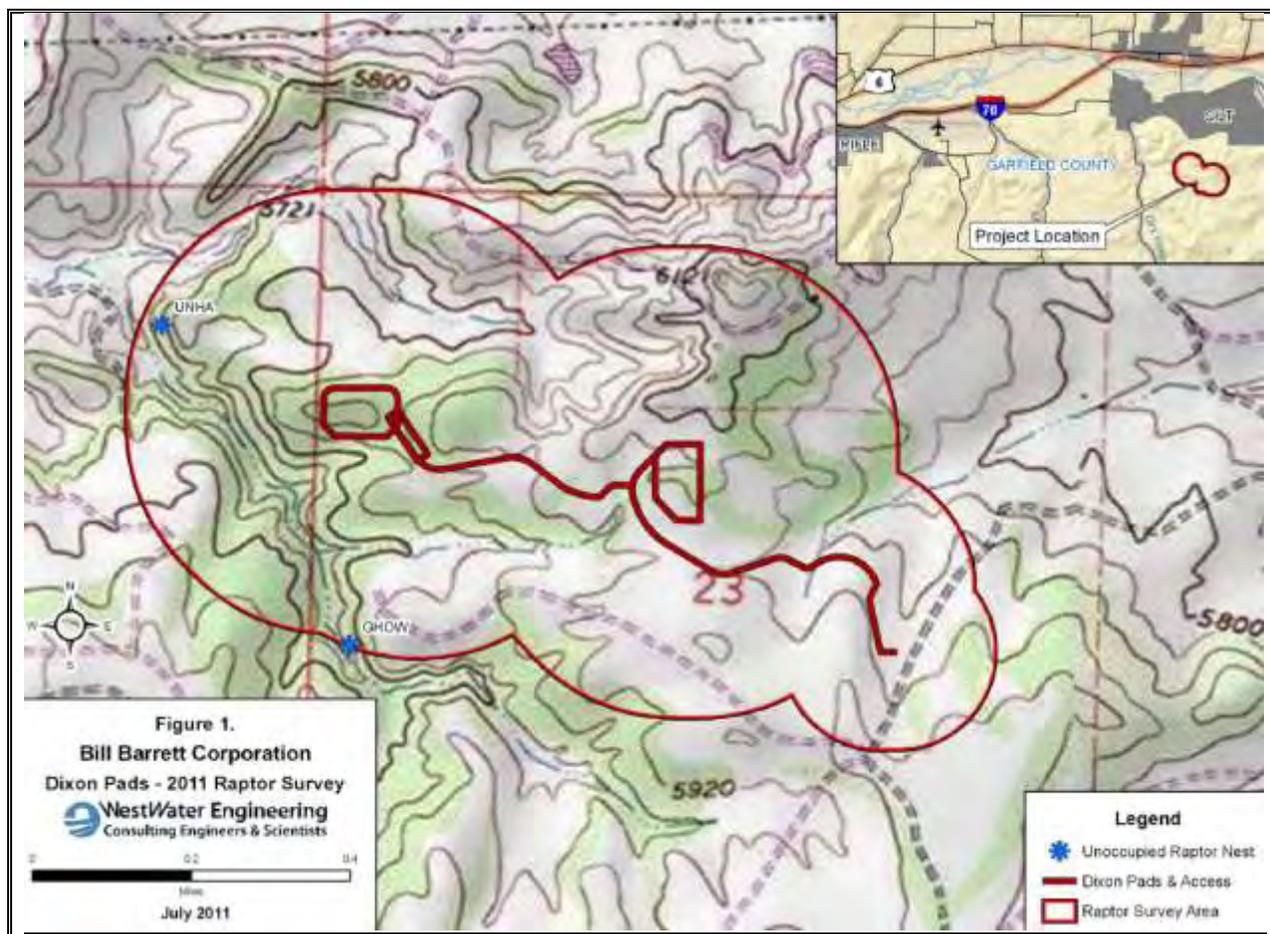


Figure 5. Raptor Survey Results Dixon SENW and SWNW Pads on Private Surface

The operator remains subject to the MBTA, administered by the USFWS, which precludes the “take” of any raptor or most other native species. Under the Act, the term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The USFWS interprets “harm” and “kill” to include loss of eggs or nestlings due to abandonment or reduced attentiveness by one or both adults as a result of disturbance by human activity, as well as physical destruction of an occupied nest.

As a result of the raptor survey, a 60-day TL from May 1 to July 1 would be applied as a COA to any activities authorized within 0.25 mile of occupied nests. A second TL would be applied to the same dates to prohibit removal of vegetation throughout the project area to reduce adverse impacts to other migratory birds, including BCC species found to nest in the area. Appendix A provides details of these COAs and describes potential bases for the granting of an exception to the TLs.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM surface, as the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids the

BLM surface. Therefore, impacts of the No Action Alternative on migratory birds proportionately less than under the Proposed Action.

Native American Religious Concerns

Affected Environment

The Proposed Action is located within an area identified by the Ute Tribes as part of their ancestral homeland. A number of Class III cultural resource inventories (see section on Cultural Resources) were conducted in the Proposed Action's vicinity to determine if any areas were known to be culturally sensitive to Native Americans. No sensitive areas were identified or are currently known in the proposed project area.

Environmental Consequences

Proposed Action

At present, no Native American concerns are known within the project area and none was identified during the inventories. The Ute Tribe of the Uintah and Ouray Bands, the primary Native American tribe in this area of the CRVFO, have indicated that they do not wish to be consulted for small projects or projects where no Native American areas of concern have been identified either through survey or past consultations. Therefore, formal consultation with Native American Tribes was not undertaken. If new data are disclosed, new terms and conditions may have to be negotiated to accommodate their concerns.

Although the Proposed Action would have no direct impacts, increased access and personnel in the vicinity of the proposed project could indirectly impact unknown Native American resources ranging from illegal collection to vandalism.

The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer 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 agency Authorized Officer, 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. Bill Barrett Corporation will notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations. A standard COA for the protection of Native American values would be attached to the APDs (Appendix A).

Indirect, long-term cumulative impacts from increased access and the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the project area. These impacts could range from accidental damage or vandalism to illegal collection and excavation.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM surface, as the 28 proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids

BLM surface. Therefore, impacts of the No Action Alternative on air quality proportionately less than under the Proposed Action.

Noise

Affected Environment

Noise is generally described as unwanted sound, weighted and noise intensity (or loudness) is measured as sound pressure in decibels (dBAs). 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 to encompass all the sounds that need to be measured. Each 20-unit increase in the decibel scale increases the sound loudness by a factor of 10.

Sound levels have been calculated for areas that exhibit typical land uses and population densities. In rural recreational areas, ambient sound levels are expected to be approximately 30 to 40 dBA (EPA 1974, Harris 1991). As a basis for comparison, the noise level during normal conversation of two people 5 feet apart is 60 dBA. The project area is in a rural setting approximately 2 miles south of I-70. Noise levels in the project area are presently created by ranching/farming operations, traffic serving the existing nearby well pads and ongoing drilling and completion activities.

Environmental Consequences

Proposed Action

The project would result in increased levels of noise during the construction, drilling, and completion phases. The noise would be most noticeable along the roads used to haul equipment and at the pad location. Drilling activities are subject to noise abatement procedures as defined in the COGCC Rules and Regulations (Aesthetic & Noise Control Regulations). Operations involving pipeline or gas facility installation or maintenance, compressors, the use of a drilling rig, completion rig, workover rig, or stimulation are subject to the maximum permissible noise levels for industrial zones. The 2006 revised COGCC noise control rules call for noise levels from oil and gas operations at any well site and/or gas facility to comply with the maximum permissible levels (Table 5) at a distance of 350 feet. Periodically, the noise level may increase to 10 dbA above levels in Table 5 for no more than 15 minutes in one hour period. Operations involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones.

Because several occupied structures are present within 1,500 feet of the proposed project, the agricultural/rural standard is applicable. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown (COGCC 2006).

Table 5. Noise Standards for Light industrial, Residential/Agriculture/Rural		
<i>Zone</i>	<i>7:00 A.M. to 7:00 P.M</i>	<i>7:00 P.M. to 7:00 A.M</i>
Light Industrial	70 dBA	65 dBA
Residential/Agricultural/Rural	55 dBA	50 dBA

Short-term (7- to 14-day) increases in nearby noise levels would characterize road and well pad construction. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and a typical noise level for construction sites of 65 dBA at 500 feet (Table 6), project-related noise levels would be

approximately 59 dBA at a distance of 1,000 feet, approximating active commercial areas (EPA 1974). These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas development in the area.

<i>Equipment</i>	<i>Noise Level (dBA)</i>		
	<i>50 feet</i>	<i>500 feet</i>	<i>1,000 feet</i>
Air Compressor, Concrete Pump	82	62	56
Backhoe	85	65	59
Bulldozer	89	69	63
Crane	88	68	62
Front End Loader	83	83	57
Heavy Truck	88	68	62
Motor Grader	85	65	59
Road Scraper	87	67	61
Tractor, Vibrator/Roller	80	60	54

Sources: BLM (1999a), La Plata County (2002)

Noise impacts from drilling and completion activities would last approximately 45 to 60 days at each well. Noise would occur continuously, 24 hours per day, during the drilling and completion period. Based on a measured noise level of 68 dBA at 500 feet, actions associated with drilling and completion would generate approximately 62 dBA at 1,000 feet. This noise level approximates that associated with light industrial activities (EPA 1974). These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas developments in the area.

Traffic noise would also be elevated as a consequence of the Proposed Action. The greatest increase would be along access roads during the drilling and completion phases. Based on the La Plata County data presented in Table 6, approximately 68 dBA of noise (at 500 feet) would be created by each fuel and water truck that travels these roads. 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.

Noise impacts would decrease during the production phase but would remain background noise levels. During maintenance and well workover operations, noise levels would temporarily increase above those associated with routine well production. These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas developments in the area. Traffic noise levels would affect residences located along County roads that provide primary access into the area.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed Fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on air quality would be only slightly less overall than the Proposed Action.

Realty Authorizations

Affected Environment

Issuance of right-of-way grants from the BLM would be required for crossing of BLM lands to access the three well pads, except for lands overlying the Federal oil and gas lease being developed. This would include a right-of-way grant for use of the NENW pad to access Fee minerals. Terms and conditions of the grants would include the NSO, CSU, or TL stipulations available for specific resources as identified in the current land use plan (BLM 1999b) to the extent applicable for the particular activity and location. Because right-of-way grants are discretionary actions, associated stipulations are not limited to those attached to the underlying Federal oil and gas lease(s).

Environmental Consequences

Proposed Action

Under the Proposed Action, the ROW authorizations would be granted subject to appropriate terms and conditions. These authorizations would provide BBC legal access for the construction and development of the proposed pads, roads, and pipelines. Standard BLM reclamation requirements would apply.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM surface, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids the BLM surface. In doing so, no realty authorizations would be needed.

Socioeconomics

Affected Environment

The project area is located within Garfield County, Colorado. The population of Garfield County grew by 28.8% from 2000 to 2010, representing an increase from 43,791 to 56,389 residents (DOLA 2010). Population growth in Garfield County is expected to more than double over a 20-year period from approximately 50,000 in 2005 to approximately 106,500 in 2025 (DOLA 2010).

In 2009, industry groups in Garfield County with the highest percentage of total employment were construction 15%, tourism 12%, retail trade 13%, and education and health 20% (Colorado Department of Labor and Employment 2010). An estimated 13% of the population was retired in 2000 and did not earn wages (Garfield County 2000). Employment in agriculture, forestry, hunting, and mining accounted for 8% of total employment (Colorado Department of Labor and Employment 2010).

Personal income in Garfield County has also risen, growing from \$504 million in 1990 to \$2.2 billion in 2008 (U.S. Department of Commerce 2008). Annual per capita income has grown in the same period; from about \$19,354 to \$40,166 (U.S. Department of Commerce 2008), and the average earnings per job in 2005 was approximately \$37,500 (Garfield County 2007). The communities of Parachute, Silt, and Rifle are the most affordable for housing, while the communities of Battlement Mesa, New Castle, and Glenwood Springs are the least affordable, with the cost to rent or own similar housing higher by 50% or more (BLM 2006).

Activities on public land in the vicinity of the project area are primarily ranching/farming, hunting, OHV travel, and the development of oil and gas resources. Hunters contribute to the economy because many require lodging, restaurants, sporting goods, guides and outfitting services, food, fuel, and other associated supplies. Big-game hunting, in particular, is viewed as critical to Garfield County, and especially the local community economies that depend on BLM and U.S. Forest Service (USFS) public lands where most hunting occurs (BLM 2006). Expenditures by hunters in the Roan Plateau Planning Area alone have been estimated to be as much as \$1 million annually, with perhaps an additional \$1 million annually of indirect and local expenditures (CPW 1995, cited in BLM 2006).

The growth of the oil and gas industry in the past 10 years has been increasingly important to local economies (BLM 2006). Production of natural gas in Garfield County increased dramatically during recent years, from approximately 70 billion cubic feet (BCF) in 2000 to 576 BCF in 2009 (COGCC 2010). In addition, Garfield County is experiencing the fastest increase in oil and gas development in Colorado, with over 2,000 drilling permits currently approved between July 2009 and September 2010 (COGCC 2010). While the number of workers employed in the mining and extraction industry in Garfield County has been shown to be only 1.7%, this number is considered misleading because some oil and gas employment has been incorporated as part of the construction sector statistics instead (BLM 2006). For example, in 2005, an estimated 4,000 persons were directly employed by gas development companies and their subcontractors in Garfield County (Garfield County 2009).

The Federal government makes “Payments in Lieu of Taxes” (PILT) to county governments to help offset property tax revenue lost for nontaxable Federal lands within the county (BLM 2006). Payments are based on Federal acreage in the county for all land management agencies, including BLM, USFS, USFWS, and National Park Service. The amount may also be adjusted based on population and as appropriated by Congress. By formula, payments are decreased as other funds, such as mineral royalty payments, increase. Approximate PILT received by Garfield County in recent years has been as follows: \$0.8 million in 2005; \$1.1 million in 2006, 2007, and 2008; and \$1.9 million in 2009 (USDI 2010).

Property tax revenue from oil and gas development has become the largest source of public revenue in Garfield County (BLM 2006), with an assessed valuation in Garfield County of approximately \$3.8 billion, or 74% of the total. Total tax revenues from property taxes and special district levies were \$130 million. Tax dollar distributions in 2009 were Schools – 30.4%, County – 32.3%, Special Districts – 14.3%, Fire Districts – 12.3%, Colleges – 8.9%, and Towns – 1.7% (Garfield County 2009).

In addition to PILT payments, BLM shares revenue generated by commercial activities on public lands with state and county governments (BLM 2006). Federal mineral royalties are levied on oil and gas production from Federal mineral leases. Oil and gas lessees pay royalties equal to 12.5% of the wellhead value of oil and gas produced from public land. Half the royalty receipts are distributed to Colorado, and the amount distributed to Garfield County in 2002 attributable to oil and gas production was \$14.1 million. In 2001, the amount was \$5.5 million (BLM 2006). These funds are then allocated to fund county services, schools, and local communities.

The NEPA process requires a review of the environmental justice issues as established by Executive Order 12898 (February 11, 1994). The order established that each Federal agency identify any “disproportionately high and adverse human health or environment effects of its programs, policies, and activities on minority and low-income populations.” The Hispanic/Latino community is the only minority population of note in the project vicinity. In 2010, approximately 28% of the residents of Garfield County identified themselves as Hispanic/Latino, compared to 17% in 2000. Statewide, the percentage of Hispanic/Latino residents grew from 17% to 21% during the same 10-year period. African-

American, American Indian, Asian, and Pacific Islander residents accounted for a combined 2.6% of the Garfield County population in 2010, compared to a statewide level of 8% (Garfield County 2010).

Environmental Consequences

Proposed Action

The Proposed Action would have minor positive impacts the local economies of Garfield County through the creation or retention of job opportunities in the oil and gas industry and in supporting trades and services. In addition, local governments in Garfield County would experience an increase in tax and royalty revenues. Some minor economic loss to private landowners or guides may result from the potential displacement of big game and resulting reduction in big game hunting within the project area.

The Proposed Action could result in minor negative social impacts, including reduced scenic quality, increased dust levels, and increased traffic. However, these impacts would be minor and limited to the relatively short duration of drilling and completion activities.

No Action Alternative

Under this alternative, the socioeconomic impacts related to drilling, completing, servicing, and producing the 28 Federal wells would not occur, but it is likely that BBC would still drill and complete the 11 Fee wells from a Fee surface. Therefore, impacts to socioeconomics would be reduced compared to the Proposed Action but not eliminated.

Soils (includes an analysis of Public Land Health Standard 1)

Affected Environment

The Proposed Action is covered by the *Soil Survey of Rifle Area, Colorado* (NRCS 2010, USDA 1985) and would include surface-disturbing activities on two soil complexes. The pipeline, the access road, and the pads are located on two soils: Potts loam and Torriorthents-Camborthids-Rock. The sites of SENW, NWSW, and SENW pads are on Potts loam, a well-drained, moderately sloping to rolling soil on 3 to 12% slopes. This soil is found on mesas, benches, and sides of valleys ranging from 5,000 to 7,000 feet. This soil is formed on alluvium derived from the sandstone, shale, and basalt. The permeability is moderate, runoff is medium, and erosion hazard is severe. This soil is generally used for grazing, wildlife habitat, and some dryland farming. Development is limited by low strength, shrink-swell potential, and steep slopes.

According to the mapped areas a portion of the SENW pad lies within the Torriorthents-Camborthids-Rock outcrop complex. This complex consists of exposed sandstone and bedrock, stony areas, and shallow to deep soils over bedrock. The soils and outcrops are moderately steep to very steep with slopes ranging from 15 to 70%. The project area is proposed on the more moderate slopes where erosions hazard is moderate to severe. This complex is used for grazing, wildlife habitat, and recreation. Steep slopes and stoniness limit development.

Environmental Consequences

The Proposed Action would result in 18.7 acres of short-term vegetation loss and soil compaction and displacement on Fee and BLM lands. After reclamation, long-term surface disturbance would be reduced to 5.5 acres. In general, the area that would be affected by the Proposed Action contains adequate

vegetation buffers and moderate slopes that would reduce the potential for sediment transport to Dry Hollow Creek and Colorado River. In areas susceptible to erosion or possible slope instability issues, proper erosion control and construction techniques, and geotechnical analysis may be required.

Additionally, construction activities would cause mixing of soil horizons, slight to moderate increases in local soil loss, loss of soil productivity, and sediment available for transport to surface waters. Noxious weed infestation resulting from disturbance would impact soil productivity. Potential for such soil loss and transport would increase as a function of slope, feature (pad, road, or pipeline route) to be constructed, and proximity to streams.

The potential would also exist for accidental spills or leaks of petroleum products and hazardous materials during construction, drilling activities, and long-term operations for the life of the wells. These events would cause soil contamination and may decrease the soil fertility and revegetation potential.

No Action Alternative

The No Action alternative would constitute denial of the Federal wells as proposed. Consequently, no impacts to soils on BLM land would occur. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts to soils on private lands would be expected, although to a lesser extent than under the Proposed Action.

Analysis on Public Land Health Standard 1 for Upland Soils

The 2009 Divide Creek Land Health Assessment (LHA) determined that all areas were meeting Standard 1 for upland soils, although some areas were found to slight impacts from accelerated erosion. The Proposed Action with associated mitigation is unlikely to prevent Standard 1 from being achieved. Measures attached as COAs (Appendix A) for controlling erosion and revegetating disturbances would minimize long-term impacts to soil volume and productivity. The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for soils because no new development would occur on BLM land.

Special Status Species

Federally Listed, Proposed, or Candidate Plant Species

Affected Environment

According to the latest species list from the USFWS, the following Federally listed, proposed, or candidate plant species may occur within or be impacted by actions occurring in Garfield County: Parachute beardtongue (*Penstemon debilis*), DeBeque phacelia (*Phacelia submutica*), Colorado hookless cactus (*Sclerocactus glaucus*), and Ute ladies'-tresses orchid (*Spiranthes diluvialis*).

Environmental Consequences

Proposed Action

Habitat types in the area are unsuitable for any of the Federally listed, proposed, or candidate plants listed for Garfield County. Therefore, the Proposed Action would have “**No Effect**” on these species.

No Action Alternative

Because no Federally protected plants or their habitats occur in the project area and vicinity, this alternative would also have “**No Effect**” on these species.

Federally Listed, Proposed, or Candidate Animal Species

Affected Environment

Eight species of Federally listed, proposed, or candidate threatened or endangered vertebrate species occur within Garfield County or may be affected by projects within the County. These species, their status, and their distributions and habitat associations in the region are summarized below:

Canada Lynx (*Lynx canadensis*). Federally listed as threatened. Canada lynx occupy high-latitude or high-elevation coniferous forests characterized by cold, snowy winters and an adequate prey base (Ruggiero et al. 1999). The USFS has mapped suitable denning, winter, and other habitat for lynx within the White River National Forest (WRNF), portions of which are adjacent to BLM lands within the CRVFO. Mapped suitable habitat in the WRNF comprises several areas known as Lynx Analysis Units (LAUs) that border BLM lands along the I-70 corridor from east of Wolcott to west of DeBeque. While BLM lands within the CRVFO area are generally not suitable habitat, they may support movement by animals dispersing to a new area or moving to lower elevations during severe winter weather in search of prey. The project area does not border any LAUs, and the lynx is therefore not considered further.

Mexican Spotted Owl (*Strix occidentalis*). Federally listed as threatened. In Colorado, the Mexican spotted owl occurs in lower elevation forests, mostly in deeply incised, rocky canyons that contain complex coniferous forest structures. The project area does not contain suitable habitat and this species is therefore not considered further.

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*). Candidate for Federal listing. This secretive species occurs in mature riparian forests of cottonwoods and other large deciduous trees with a well-developed understory of tall riparian shrubs. It also is not known to occur in the cottonwood corridor along the Colorado River 2 miles north of the project area; occurrence there is unlikely due to the patchy nature of the stands and the general lack of a tall-shrub understory. Because no known occurrences or suitable habitats are present in the project vicinity, this species is not considered further.

Razorback Sucker (*Xyrauchen texanus*), Colorado Pikeminnow (*Ptychocheilus lucius*), Humpback Chub (*Gila cypha*), and Bonytail Chub (*G. elegans*). Federally listed as endangered. These four species of Federally listed big-river fishes occur within the Colorado River drainage basin near or downstream from the project area. Designated Critical Habitat for the razorback sucker and Colorado pikeminnow includes the Colorado River and its 100-year floodplain west (downstream) from the town of Rifle. The nearest known habitat for the humpback chub and bonytail is within the Colorado River approximately 80 miles downstream from the project area. Occasionally, the bonytail is in Colorado west of Grand Junction, but its range does not extend east from that point. Only one population of humpback chub, at Black Rocks west of Grand Junction, is known to exist in Colorado.

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*). Federally listed as threatened. The greenback cutthroat trout was not identified on the USFWS list for Garfield County; however, recent surveys have identified a population in Cache Creek, located several drainages east of the project area. The greenback is the subspecies of cutthroat trout native to the Platte River drainage on the Eastern Slope of Colorado, while the Colorado River cutthroat trout (*O. c. pleuriticus*) is the subspecies native on

Colorado's western slope, including Garfield County. Although the occurrence of greenbacks in Cache Creek and potentially elsewhere in the CRVFO and WRNF areas is apparently the result of human intervention (e.g., sanctioned or *ad hoc* translocation of fish from the Eastern Slope), its status as threatened applies to Western Slope populations. However, because drainages within the project area do not support this species, it is not considered further.

Environmental Consequences

Proposed Action

The Canada lynx, Mexican spotted owl, and western yellow-billed cuckoo are not expected to occur in the project vicinity based on habitat types present and documented occurrences. Therefore, the Proposed Action would have “**No Effect**” on these species.

The endangered Colorado River fishes could potentially be affected by the consumptive use of water taken from the Colorado River basin to support activities associated with the Proposed Action. Depletions in flows in the Colorado River and major tributaries are a major source of impacts to these fishes due 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. Principal sources of depletion in the Colorado River basin include withdrawals for agricultural or industrial uses, withdrawals for municipal water supplies, and evaporative losses from reservoirs. On average, approximately 0.7 acre-feet of Colorado River water is consumed during activities related to each oil and gas well.

In 2008, the BLM prepared a Programmatic Biological Assessment (PBA) addressing water-depleting activities associated with BLM's fluid minerals program in the Colorado River Basin in Colorado. In response to this PBA, the USFWS issued a Programmatic Biological Opinion (PBO) (ES/GJ-6-CO-08-F-0006) on December 19, 2008. The PBO concurred with BLM's effects determination of “**May Affect, Likely to Adversely Affect**” the Colorado pikeminnow, humpback chub, bonytail chub, or razorback sucker as a result of depletions associated with oil and gas projects. To offset the impacts, the BLM has set up a Recovery Agreement, which includes a one-time fee per well. The estimated depletions from the Proposed Action would be added to the CRVFO tracking log and submitted to the USFWS per the PBA/PBO at the end of the year to account for depletions associated with BLM's fluid mineral program. The calculated mitigation fees are used by the USFWS for mitigation projects and contribute to the recovery of these species.

Other potential impacts to these species include inflow of sediments from areas of surface disturbance and inflow of chemical pollutants related to oil and gas activities on the well pads, associated with ancillary surface facilities, or resulting from an accident involving a haul truck in proximity to a stream. Stormwater controls required for the protection of surface water quality would also provide protection of aquatic organisms (see COAs in Appendix A). Even if sediment inflow were to occur, including incidental aerial deposition of fugitive dust from roadways and construction areas, these fishes are adapted to the naturally high sediment loads that characterize the Colorado River and its tributaries.

In contrast to inflow of sediments, the inflow of chemical pollutants could impact the endangered big-river fishes if concentrations were sufficient to cause acute effects. The potential for adverse impacts would be limited to the Colorado pikeminnow and razorback sucker, the two species known to occur within the CRVFO area. Spills or other releases of chemical pollutants as a result of oil and gas activities are infrequent in the CRVFO area due to the various design requirements imposed by BLM and the State of Colorado.

In the event of a spill or accidental release, the operator is required to implement its Spill Prevention, Control, and Countermeasures (SPCC) plan, including such cleanup and mitigation measures as required by BLM or the State. In addition, the stormwater controls (see COAs in Appendix A) would reduce the risk of transport of these substances as well as sediments to surface waters, including the Colorado River. For these reasons, and because any spills making their way into the Colorado River would be rapidly diluted to levels below that are not deleterious, or even detectable, the potential for adverse impacts from chemical releases is not considered significant.

No Action Alternative

The No Action Alternative constitutes denial of the Federal APDs described in the Proposed Action. No surface disturbance would occur on BLM surface, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using an alternate location that avoids BLM surface. Therefore, impacts of the No Action Alternative on Federally Listed, Proposed, or Candidate Animal Species would be generally similar to those under the Proposed Action.

BLM Sensitive Plant Species

Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County include DeBeque milkvetch (*Astragalus debequaeus*), Naturita milkvetch (*Astragalus naturitensis*), Piceance bladderpod (*Lesquerella parviflora*), Roan Cliffs blazing star (*Mentzelia rhizomata*), Harrington's penstemon (*Penstemon harringtonii*), and Cathedral Bluffs meadow-rue (*Thalictrum heliophilum*).

Environmental Consequences

Proposed Action

Habitats types in the project area are not suitable for any of the BLM sensitive plant species listed above. Therefore, the Proposed Action would have no adverse impacts on these species.

No Action Alternative

This alternative would not cause impacts to any BLM sensitive plant species because none of these species occurs in the area to be affected or the project vicinity.

BLM Sensitive Animal Species

Affected Environment

BLM sensitive animal species with habitat and/or occurrence records in the portion of the CRVFO that includes the project area and vicinity are listed in Table 7. Species indicated in the table as present or possibly present in the project vicinity are described more fully following the table.

Table 7. Special Status Wildlife Species Present or Potentially Present in the Project Area		
<i>Common Name</i>	<i>Habitat</i>	<i>Potential for Occurrence</i>
Fringed myotis, Townsend's big-eared bat	Breed and roost in caves, trees, mines, and buildings; hunt over pinyon-juniper, montane conifers, and semi-desert shrubs.	Possible
Northern goshawk	Primarily nests in spruce/fir forests but also use Douglas-fir, various pines, and aspens but may move to lower elevation forests in winter.	Possible
Bald eagle	Nests and roosts in mature cottonwood forests along rivers, large streams, and lakes.	No suitable habitat
Brewer's sparrow	Nests almost exclusively in sagebrush shrublands, typically in extensive stands of Wyoming big sagebrush on level or gently rolling terrain.	Possible – habitat marginal
Midget faded rattlesnake	Limited to cold desert dominated by sagebrush and with an abundance of rock outcrops and exposed canyon walls, typically farther west in the CRVFO.	Possible – habitat marginal
Great Basin spadefoot	Breeds in seasonal pools and slow-moving streams in pinyon-juniper woodlands and semi-desert shrublands, typically farther west than the CRVFO.	No suitable habitat
Northern leopard frog	Wet meadows and the shallows of marshes, glacial kettles, beaver ponds, lakes, reservoirs, streams, and irrigation ditches.	Possible
Colorado River cutthroat trout	Restricted to small headwaters streams isolated from introductions or colonization by non-native trouts.	Not found during fish surveys
Flannelmouth sucker and roundtail chub	Generally restricted to rivers and major tributaries. No habitat for these species within the project vicinity.	Present in Colorado River and Divide Creek
Bluehead sucker	Found in smaller streams with rock substrate and mid to fast flows.	Present in Divide Creek

Environmental Consequences

Proposed Action

Fringed Myotis (*Myotis thysanodes* and Townsend's Big-eared Bat (*Corynorhinus townsendii*) – No caves or other suitable roosting sites occur in the project area. Loss of large trees, potentially also used for roosting, would be negligible. No new loss of habitat above which the bats could search for aerial prey would occur, and the area they might avoid during nighttime drilling and completion activities would represent a small portion of their total feeding range, if present.

Northern Goshawk (*Accipiter gentilis*) – This species is mostly limited to spruce/fir or aspen forests, such as atop the Roan Plateau, Battlement Mesa, and other areas that reach subalpine 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. Goshawks feed primarily on small birds but also on diurnal small mammals (rabbits, chipmunks, etc.).

Brewer's Sparrow (*Spizella breweri*) – This project vicinity contains limited and marginal habitat for the Brewer's sparrow, which is generally restricted to extensive, uniform stands of sagebrush, primarily

sagebrush steppe. If the species were to occur, oil and gas activities occurring within the home range of a nesting pair could cause individuals to shift their feeding patterns and to locate their nests to avoid the disturbance (noise, dust, human activity). However, this impact would be limited to the nesting season and would not be an issue for long-term production and maintenance operations.

Midget Faded Rattlesnake (*Crotalus viridis concolor*) - This species is mostly limited to areas with rock outcrops that provide escape cover, thermal cover, and especially hibernacula. These are crucial components for reproduction and survival and are uncommon in the project vicinity. Though the midget faded rattlesnake is known to occur in northwestern Colorado in a variety of habitats, including pinyon and juniper woodlands and shrublands, it is not expected to occur within the project area.

Northern Leopard Frog (*Rana pipiens*) – The northern leopard frog is limited to perennial waters, including ponds and slow-flowing perennial streams or persistent portions of intermittent streams. It requires good water quality and abundant aquatic or shoreline vegetation. Suitable habitat occurs along some streams in the general vicinity of the project. However, because the project would not involve habitat disturbance near water sources, impacts to this species are not expected.

Flannelmouth Sucker (*Catostomus latipinnis*), Bluehead Sucker (*C. discobolus*), and Roundtail Chub (*Gila robusta*) – Similar to the endangered Colorado River fishes described previously, these species are vulnerable to alterations in flow regimes in the Colorado River that affect the availability and suitability of spawning sites and habitats needed for development of the larvae. The amount of consumptive water use associated with the Proposed Action would not be expected to cause discernible impacts to flows in the Colorado River.

Also similar to the endangered big-river fishes, these BLM sensitive species are adapted to naturally high sediment loads and therefore would not be affected by increased sediment transport to the Colorado River. However, these species are vulnerable to inflow of sediments into smaller streams by smothering the eggs of these species. The potential for adverse impacts from inflow of chemical pollutants is also greater in small streams due to less dilution and the presence of larval or juvenile fishes, which are more susceptible to mortality from acute toxicity. The COAs for the protection of water quality (Appendix A) would minimize the potential for impacts from inflow of sediments or toxicants. Prompt implementation of the SPCC plan following any spill or other release of hydrocarbons, saline waters, or other contaminants would further reduce the risk of significant adverse impacts to these species and other aquatic life in affected waters.

No Action Alternative

The No Action Alternative constitutes denial of the Federal APDs described in the Proposed Action. No surface disturbance would occur on BLM surface, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells using an alternate location that avoids BLM surface. Therefore, impacts of the No Action Alternative on BLM Sensitive Animal Species would be only slightly less overall than the Proposed Action.

Analysis on Public Land Health Standard 4 for Special Status Species

According to the Divide Creek LHA (BLM 2009), qualitative information suggests all sites with potential special status species habitat were in good condition, providing healthy and productive habitat. Based on the overall condition of upland and riparian habitats located on public lands, suitable habitat is available

for BLM sensitive plant and terrestrial wildlife species within the Divide Creek LHA. Thus, Standard 4 for BLM sensitive terrestrial wildlife species is being met within the Divide Creek watershed.

However, the habitat alteration associated with the Proposed Action would likely contribute to a declining trend and help to reduce the potential for meeting or maintaining Standard 4 for special status species over the long-term. With the implementation of the mitigation measures identified in this section and elsewhere in the EA, Standard 4 for special status species and their habitats would be achieved, but populations could be at risk with increasing natural gas development.

Vegetation

Affected Environment

The project area lies within an area dominated naturally by a mosaic of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) on rolling terrain and open woodland of Utah juniper (*Sabina osteosperma*) and pinyon pine (*Pinus cembroides* ssp. *edulis*) on steeper slopes and ridgetops.

Sagebrush areas of private lands where the SWNW and SENW pads would be located appear to have been mowed in the past to remove sagebrush and then planted with crested wheatgrass, a non-native perennial bunchgrass. The sagebrush portion of the BLM where the NENW pad would be located also appears to have been mowed and planted with crested wheatgrass in the past, although the amount of sagebrush cover is greater overall. The sagebrush on BLM land also supports fewer weeds. Weedy non-natives in both areas include Russian-thistle, redstem filaree, desert alyssum, tumble-mustard, and tansy-mustard in addition to cheatgrass (see the section on Invasive Non-Native Plants). Native forbs on the sagebrush areas are scarce, with low-growing copper mallow (*Sphaeralcea coccinea*) being the most abundant species observed.

The understory of pinyon-juniper woodland on the private lands also reflects protracted and heavy grazing use, with few native grasses or forbs and localized infestations of cheatgrass. On the BLM land, the woodland is in generally better condition, with an understory that includes some native perennial grasses such as sand dropseed (*Sporobolus cryptandrus*), slender wheatgrass (*Elymus trachycaulus*), and Sandberg bluegrass (*Poa secunda*) scattered across the dry, rocky soil beneath the tree canopy.

Environmental Consequences

Proposed Action

Under the Proposed Action, 18.7 acres of new disturbance would occur on Fee land from the Proposed Action. Following successful interim reclamation, the disturbance would be reduced to 5.5 acres. With implementation of standard COAs (Appendix A), desirable forbs and grasses on the unused portions of the pads and pipeline could be established within 2 to 3 years. However, because of periodic workovers and the potential for additional well bores in the future, it is likely that vegetation would remain in an early seral stage for the life of the wells.

No Action Alternative

Under the No Action alternative, the Federal wells would not be drilled; however, continued operations and maintenance activities of drilling and completing the 11 Fee wells under the authority of the COGCC, would present a continuing potential source of weed introductions. Weed control requirements associated with ongoing operations are the same as under the Proposed Action (see Appendix A). Therefore,

impacts of the No Action Alternative on vegetation proportionately less than under the Proposed Action.

Visual Resources

Affected Environment

The sites of the proposed pads, access road, and pipelines include both public (BLM) land and private land approximately 2 miles south of Silt, Colorado. The BLM land is classified as Visual Resource Management (VRM) Class III, as identified in the 1984 Glenwood Springs RMP. The objectives for VRM Classes III, as defined in BLM Manual H-8410-1, Visual Resource Inventory (BLM 1986), are described below.

- The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The project area consists of gently rolling hills dissected by small drainages, intermixed with flatter open areas nestled in between Dry Hollow Creek to the west and Divide Creek to the east. The Colorado River sits at the northern extent of the project area and County Road 326 (Chipperfield Lane) sits along the southern extent of the project area. The Proposed Action will occur within the rolling hills. The hills create a bowl-like structure surrounding the Proposed Action and would provide visual screening. The area is characteristic of agricultural and ranching land with scattered rural residences. The area is also heavily developed with oil and gas facilities, including a compressor station. Vegetation within the project area consists of an overabundance of cheatgrass and crested wheatgrass interspersed among rolling mixed shrub/sagebrush flats and degraded pastures with scattered pinyon-juniper woodlands.

The proposed SWNW and SENW pads and associated access roads and pipelines would be located on private land, while the NENW Pad and associated pipeline would be located entirely on BLM land designated as VRM Class III land (Figure 6). Although VRM objectives do not apply to non-BLM lands, the BLM maintains regulatory authority regarding protection of sensitive resources when Federal wells would be located on a Fee pad.

The visual resource analysis area includes County Road 331 (Dry Hollow Creek Road), County Road 326 (Chipperfield Lane), County Road 311 (Divide Creek Road), and within the project area itself. Views into the project location from the roads described previously are screened by the topography immediately surrounding the Proposed Action. Views of the project area would be limited to private landowners and oil and gas workers within in the immediate vicinity. Casual observers may see the project from Silt Mesa or Jolley Mesa, although at considerable distances, making landscape changes less discernible.

The SWNW pad site is on a saddle between two more prominent points along a ridgeline. The SENW Pad site is just below the same ridgeline to the east. This ridgeline screens views into the project area from the north, including the I-70 corridor. The NENW pad site is farther south in the project area below Dry Hollow, one of the most prominent topographic features in the project area. Dry Hollow and the ridgelines that extend to the north and east of it screen views from the south and east of the Proposed Action directly north.

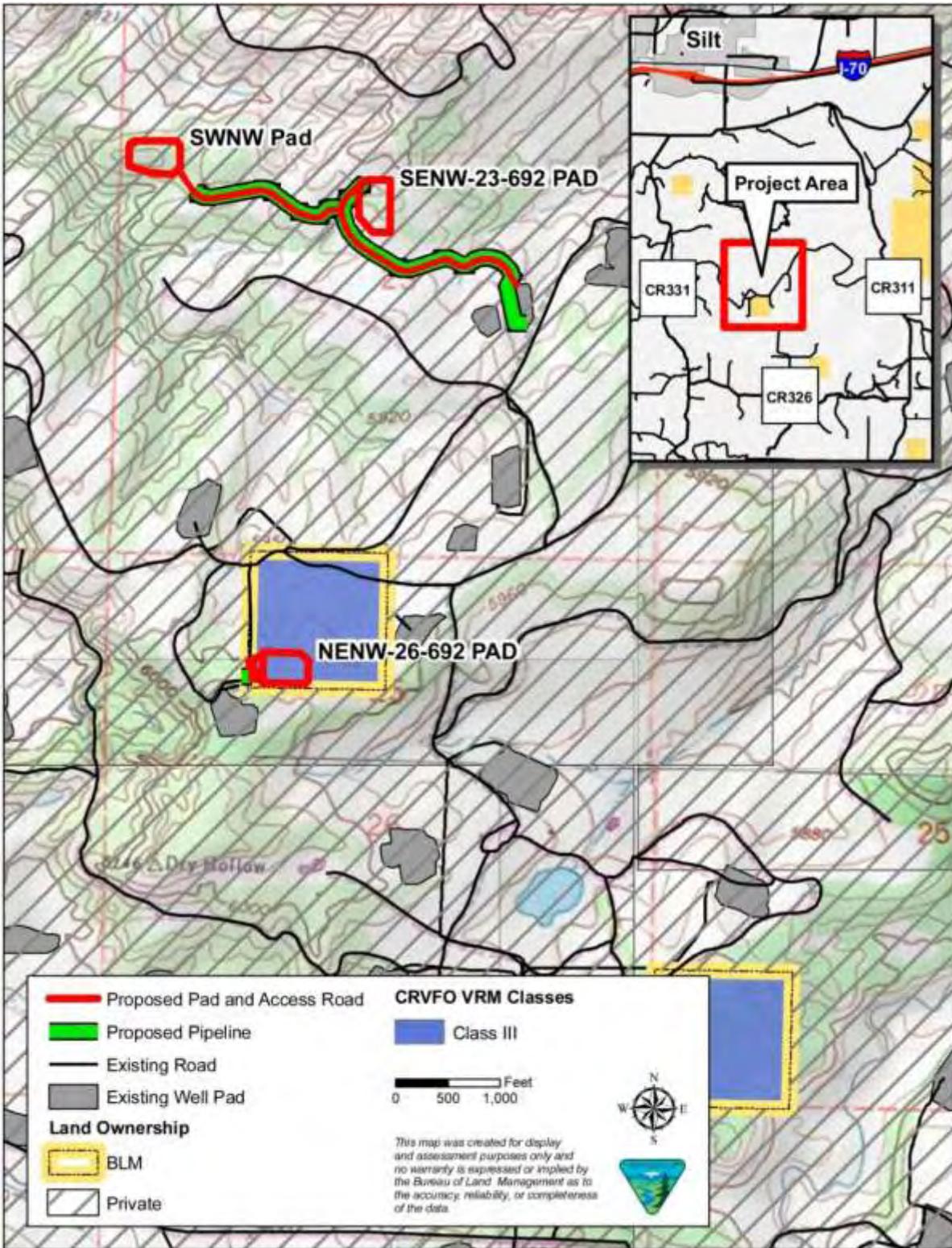


Figure 6. Visual Resource Management (VRM) Class Designations in the Project Area.

Environmental Consequences

Proposed Action

The planning process for this project included site visits to identify the best locations for the pads, access road, and pipelines. Short-term visual impacts due to pad, access road construction, pipeline installation, drilling and completion activities would occur within the project area. Construction of the Proposed Action would create contrast within the landscape by removing the existing vegetation, exposing bare ground, and creating distinct lines and forms within the landscape. The new pads, surface facilities, access road, and pipelines would increase the presence of drilling rigs, heavy equipment (e.g., dozers, graders, trackhoes), and vehicular traffic with an associated increase in dust, light pollution, and well flaring.

Long-term impacts of the Proposed Action would consist of an increase in the departure from the native characteristics of the visual character within the landscape where new pads, facilities, road, and pipelines are constructed. The visibility of new areas of surface disturbance and production equipment would increase the existing visual contrasts associated with human modification already present in the area.

The standard best management practices (BMPs) related to reclamation, facility paint colors, and screening the access road and pipeline alignments from view would largely mitigate long-term impacts for the two pads located on private land. Long-term impacts and mitigation measures to reduce visual impacts to meet VRM Class III objectives are described below and are applied by the BLM as COAs (Appendix A).

The footprint of the proposed NENW pad on BLM land would include approximately 5 acres of total surface disturbance. The pad would be approximately 285 feet wide by 388 feet in length with additional 100 feet of length at the west end to accommodate the production facilities. The fill slope on the north end of the pad would vary between approximately 12 feet at the northwest corner, to 20 feet pad center, to 1 foot at the northeast corner. The cut slope along the southern pad edge would vary between approximately 13 feet at the southwest corner, to 7 feet at pad center, and 9 feet in the southeast corner. After drilling and completion operations are finished, the disturbance acres would be reduced to approximately 1 acre after interim reclamation.

Total surface disturbance for the NENW pad and pipeline construction would amount to 5.8 acres, representing approximately 30% of the total surface disturbance planned for the entire project. Implementation of mitigation measures would assist in the project components related to the BLM 40-acre parcel meeting the objectives for the VRM Class III designation (Appendix A).

Mitigation of visual impacts for the NENW pad on BLM land and the private land during construction would include the following measures to be applied as COAs (Appendix A):

- All woody vegetation (live and dead) shall remain standing at the toe of the fill slopes and at the top of the cut slopes to provide visual screening.
- Rocks and woody debris shall be saved during the construction process; care shall be taken to preserve the canopy of the woody material while storing and transporting.
- Facilities shall be located to maximize area for interim reclamation.
- All facilities shall be painted BLM color **Shadow Gray**, a color found in the natural vertical elements.

The following COAs (Appendix A) would be applied at interim reclamation of the NENW:

- All woody vegetation left standing at the toe of the fill slopes and at the top of cut slopes shall be protected and remain standing and undamaged when fill material is pulled back to recontour the pad.
- All cut and fill slopes shall have undulating contours which emulate the slopes seen in the adjacent landscape. Constructed slopes shall meet existing grades with a similar slope to eliminate the line created at the edge where two different grades meet.
- Rocks and woody debris saved during the construction process shall be re-placed onto the cut and fill slopes to emulate the color and texture closer to that of the native landscape and to encourage vegetation growth.
- Rocks (white side down) saved during construction shall be re-placed on the pipeline corridor to emulate the texture closer to that of the native landscape and to encourage vegetation growth. Placement of rocks and woody debris on the pipeline corridor would also deter off-road travel, which would help prevent additional surface disturbance, expansion of the corridor, and visual impacts.

No Action Alternative

Under this alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the proposed Federal wells would not be drilled, completed, or produced. However, it is likely that BBC would drill, complete, and produce 11 proposed Fee wells using a modified pad location and pad design that avoids the BLM surface. This would result in impacts similar to the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to visual resources because the alternative surface location (s) used by BBC would be in less suitable areas and would increase the existing visual contrasts associated with human modification already present in the area.

Wastes, Hazardous or Solid

Affected Environment

The affected environment for hazardous materials includes air, water, soil, and biological resources that may potentially be affected by an accidental release of hazardous materials during transportation to and from the project area, storage, and use in construction and operations. Sensitive areas for hazardous materials releases include areas adjacent to water bodies, above aquifers, and areas where humans or wildlife would be directly impacted.

BLM Instruction Memoranda numbers 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 of as a result of a proposed project. The Glenwood Springs Resource Area, Oil & Gas Leasing & Development, Draft Supplemental Environmental Impact Statement (June 1998), Appendix L, Hazardous Substance Management Plan, contains a comprehensive list of materials that are commonly used for oil and gas projects. It also includes a description of the common industry practices for use of these materials and disposal of the waste products. These practices 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. The most pertinent of the Federal laws dealing with hazardous materials are as follows:

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

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Public Law 96-510 of 1980) 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 Environmental Protection Agency-produced plans), the Mesa County Emergency Operations Plan (developed by the Mesa County Office of Emergency Management), and the BLM Grand Junction Field Office Hazardous Materials Contingency Plan.
- The Resource Conservation and Recovery Act (RCRA) (Public Law 94-580, October 21, 1976) 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. RCRA strictly regulates the management and disposal of hazardous wastes.

Emergency response to hazardous materials or petroleum products on BLM lands are handled through the BLM Grand Junction Field Office contingency plan. BLM would have access to regional resources if justified by the nature of an incident.

Environmental Consequences

Proposed Action

Possible pollutants that could be released during the construction phase of this project would include diesel fuel, hydraulic fluid, and lubricants. These materials would be used during construction of the pads, roads, and pipelines, and for refueling and maintaining equipment and vehicles. 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 would 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 that would be used in construction meet the criteria for an acutely hazardous material/substance, or meet the quantities criteria per BLM Instruction Memorandum No. 93-344. In addition, no extremely hazardous substance, as defined in 40 CFR 355, in amounts above threshold planning quantities would be produced, used, stored, transported, or disposed of during construction or operation of the facilities.

Solid waste (human waste, garbage, etc.) would be generated during construction activities and, to a limited extent, during project operations. These would be removed to a landfill or water treatment facility as needed, and all would be removed prior to interim reclamation.

Surface water or groundwater could be affected under the Proposed Action. Pollutants that might be released during the operational phase of the project could include condensate, produced water (if the wells

in the area produce water) and glycol (carried to the site and used as antifreeze). While uncommon, an accident could occur that could result in a release of any of these materials. A release could result in contamination of surface water or soil. Improper casing and cementing procedures could result in the contamination of groundwater resources. In the case of any release, emergency or otherwise, the responsible party would be liable for cleanup and any damages. Depending on the scope of the accident, any of the above referenced contingency plans would be activated to provide emergency response. At a minimum, the BLM Grand Junction Field Office contingency plan would apply.

These laws, regulations, standard lease stipulations, and contingency plans and emergency response resources are expected to adequately mitigate any potential hazardous or solid waste issues associated with the Proposed Action.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on Federal surface, and the proposed Federal wells would not be drilled, completed, or produced. However, it is likely that BBC would drill, complete, and produce 11 proposed Fee wells using a modified pad location and pad design that avoids the BLM surface. This would result in impacts similar to the Proposed Action.

Water Quality, Surface and Ground (includes an analysis of Public Land Health Standard 5)

Surface Water

Affected Environment

The Proposed Project would occur within Dry Hollow Creek 6th code hydrologic unit which drains to the Colorado River. The East branch of Dry Hollow Creek flows 0.8 miles northwest to Dry Hollow Creek and ultimately empties into the Colorado River approximately 2 miles to the north of the project. According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37) (CDPHE 2007) the mainstem of Dry Hollow Creek, including all tributaries and wetlands, from the source to the confluence with the Colorado River are within segment 4d. The following is a brief description of segments 4d.

- Segment 4a – This segment has been classified aquatic life cold 2, recreation N, water supply, and agriculture. Aquatic life cold 2 indicates that this water course is not capable of sustaining a wide variety of cold or warm water biota due to habitat, flows, or uncorrectable water quality conditions. Recreation class N refers to waters that are not suitable or intended to become suitable for primary contact recreation. This segment is, however, suitable or intended to become suitable for potable water supplies and agricultural purposes that include irrigation and livestock use.

All streams within segment 4d are not on the State of Colorado's 303(d) List of Impaired Waters and Monitoring and Evaluation List (CDPHE, WQCC Regulation No. 93) (CDPHE 2010). The Colorado River which Dry Hollow Creek flows to is currently considered impaired due to naturally high levels of selenium. Colorado's Monitoring and Evaluation List identifies water bodies where there is reason to suspect water quality problems, but uncertainty also exists regarding one or more factors. No stream segments within the project area are on the State of Colorado's Monitoring and Evaluation List (CDPHE 2010). Data were also collected from the Colorado River below the project area near Rulison in 1977 and 1978 (Table 9).

Table 9. Selected Water Quality Data for Two Sampling Locations near the Project Area		
<i>Parameter</i>	<i>Colorado River below Rulison CO, USGS Site #09092570</i>	
	<i>1/18/1978</i>	<i>4/8/1977</i>
Instantaneous discharge (cfs)	1,500	1,560
Temperature, water (°C)	2.5	11
Field pH (standard units)	7.9	8.1
Specific conductance (µS/cm/cm at 25°C)	1,320	1,200
Total Dissolved Solids (mg/L)	756	733
Hardness as CaCO ₃ (mg/L)	280	250
Chloride (mg/L)	230	230
Selenium (µg/L)	2	1
Dissolved oxygen (mg/L)	11.2	10
Note: NA = data not available		
Source: USGS 2007		

No sediment measuring stations are present on the Colorado River or its tributaries near the pad location. The closest downstream station on the Colorado River is near DeBeque, Colorado. A summary of USGS data collected at this station indicates that the mean sediment load was 1,817 tons per day during the period of 1974 to 1976. The maximum and minimum for this location during the same period was 41,300 and 8 tons/day respectively (USGS 2007).

Environmental Consequences

Proposed Action

The Proposed Action would result in 18.7 acres of surface disturbance, of which approximately 5.5 acres would not be reclaimed during the life of the wells. Potential impacts to surface water associated with the Proposed Action occur from surface-disturbing activities, traffic, waste management, and the use, storage and transportation of fluids (i.e., chemicals, condensate, and produced water). Surface-disturbing activities associated with well and facility pads, roads, and pipelines cause loss of vegetation cover, soil compaction and displacement, increased volume and velocity of runoff, and increased sedimentation and salinity in surface waters. Initially, impacts can be minimized by stormwater management, stockpiling topsoil, controlling erosion, rehabilitation of disturbed surfaces quickly. Long-term soil protection could be achieved by continued road and pad maintenance to reduce erosion, remediation of contaminated soils, and minimizing the size of the long-term pad footprint through interim reclamation measures. As proposed, these measures would include limiting cut slope steepness, step-cutting, crowning road surfaces, installing culverts and drainage systems, and applying gravel to all upgraded BLM roads in the project area to a compacted thickness of 6 inches (Appendix A).

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. Use, storage, and transportation of fluids such as produced water, hydraulic fracturing fluids, and condensate increase the possibility of spills that could migrate to surface or groundwater. Other elements of the Proposed Action are designed to mitigate risks to surface waters associated with the release of drilling fluids, produced water, and condensate. A closed-loop drilling system would be implemented which recycles drilling fluids; cuttings would be dried through the use of a shaker system and be stacked against the cutslope on

the pad. A traditional reserve pit would not be constructed. Additionally, tanks used to store produced water and condensate would be placed in secondary containment to prevent offsite release.

In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area and would not migrate to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure tested to detect leakage prior to use. Cuttings management areas must be decontaminated to COGCC standards prior to pit closure.

Implementation of the standard COAs for mitigating impacts to surface waters (Appendix A) would minimize risks of adverse impacts associated with construction and ongoing production activities.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells from a nearby Fee location. Therefore, impacts of the No Action Alternative on water quality proportionately less than under the Proposed Action.

Waters of the U.S.

Waters of the U.S. located in the project vicinity include the ephemeral tributaries and the east branch of Dry Hollow Creek. 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. A permit is required for both permanent and temporary discharges into Waters of the United States; larger discharges require an individual permit, while smaller discharges may be granted a nationwide permit (NWP).

Environmental Consequences

Proposed Action

No new crossings of Waters of the U.S. are included in the Proposed Action, nor is pad construction proposed, road alignments, or pipeline installation that could discharge fill into Waters of the U.S.

Improperly designed crossings of small ephemeral drainages, in particular any undersized or poorly aligned culverts, could result in soil degradation, including erosion at culvert outlets. This could potentially supply sediment to the Colorado River approximately 2 miles to the north. However, standard and site-specific COAs listed in Appendix A would be implemented to protect Dry Hollow Creek, the Colorado River, and any other Waters of the U.S. potentially impacted by long-distance stormflow transport.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells from a nearby Fee location. Therefore, impacts of the No Action Alternative on Waters of the U.S. would be somewhat less than under the Proposed Action.

Groundwater

Affected Environment

The Lower Piceance Basin contains both alluvial and bedrock aquifers (Colorado Geological Survey 2003). Unconsolidated alluvial aquifers are the most productive aquifers in the region (EPA 2004) and are defined as narrow, thin deposits of sand and gravel formed primarily along stream courses, in this case, along the Colorado River and its tributaries. Alluvial well depths are generally less than 200 feet and water levels typically range between 100 to 150 feet. Well yield is dependent upon the intended use of the well, well construction design, sediment type and saturated thickness. Domestic use wells are limited to 15 gallons per minute (gpm) administratively, while municipal wells are designed and constructed for maximum potential yield. Below these alluvial aquifers resides the Wasatch formation. Although considered a confining unit, some fresh water wells are completed in the discontinuous water bearing sands of the Wasatch Formation, but these water bearing intervals are considered to be localized.

Underlying the Wasatch Formation is the Cretaceous-aged Mesaverde aquifer. The depth to the top of this aquifer beneath the project area is more than 5,000 feet below ground surface (bgs), far too deep for economic development. The Mesaverde aquifer is of regional importance, but does not provide recharge into the fresh water system within the shallower groundwater system of the project area.

Water quality of the upper Piceance Basin aquifer unit is relatively good, ranging in Total Dissolved Solid (TDS) levels from 500 to 1,000 milligrams per liter (mg/L). In the lower unit, TDS concentrations increase from 1,000 to 10,000 mg/L along basin flow paths. Waters with TDS values in excess of 1,000 mg/L are generally unsuitable for potable supply. Water suitable for drinking has a Federal secondary standard set at 500 mg/L or less (EPA 2006). The quality of the water in the Mesaverde aquifer is highly variable, with concentrations of dissolved solids ranging from less than 1,000 mg/L in many of the basin-margin areas to more than 10,000 mg/L in the central part of the Piceance Basin (EPA 2004). In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water. However, water quality in the Piceance Basin is generally poor overall due to the presence of nahcolite deposits and salt beds found throughout the basin. Only very aquifers such as those in the Wasatch Formation are used for drinking water (Graham 2001, cited in EPA 2004).

A total of 23 permitted domestic water wells are located within a 1-mile radius of the proposed pads. The statuses of nine of the permits are unknown. The remaining 16 wells range in depth from 570 to 1,000 feet, have static water levels between 110 and 350 feet bgs and discharge rates between 1 and 15 gpm.

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 (fracing) 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. Typical proppants include sand, aluminum, glass, or plastic beads, with less than 1% of other compounds such as corrosion-, friction-, and scale-inhibitors (EnerMax Inc. 2007). Fracing techniques are used to create secondary porosity fractures, held open by proppants, allowing the trapped gas to migrate up the borehole for production. Hydrofracturing would be conducted at 5,000 feet or more 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 the cementing and casing programs are

adequate to protect all downhole resources. This analysis shows that water wells are common in the project area, some within 0.25 mile of the proposed wellbores. Therefore, additional protection measures regarding casing depths would be instituted for all Federal wells and any private wells drilled from Federal land (see Appendix A). With the use of proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers are anticipated.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on BLM land, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells from a nearby Fee location. Therefore, impacts of the No Action Alternative on groundwater proportionately less than under the Proposed Action.

Analysis on Public Land Health Standard 5 for Water Quality

The Divide Creek LHA conducted in 2009 covered the major tributaries on BLM-managed lands to the Colorado River south of I-70 from West Mamm Creek to Paradise Creek, which includes Dry Hollow Creek. The LHA indicated that all segments of streams were meeting Standard 5. The Proposed Action would unlikely prevent Standard 5 from being achieved because direct impact to the creek and Colorado River are being avoided. In addition, water bodies, riparian areas, and erosive soils would be protected by COAs (Appendix A) and requirements set for permitting by the COGCC and USACE. Therefore, the Proposed Action is not expected to contribute to a failure of the area to meet standards.

The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for plant and animal communities because no new development would occur on BLM land.

Wildlife, Aquatic (includes an analysis on Public Land Health Standard 3)

Affected Environment

Aquatic habitat is limited in the project area given the intermittent nature of the streams. Divide Creek lies approximately 1.5 miles to the east of the Dixon pads. Fish sampling conducted by the CPW (2011b) has documented speckled dace, creek chub, roundtail chub, flannelmouth sucker, and bluehead sucker in Divide Creek. Dry Hollow Creek, an ephemeral drainage, lies approximately 1.5 miles from the pads. No fish occur in Dry Hollow Creek due to its small size and limited water flow.

Aquatic macroinvertebrates living in perennial streams such as Divide Creek during a portion of their lifecycles include larvae of stoneflies, mayflies, and some caddisflies in fast-flowing reaches with rocky or detrital substrates. In slow-flowing portions of Divide Creek with fine substrate, aquatic macroinvertebrates could include the larvae of midges, mosquitoes, and some caddisflies. These species are able to tolerate relatively warm, turbid, and poorly oxygenated waters, and their more abbreviated larval stages allow them to reproduce in intermittent streams and in seasonally inundated overbank areas.

Environmental Consequences

Proposed Action

Habitat for the present fish population would remain adequate by maintaining the present condition of the aquatic and riparian environment of Divide Creek. Runoff from the well pads is adequately buffered

given the distance to the creek. Additionally, protective COAs for water quality would minimize potential impacts from the development (Appendix A).

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells from a nearby Fee location. Therefore, impacts of the No Action Alternative on aquatic wildlife would be only slightly less overall than the Proposed Action.

Analysis on Public Land Health Standard 3 for Plant and Animal Communities (partial, see also Vegetation and Wildlife, Terrestrial)

A formal LHA was completed in 2009 for the portion of the CRVFO that includes the project area. Under the Proposed Action, increased erosion and sedimentation to drainages in the project area, as well as the increased potential for soil contamination from leaks or spills or fuels or lubricants, have the potential to trend the area away from meeting this standard. However, with implementation of applicant-committed environmental mitigation measures and standard surface-use COAs, the Proposed Action would not be expected to prevent Standard 3 from being met for aquatic wildlife.

Wildlife, Terrestrial (includes an analysis on Public Land Health Standard 3)

Affected Environment

Mammals

The site is located within winter range, severe winter range, and winter concentration area for mule deer (*Odocoileus hemionus*) and winter range and severe winter range for American elk (*Cervus elaphus*) as mapped by CPW (2010). Winter range is that part of the overall range of a species where 90% of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each data analysis unit (CPW 2011). Severe winter range is that part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten (CPW 2010). Winter Concentration areas are that part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten (CPW 2010). Field surveys indicate that the project area is occupied winter range for elk and that mule deer occupy the proposed project area on a year-round basis.

Large carnivores present in the project area include the mountain lion (*Puma concolor*) and black bear (*Ursus americanus*). Mountain lions move seasonally to generally follow migrations of their preferred prey, mule deer. Two medium-sized carnivores, the coyote (*Canis latrans*) and bobcat (*Lynx rufus*), are also present in the region in open habitats and broken or wooded terrain, respectively, where they hunt for small mammals, reptiles, and ground-dwelling birds. Smaller carnivores in habitats similar to those near the project site include the ringtail (*Bassariscus astutus*) and spotted skunk (*Spilogale gracilis*).

Small mammals present within the project area include rodents such as the rock squirrel (*Spermophilus variegatus*), least chipmunk (*Tamias minimus*), and packrat (bushy-tailed woodrat) (*Neotoma cinerea*), as well as the desert cottontail (*Sylvilagus audubonii*). Rodents and, to a lesser extent rabbits, are the primary prey base for a variety of avian and mammalian predators.

Birds

The wild turkey (*Meleagris gallopavo*) is native to North America and is the largest upland gamebird. Wild turkeys are omnivorous, foraging on the ground or climbing shrubs and small trees to feed. They prefer eating hard mast such as acorns, nuts, and various trees, including pinyon pine as well as various seeds, berries such as juniper and bearberry, roots and insects. Wild turkeys often feed in cow pastures and are also known to eat a wide variety of grasses. See the sections on Migratory Birds and Special Status Species for discussions of other birds in the area.

Reptiles and Amphibians

Species most likely to occur include the western fence lizard (*Sceloporus undulatus*), plateau striped whiptail (*Cnemidophorus velox*), gopher snake (bullsnake) (*Pituophis catenifer*), and yellow-bellied racer (*Coluber constrictor*), all of which may be found in sagebrush shrublands, pinyon-juniper woodlands, and degraded pastures such as occur in the project vicinity.

Although the project area does not contain any suitable habitat, the surrounding area provides potentially suitable habitat for the northern leopard frog (see the section on Special Status Species) and two additional amphibians, the Woodhouse's toad (*Bufo woodhousii*), and western chorus frog (*Pseudacris triseriata*). Within the CRVFO and vicinity, the spadefoot toad and Woodhouse's toad occur primarily along ephemeral washes that do not support fish and contain pools of water for a period of at least a few weeks every spring. The chorus frog occurs primarily in cattail and bulrush wetlands and along the vegetated margins of seasonal or perennial ponds and slow-flowing streams. Some existing stock ponds and slow-flowing portions of the drainages are potentially suitable for the northern leopard frog, though none have been documented.

Environmental Consequences

Proposed Action

The total surface disturbance for the proposed construction would amount to 18.7 acres. The surface disturbance related to the pads would be reduced to approximately 5.5 acres following successful interim reclamation. Reclamation activities would benefit some wildlife species by increasing herbaceous forage. In areas where shrubs and trees would be disturbed, impacts to wildlife from loss of thermal and/or hiding cover would be long-term, lasting the 20 to 30+ years following reclamation that it would take for these woody species to re-establish. Surface disturbing activities within these habitats during the winter and during migratory seasons have the potential to displace mule deer and elk from these important habitats.

Construction activities, soil disturbance, and traffic could potentially spur the introduction and spread of weed species within the project area. Weed invasion and establishment has become an increasingly important concern associated with surface disturbing activities in the West. Weeds often out-compete native plant species, rendering an area less productive as a source of forage for wildlife. However, implementation of the suggested mitigation measures in the section on Invasive Non-Native Species would minimize the potential for invasion and establishment of the project area by undesirable plants.

Indirect impacts on wildlife, especially big game and raptors, would be disturbance caused by increased human activity, equipment operation, vehicle traffic, harassment by any dogs brought to the site by contractors, and noise related to drilling and completion activities. Most species of wildlife are relatively secretive, and distance themselves from these disturbances, or move to different areas screened by vegetation or topographic features. This avoidance, referred to as displacement, results in underuse of

habitat near the disturbance. Avoidance of forage and cover resources adjacent to disturbance reduces habitat utility and the capacity of the affected acreage to support wildlife populations.

No Action Alternative

For the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the proposed Federal wells would not be drilled, completed, and produced. However, it is likely that BBC would drill, complete, and produce the 11 proposed Fee wells from a nearby Fee location. Therefore, impacts of the No Action Alternative on terrestrial wildlife proportionately less than under the Proposed Action.

Analysis on Public Land Health Standard 3 for Plant and Animal Communities (partial, see also Vegetation and Wildlife, and Aquatic)

A formal Land Health Assessment was completed in 2009 for the portion of the CRVFO that includes the project area. The area was generally meeting the standard, although some issues with weeds were noted. Habitat loss and fragmentation at the small scale of the Proposed Action, in combination with the COAs included as Appendix A, are not expected to contribute to a failure of the area to meet Standard 3.

SUMMARY OF CUMULATIVE IMPACTS

Until relatively recently, modifications of the region have been characteristic of agricultural and ranching lands, with localized industrial impacts associated with the railroad and I-70 corridors. More recently, these changes are cumulative to the growth of residential and commercial uses, utility corridors, oil and gas developments, and other rural industrial uses. These increasing activity levels have accelerated the accumulation of impacts in the area. Cumulative impacts have included: (1) direct habitat losses, (2) habitat fragmentation and losses in habitat effectiveness, (3) elevated potential for runoff, erosion, and sedimentation, (4) expansion of noxious weeds and other invasive species, and (5) increased noise and traffic and reductions in the scenic quality of the area (BLM 1999a: 4-1 to 4-68).

Although none of the cumulative impacts described in the 1999 FSEIS was characterized as significant, and while new technologies and regulatory requirements have reduced the impacts of some land uses, it is nonetheless clear that past, present, and reasonably foreseeable future actions has had and would continue to have adverse effects on various elements of the human environment. The anticipated impact levels for existing and future actions range from negligible to locally major, and primarily negative, for specific resources. The primary reasons for this assessment are twofold: (1) the rate of development, particularly oil and gas development, has until recently been increasing in the area, resulting in an accelerated accumulation of individually nominal effects; and (2) residential and commercial expansion, as well as most of the oil and gas development, has occurred private holdings lands where mitigation measures designed to protect and conserve resources are not in effect.

It is clear that the Proposed Action would contribute to the collective adverse impact for some resources. Although the contribution would be minor, the Proposed Action would contribute incrementally to the collective impact to air quality, vegetation, migratory birds, terrestrial wildlife, and other resources.

PERSONS AND AGENCIES CONSULTED

BBC: Doug Dennison, Tracey Fallang, Jeff Fandrich, Jesse Merry, Mary Pobuda
Eclipse Surveying: Jim Kalmon

INTERDISCIPLINARY REVIEW

BLM staff who participated in the preparation of this EA are listed in Table 10.

Table 10. BLM Interdisciplinary Team Authors and Reviewers		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Jim Byers	Natural Resource Specialist	EA Project Lead, Access & Transportation, Invasive Non-native Species, Socioeconomics, Wastes-Hazardous or Solid, Special-status Species (Plants), Vegetation
Allen Crockett, Ph.D.	Supervisory Natural Resource Specialist	NEPA Review
Bob Hartman	Petroleum Engineer	Downhole COAs
Shauna Kocman, Ph.D.	Hydrologist	Air Quality, Noise, Soils, Surface Water, Waters of the U.S.
Julie McGrew	Natural Resource Specialist	Visual Resources
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special-status Species (Animals), Wildlife, Aquatic and Terrestrial
Todd Sieber	Geologist	Geology and Minerals, Groundwater, Paleontology

REFERENCES CITED

Bureau of Land Management (BLM). 1984. Glenwood Springs Resource Management Plan. Glenwood Springs Field Office, Colorado.

_____. 1986. BLM Manual Handbook 8410-1-Visual Resource Inventory.

_____. 1991. Record of Decision, Oil and Gas Plan Amendment. Glenwood Springs Field Office, Colorado.

_____. 1999a. Oil & Gas Leasing & Development – Final Supplemental Environmental Impact Statement. Glenwood Spring Field Office, Colorado.

_____. 1999b. Oil & Gas Leasing & Development – Record of Decision and Resource Management Plan Amendment. Glenwood Spring Field Office, Colorado.

_____. 2006. Final Roan Plateau Resource Management Plan Amendment & Environmental Impact Statement, Volume III, Appendix C. Glenwood Springs Field Office, Colorado.

_____. 2010. Divide Creek Land Health Assessment. Colorado River Valley Field Office, Silt, CO

_____. 2011. Air Resources Technical Support Document. Colorado River Valley Field Office, Silt, CO. <http://www.blm.gov/co/st/en/fo/crvfo.html>

Chick, N. D. 2008. Personal Communication. Email from Nancy D. Chick (CDPHE) to Noel Ludwig (BLM) on 10/14/2018.

_____. 2011. Personal Communication. Email from Nancy D. Chick (CDPHE) to Susan Bassett (URS) on 2/14/2011. Data were obtained via email from William Kotasek (CDPHE-APCD) to Susan Bassett (URS) on 2/11/2011 via email from Nancy D. Chick (CDPHE-APCD) to Susan Bassett on 2/14/2011

Colorado Department of Labor and Employment. 2010. LMI Gateway 2009 quarterly census of employment and wages data for Garfield County. Available online.

Colorado Department of Public Health and Environment (CDPHE). 2007. Water Quality Control Commission (WQCC), Regulation No. 37 Classifications and numeric standards for Lower Colorado River basin and tables. Amended February 8, 2010; effective June 3, 2010. Available online.

_____. 2010. Water Quality Control Commission (WQCC), Regulation No. 93, Section 303(d) List of Impaired Waters and Monitoring and Evaluation List. Effective April 30, 2010. Available online.

Colorado Division of Local Affairs (DOLA). 2010. Population Totals for Colorado Counties; 1 year increments, 2000 – 2040. Available online.

Colorado Parks and Wildlife (CPW). 2011. National Diversity Information Source (CPW-NDIS). Elk and mule deer habitat GIS data.

Colorado Geological Survey (CGS). 2003. Ground Water Atlas of Colorado, Special Publication 53, pgs. 97-106.

Colorado Oil and Gas Commission (COGCC). 2010. Colorado Oil and Gas Information System (COGIS) Production. <http://cogcc.state.co.us/>. Accessed 09/29/10.

EnerMax, Inc. 2007. Hydraulic fracturing. <http://www.enermaxinc.com/hydraulic-fracturing>.

Fenneman, N. M. 1946, Physical subdivisions of the United States (Map): U.S. Geological Survey, 1:700,000, 1 sheet.

Franczyk, K.J., J.K. Pitman, and D.J. Nichols. 1990. Sedimentology, mineralogy, and depositional history of some Uppermost Cretaceous Lowermost Tertiary rocks along the Utah Book and Roan Cliffs east of the Green River: U.S. Geological Survey Bulletin 1787:27 pp.

Garfield County. 2000. Garfield County Demographic Summary prepared by U.S. Census Bureau from 2000 Decennial Census Data. Available online.

_____. 2007. Socioeconomic Impact Study. Available online.

_____. 2009. Abstract of Assessment and Tax Levies. Available online.

George, R.D. 1927. Geology and Natural Resources of Colorado. University of Colorado, Boulder, CO.

Graham, G. 2001. Colorado Division of Water Resources. Personal communication.

Harris, C.M. 1991. Handbook of acoustical measurements and noise control, McGraw-Hill, Inc., New York.

- Hemborg, T.H. 2000. Gas production characteristics of the Rulison, Grand Valley, Mamm Creek, and Parachute Fields, Garfield County, Colorado: Turning marginally economic basin-centered tight-gas sands into profitable reservoirs in the Southern Piceance Basin. Colorado Geological Survey, Resource Series 39. Denver.
- Holditch, S.A. 2006. Tight gas sands. Society of Petroleum Engineers Paper 103356, Journal of Petroleum Technology.
- Johnson, R.C. 1989. Geologic history and hydrocarbon potential of late Cretaceous-age, low-permeability reservoirs, Piceance Basin, western Colorado: U.S. Geological Survey Bulletin 1787, Evolution of sedimentary basins-Uinta and Piceance Basins, chapter E, 51 p.
- Kuuskras, V.A. 1997. Producing massively stacked lenticular sands of Colorado's Piceance Basin: Gas Tips – A Publication of Gas Research Institute GRI-97/0206:4-11.
- La Plata County, Colorado. 2002. Final La Plata County Impact Report. October.
- Lorenz, J.C. 1989. Reservoir sedimentology of rocks of the Mesaverde Group, multiwall experiment site and east-central Piceance Basin, northwest Colorado. *In* B.E. Law and C.W. Spencer, C.W. (Eds.), Geology of tight gas reservoirs in the Pinedale Anticline area, Wyoming, and at the multiwall experiment site, Colorado: U.S. Geological Survey Bulletin 1886:K1-K24.
- Murphy, P.C., and D. Daitch, 2007. Paleontological overview of oil shale and tar sands areas in Colorado, Utah, and Wyoming, p. 58.
- National Academy of Sciences. 2007. Weather and climate extremes in a changing climate. National Academies Press. <http://dels.nas.edu/globalchange/reportDetail.php?id=4288&c=clim&t=pubs>.
- Ruggiero, L.F., K.B. Aubrey, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.M. Squires (Eds). 1999. The scientific basis for lynx conservation in the contiguous United States. Gen. Tech. Rpt. RMRS-GTR-30. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Shroba, R.R., Fairer, G.M., Green, M.W. Geologic map of the Silt Quadrangle. 1994 USGS open-file report 94-696. 1:24,000 scale.
- Spencer, C.W., and Wilson, R.J., 1988. Petroleum geology and principal exploration plays in the Uinta-Piceance-Eagle Basins Province, Utah and Colorado: U.S. Geological Survey Open-File Report 88-450-G, 35 p.
- U.S. Department of Agriculture (USDA). 1985. Soil survey of Rifle area, Colorado: parts of Garfield and Mesa Counties. Soil Conservation Service [Natural Resources Conservation Service].
- U.S. Department of Commerce. 2008. Regional Economic Information System, Bureau of Economic Analysis (BEA). Table CA 1-3. Available online.
- U.S. Department of the Interior (USDI). 2010. Payments in Lieu of Taxes (PILT) County Payments and Acres. <http://www.nbc.gov/pilt/pilt/search.cfm#search>.

USDI Bureau of Land Management and USDA Forest Service (USDI and USDA). 2007. The Gold Book – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, 4th Edition, Revised BLM/WO/ST-06/021+3071/REV07. BLM. Denver, CO. 84pp.

U.S. Environmental Protection Agency (EPA). 1974. Information on noise levels identified as requisite to protect public health and welfare with an adequate margin of safety. EPA-550/9-74-004, Arlington, VA.

_____. 2004. Environmental Protection Agency. Evaluation of impacts to underground sources of drinking water by hydraulic fracturing of coalbed methane reservoirs. EPA 816-R-04-003, Attachment 3, The Piceance Basin, June 2004.

_____. 2006. Drinking water standards and health advisories, EPA 822-R-06-013, August 2006. Available online.

U.S. Geological Survey (USGS). 2007. Water Resources of the United States, NWISWeb. Water quality samples for the nation, Colorado River near DeBeque. Available online.

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of conservation concern. Division of Migratory Bird Management, Arlington, Virginia. 93 pp. Available online..

Vargas, M.F., and T.L. Davis. 2006. Characterization and 3-D reservoir modeling of fluvial tight-gas sandstones in the Williams Fork Formation, Rulison Field, Piceance Basin, Colorado, USA. American Association of Petroleum Geologists, Annual Convention, (SEPM) Technical Program Abstracts.

Weiner, R.J., and J.D. Haun. 1960. Guide to the Geology of Colorado. Geological Society of America.

WestWater Engineering. August 2011. Dixon Pads Raptor Survey Report.

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APPENDIX A

Surface Use and Downhole Conditions of Approval

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SURFACE-USE CONDITIONS OF APPROVAL

STANDARD COAS APPLICABLE TO ALL ACTIVITIES FOR EA #DOI-BLM-CO-N040-2011-0117

The following standard surface-use COAs are in addition to all stipulations attached to the respective Federal leases and to any site-specific COAs for individual well pads. Wording and numbering of these COAs may differ from those included in DMDP. In cases of discrepancies, the following COAs supersede earlier versions.

1. Administrative Notification. The operator shall notify the BLM representative at least 48 hours prior to initiation of construction. A pre-construction onsite meeting shall be held **prior to pad construction**. Attendees will include the appropriate operator representatives, construction contractors, and BLM specialists including the natural resource specialist, hydrologist, and ecologist.
2. Road Construction and Maintenance. Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards. 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.
3. 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.
4. 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 to be 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. 17 (Travis Morse).

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.

5. 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 waters of the U.S. may require mitigation. Contact the USACE Colorado West Regulatory Branch at 970-243-1199 ext. 17 (Travis Morse). Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.

6. 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.
7. Reclamation. An onsite meeting shall also be held **prior to interim reclamation of the pad**. Attendees shall include the appropriate operators' representatives, construction contractors, and BLM specialists including the natural resource specialist, hydrologist, and ecologist.

The goals, objectives, timelines, measures, and monitoring methods for final reclamation of oil and gas disturbances are described in Appendix I (Surface Reclamation) of the 1998 Draft Supplemental EIS (DSEIS). Specific measures to follow during interim and temporary (pre-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 (COA number 19) 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.

Final seedbed preparation shall consist of scarifying (raking or harrowing) the spread topsoil prior to seeding. If more than one season has elapsed between final seedbed preparation and seeding, and if the area is to be broadcast-seeded or hydroseeded, this step shall be repeated no more than 1 day prior to seeding to break up any crust that has formed.

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 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 reseeded 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.

Seedbed preparation is not required for topsoil storage piles or other areas of temporary seeding.

- e. Seed Mixes. A seed mix 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 (see Attachments 1 and 2 of the letter provided to operators dated May 1, 2008). Note that temporary seeding no longer allows the use of sterile hybrid non-native species.

For private surfaces, the menu-based seed mixes are recommended, but the surface landowner has final authority over the seed mix to be used in reclamation. The seed shall contain no noxious, prohibited, or restricted 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.

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. 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 measures approved by the BLM. Cut-and-fill slopes along drainages or in areas with high erosion potential shall also be protected from erosion using hydromulch designed specifically for erosion control or biodegradable blankets/matting, bales, or wattles of weed-free straw or weed-free native grass hay. A well-anchored fabric silt fence shall also be placed at the toe of cut-and-fill slopes along drainages or to protect other sensitive areas from deposition of soils eroded off the slopes. Additional BMPs shall be employed as necessary to reduce soil erosion and offsite transport of sediments.
- i. Site Protection. The pad 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 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 to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual 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 BLM.

8. Weed Control. The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs 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 shall be submitted to BLM by **December 1**.
9. Big Game Winter Range Timing Limitation. Federal lease COC15976 does not have a timing limitation associated with it; however, the BLM can apply a 60-day timing limitation (TL) to activities associated with the NENW pad on BLM surface, pads overlying Federal minerals, and associated roads and pipelines. To minimize impacts to wintering big game, no construction, drilling or completion activities shall occur during a TL period from **January 1 to March 1 annually**.
10. 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, shall be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051).
11. Raptor Nesting. Raptor nest surveys in the project vicinity in 2010 and 2011 resulted in identification of raptor nest structures within or near a 0.25-mile radius from one or more well pads or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to construction, drilling, or completion activities within the buffer widths specified above, if the activities would be initiated during period **May 1 to July 1**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied during the normal nesting period for that species, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied, but the nestlings have fledged and dispersed from the nest. If project-related activities are initiated within the specified buffer distance of any active nest, even if outside the 60-day TL period, 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 #12 for Birds of Conservation Concern).
12. Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all surface-disturbing activities are prohibited from **May 1 to July 1** to reduce impacts to Birds of Conservation Concern (BCC). An exception to this TL will be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC 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 a BCC species. This provision does not apply to

ongoing construction, drilling, or completion activities that are initiated prior to May 1 and continue into the 60-day period at the same location.

13. Migratory Birds. 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. Under the MBTA, “take” means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The operator shall prevent use by migratory birds of any pit containing fluids associated with oil or gas operations, including but not limited to reserve pits, produced-water pits, hydraulic fracturing flowback pits, cuttings trenches (if covered by water or other fluid), and evaporation pits. Liquids in these pits may pose a risk to migratory birds (e.g., waterfowl, shorebirds, wading birds, songbirds, and raptors) as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation. Regardless of the method used, it shall be in place within 24 hours following the placement of fluids into a pit. Because of high toxicity to birds, oil slicks and oil sheens shall immediately be skimmed off the surface of any pit that is not netted. The most effective way to eliminate risk to migratory birds is prompt drainage, closure, and reclamation of pits, which is strongly encouraged. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative to the BLM Field Office at 970-876-9051 and visit <http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm>.
14. 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. If a new or improved access road bisects an existing livestock fence, steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.
15. Ips Beetle. To avoid mortality of pinyon pines due to infestations of the *Ips* beetle, any pinyon trees damaged during road, pad, or pipeline construction shall be chipped after being severed from the stump or grubbed from the ground, buried in the toe of fill slopes (if feasible), or cut and removed from the site within 24 hours to a location approved by the Colorado State Forest Service.
16. 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.
17. 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 will be subject to prosecution.

Pursuant to 43 CFR 10.4(g), the BLM shall be notified by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4 (c) and (d), activities shall stop in the vicinity of the discovery, and the discovery shall be protected for 30 days or until notified by the BLM to proceed.

If in connection with operations under this contract, the operator, its contractors, their subcontractors, or the employees of any of them discovers, encounters, or becomes aware of any objects or sites of cultural value or scientific interest such as historic ruins or prehistoric ruins, graves or grave markers, fossils, or artifacts, the operator shall immediately suspend all operations in the vicinity of the cultural resource and shall notify the BLM of the findings (16 USC 470h-3, 36 CFR 800.112). Operations may resume at the discovery site upon receipt of written instructions and authorization by the BLM. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the BLM from a Federal agency insofar as practicable. When not practicable, the operator shall bear the cost of the services of a non-Federal professional.

Within five working days, the BLM will inform the operator as to:

- whether the materials appear eligible for the National Register of Historic Places
- what mitigation measures the holder will likely have to undertake before the site can be used (assuming that *in-situ* preservation is not necessary)
- the timeframe for the BLM to complete an expedited review under 36 CFR 800.11, or any agreements in lieu thereof, to confirm through the SHPO State Historic Preservation Officer that the findings of the BLM are correct and that mitigation is appropriate

The operator may relocate activities to avoid the expense of mitigation and delays associated with this process, as long as the new area has been appropriately cleared of resources and the exposed materials are recorded and stabilized. Otherwise, the operator shall be responsible for mitigation costs. The BLM will provide technical and procedural guidelines for relocation and/or to conduct mitigation. Upon verification from the BLM that the required mitigation has been completed, the operator will be allowed to resume construction.

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).

18. Visual Resources. 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.

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.

Above-ground facilities shall be painted **Shadow Gray** to minimize contrast with adjacent vegetation or rock outcrops.

19. Windrowing of Topsoil. Topsoil shall be windrowed around the pad perimeter to create a berm that limits and redirects stormwater runoff and extends the viability of the topsoil per BLM Topsoil Best Management Practices (BLM 2009 PowerPoint presentation available upon request from Glenwood Springs Field Office). 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.
20. Pits. A minimum of 2 feet of freeboard shall be maintained in pits containing fluids. Freeboard is measured from the highest level of drilling fluids and cuttings in the reserve pit to the lowest surface elevation of ground at the reserve pit perimeter. The design, construction, lining, and leak detection of the flowback pit shall be approved by a qualified engineer licensed in the state of Colorado. An engineer shall confirm the pit is built to the specification in the design package including witnessing the adequate sealing of the seams. The operator must appropriately net the completion/flowback pit, in a timely manner, and maintain the fencing and netting until the pit is closed.
21. Soils. Cuts and fills shall be minimized when working on erosive soils and slopes in excess of 30%. Cut-and-fill slopes shall be stabilized through revegetation practices with an approved seed mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with well-anchored silt fences, straw wattles, or other acceptable BMPs designed to minimize the potential for sediment transport. On slopes greater than 50%, BLM personnel may request a professional geotechnical analysis prior to construction.
22. Requirement for self-contained flare unit. The operator shall use a flare system while drilling which contains fluids and has self-ignition to flare hydrocarbons generated during drilling.
23. Interim Reclamation Related to Multiple Drilling Phases. Within one year of completion of the initial development wells in the first cellarhole configuration or within one year of completion of all development wells on a pad (whichever situation arises), the operator shall stabilize the disturbed area by recontouring, mulching, installing runoff and erosion controls, replacing topsoil as directed, and seeding with a BLM-prescribed native seed mix (or landowner-requested seed mix on privately owned or State-owned surface), and conducting weed control as necessary. In cases where the development drilling is conducted in phases on a single pad with periods of inactivity 1 year or longer in duration, slopes shall be recontoured to the extent necessary to accommodate seeding, and seed mixes required by BLM shall be applied to stabilize the soil between visits per direction of the BLM.
24. Visual Resources. To mitigate impacts to the visual landscape the following requirements shall be incorporated into the construction activities.
 - All woody vegetation (live and dead) shall remain standing at the toe of the fill slope and at the top of the cut slope to provide visual screening.
 - Rocks and woody debris shall be saved during the construction process; care shall be taken to preserve the canopy of the woody material while storing and transporting.

- Facilities shall be located to maximize area for interim reclamation.
- All facilities shall be painted **Shadow Gray**, a color found in the natural vertical elements.

To mitigate impacts to the visual landscape the following requirements shall be incorporated into the Interim Reclamation activities.

- All woody vegetation left standing at the toe of the fill slope and at the top of cut slope shall be protected and remain standing and undamaged when fill material is pulled back to recontour the pad.
- All cut and fill slopes shall have undulating contours which emulate the slopes seen in the adjacent landscape. Constructed slopes shall meet existing grades with a similar slope to eliminate the line created at the edge where two different grades meet.
- Rocks and woody debris saved during the construction process shall be re-placed onto the cut and fill slopes to emulate the color and texture closer to that of the native landscape and to encourage vegetation growth.
- Rocks (white side down) saved during construction shall be re-placed on the pipeline corridor to emulate the texture closer to that of the native landscape and to encourage vegetation growth.
- Placement of rocks and woody debris on the pipeline corridor shall be placed to deter off-road travel, which will prevent additional surface disturbance, expansion of the corridor and visual impacts.

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DOWNHOLE CONDITIONS OF APPROVAL
Applications for Permit to Drill

Company/Operator: Bill Barrett Corporation

Mamm Creek Field

Dixon Federal, Three Pads

Well Pad Surface Locations: Garfield County

SE NW, Section 23, T6S, R92W

SW NW, Section 23, T6S, R92W

NE NW, Section 26, T6S, R92W

See list of wells following the COAs.

1. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within 24 hours *after* spudding, the CRVFO shall be notified. One of the following CRVFO inspectors shall be notified by phone. The contact number for all notifications is: 970-876-9064. The BLM CRVFO inspectors are Julie King, Lead PET; David Giboo, PET; Greg Rios, PET; Alan White, PET; and Tim Barrett, PET.
2. A CRVFO petroleum engineer shall be contacted for a verbal approval prior to commencing remedial work, plugging operations on newly drilled boreholes, changes within the drilling plan, sidetracks, changes or variances to the BOPE, deviating from conditions of approval, and conducting other operations not specified within the APD. Contact, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) for verbal approvals.
3. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) shall be forwarded to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 24 hours of a well control event.
4. The BOPE shall be tested and conform to Onshore Order No. 2 for a **5M** system and recorded in the IADC/Driller's log. A casing head rated to 5,000 psi or greater shall be utilized.
5. An electrical/mechanical mud monitoring equipment shall be function tested prior to drilling out the surface casing shoe. As a minimum, this equipment shall include a trip tank, pit volume totalizer, stroke counter, and flow sensor.
6. Prior to drilling out the surface casing shoe, gas detecting equipment shall be installed in the mud return system. The mud system shall be monitored for hydrocarbon gas/pore pressure changes, rate of penetration, and fluid loss.
7. A gas buster shall be functional and all flare lines effectively anchored in place, prior to drilling out the surface casing shoe. The discharge of the flare lines shall be a minimum of 100 feet from the wellhead and targeted at bends. The panic line shall be a separate line (not open inside the buffer tank) and effectively anchored. All lines shall be downwind of the prevailing wind direction and directed into a flare pit, which cannot be the reserve pit. The flare system shall use an automatic

ignition. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and maintain a continuous flare.

8. After the surface/intermediate casing is cemented, a Pressure Integrity Test/Mud Equivalency Test/FIT shall be performed on the first well drilled in accordance with OOGO No. 2; Sec. III, B.1.i. to ensure that the surface/intermediate casing is set in a competent formation. This is not a Leak-off Test, but a formation competency test, insuring the formation at the shoe is tested to the highest anticipated mud weight equivalent necessary to control the formation pressure to the next casing shoe depth or TD. Submit the results from the test via email (bhartman@blm.gov) on the first well drilled on the pad or any horizontal well and record results in the IADC log. Report failed test to Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell). A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.
9. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format shall be submitted to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 48 hours. If the TOC is lower than required or the cement sheath of poor quality, a CRVFO petroleum engineer shall be notified for remedial operations within 48 hours from running the CBL and prior to commencing fracturing operations,

A greater volume of cement may be required to meet the 200-foot cement coverage requirement for the Williams Fork Formation /Mesaverde Group. Evaluate the top of cement on the first cement job on the pad (Temperature Log). If cement is below 200-foot cement coverage requirement, adjust cement volume to compensate for low TOC/cement coverage.
10. On the first well drilled on this pad, a triple combo open-hole log shall be run from the base of the surface borehole to surface and from TD to bottom of surface casing shoe. This log shall be in submitted within 48 hours in .las and .pdf format to: CRVFO – Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Contact Todd Sieber at 970-876-9000 or asieber@blm.gov for clarification.
11. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller’s event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CFR 3160-9 (a).
12. Prior to commencing fracturing operations, the production casing shall be tested to the maximum anticipated surface treating/fracture pressure and held for 15 minutes without a 2% leak-off. If leak-off is found, Bob Hartman shall be notified within 24 hours of the failed test, but prior to proceeding with fracturing operations. The test shall be charted and set to a time increment as to take up no less than a quarter of the chart per test. The chart shall be submitted with the well completion report.
13. During hydraulic frac operations, monitor the bradenhead/casing head pressures throughout the frac job. Frac operations shall be terminated upon any sharp rise in annular pressure (+/- 40 psi or greater) in order to determine well/wellbore integrity. Notify BLM Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) immediately.
14. Per 43 CFR 3162.4-1(c), not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in a case of a well which has been off production for more than 90 days, the operator shall notify the authorized officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed.

Table A-1. List of Wells – Three Dixon Mamm Creek Pads			
<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottomhole Locations</i>
NENW-26-292 (Federal Surface)	21A-26-692	T6S R92W, Section 26 NENW	T6S R92W, Section 26 NENW
	21B-26-692	T6S R92W, Section 26 NENW	T6S R92W, Section 26 NENW
	21C-26-692	T6S R92W, Section 26 NENW	T6S R92W, Section 26 NENW
	21D-26-692	T6S R92W, Section 26 NENW	T6S R92W, Section 26 NENW
SWNW-23-292 (Fee Surface)	11A-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	11B-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	11C-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	11D-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	12A-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	12B-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	12C-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	12D-23-692	T6S R92W Section 23 SWNW	T6S R92W, Section 23 SWNW
	41A-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 NENE
	41B-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 NENE
	41C-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 NENE
	41D-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 NENE
	42A-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 SENE
	42B-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 SENE
	42C-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 SENE
	42D-22-692	T6S R92W Section 23 SWNW	T6S R92W, Section 22 SENE
SENW-23-292 (Fee Surface)	22A-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SENW
	22B-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SENW
	22C-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SENW
	22D-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SENW
	32A-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SWNE
	32B-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SWNE
	32C-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SWNE
	32D-23-692	T6S R92W Section 23 SENW	T6S R92W, Section 22 SWNE

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FONSI

DOI-BLM-CO-N040-2011-0117-EA

The Environmental Assessment (EA) analyzing the environmental effects of the Proposed Action has been reviewed. The project design and approved mitigation measures result in a Finding of No Significant Impact (FONSI) on the human environment. Therefore, an Environmental Impact Statement (EIS) is not necessary to further analyze the environmental effects of the Proposed Action.

DECISION RECORD

DECISION: It is my decision to approve the Proposed Action as described and analyzed in this EA. This decision will provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on a valid Federal oil and gas lease.

RATIONALE: The bases for this decision are as follows:

1. This decision will provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on Federal oil and gas leases.
2. Approval of the Proposed Action validates the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.
3. Environmental impacts will be avoided or minimized through protective lease stipulations and by the best management practices and mitigation measures included in the Proposed Action or otherwise applied and enforced by BLM as Conditions of Approval (COAs).
4. This decision does not authorize the initiation of surface-disturbing activities on BLM lands or the development of new Federal oil and gas wells on new or existing well pads. Surface-disturbing activities on BLM lands and development of Federal wells will not commence until approval by BLM of Applications for Permits to Drill (APDs) or issuance by BLM of right-of-way grants in conjunction with this EA.

MITIGATION MEASURES: Mitigation measures presented in Appendix A of the EA will be incorporated as COAs for both surface and drilling operations and attached to APD for the Federal wells drilled on the proposed well pads.

NAME OF PREPARER: Vanessa Bull, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



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

DATE: 11/9/11