

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-N040-2013-0116-EA

### CASEFILE NUMBER

Bottomholes for Federal wells are located within Federal Lease COC52889, COC69615, and COC69616.

### PROJECT NAME

Proposal to Construct the C26W Pad and Drill up to 15 Federal Wells and 2 Fee wells from the C26W well pad located on BLM land in the Gant Gulch area, Garfield County, Colorado.

### PAD LOCATIONS

Township 7 South (T7S), Range 93 West (R93W), Section 26, Sixth Principal Meridian

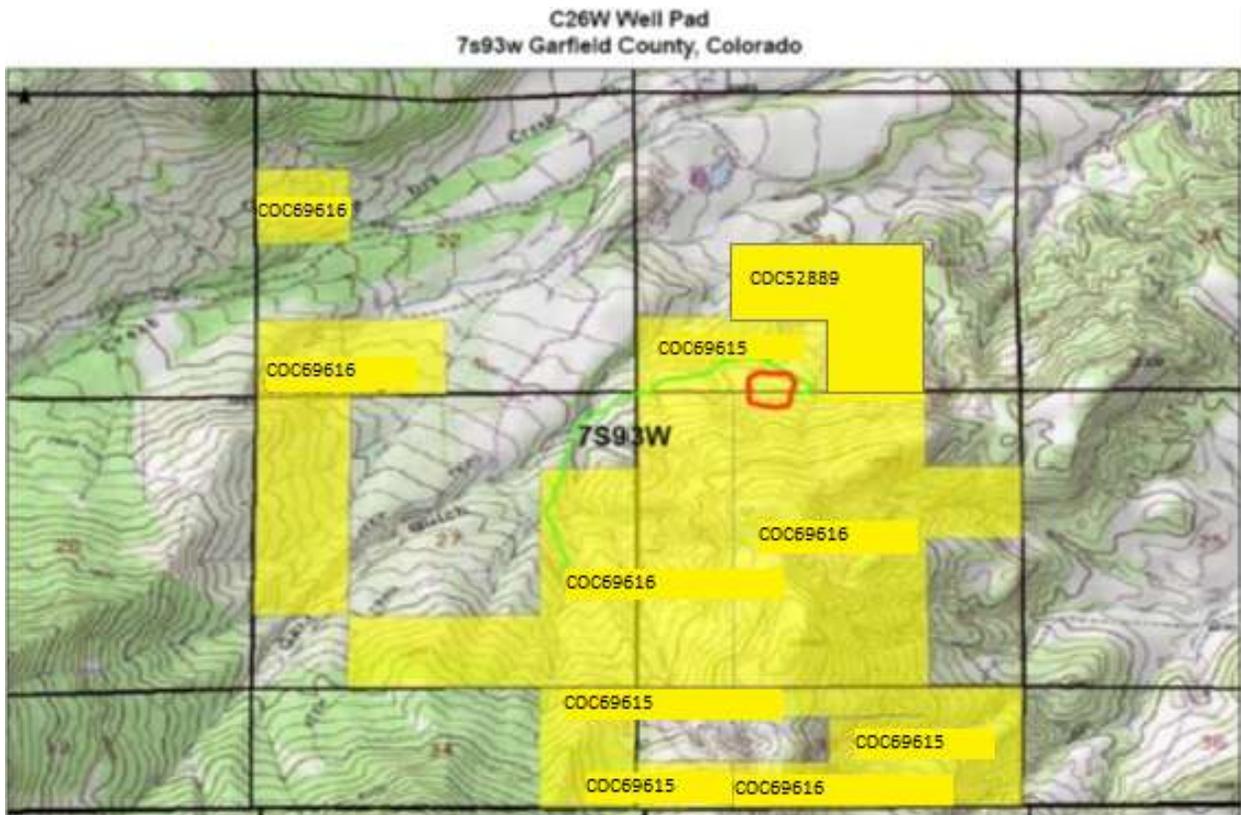
### APPLICANT

Encana Oil and Gas (USA) Inc. Contact: Alexis Bidgood, 370 Seventeenth Street, Suite 1700, Denver, CO 80202.

### PROPOSED ACTION

Encana Oil and Gas (USA) Inc. (Encana) proposes to drill and develop up to 17 oil and gas wells, including 15 Federal wells, from the proposed C26W pad, located in Gant Gulch, Garfield County, Colorado (Figure 1). The C26W pad would be located on Bureau of Land Management (BLM) land. Encana would drill the Federal wells into Federal leases COC52889, COC69615, and COC69616 (Figure 2). The C26W pad (originally called the N23W) was included in the *Gant Gulch Geographic Area Plan (GGGAP)*, approved on October 17, 2005 (CO140-2005-134-EA). The N23W well pad was deferred due to the potential impacts to visual resources. The propose pad location was changed to its currently proposed position and renamed the C26W to mitigate impacts to visual resources. The Proposed Action would disturb 21.4 acres, with 5.2 acres of disturbance remaining for the life of the wells (Table 1).

<b>Table 1. Initial and Long-term Disturbance of C26W Pad</b>		
<i>Component</i>	<i>Initial Disturbance</i>	<i>Long-term Disturbance</i>
Pad	7.58 acres	1.70 acres
Access Road	4.82 acres	3.53 acres
Pipeline	9.03 acres	0 acres
<b>Total (rounded to 0.1)</b>	<b>21.4 acres</b>	<b>5.2 acres</b>



**Figure 1. Location Map showing Pad Location (Red Outline) and Federal Leases.**

Names and locations of the well(s) are presented in Table 2. Encana plans to construct the pads and drill the wells in May 2014. Initial pad size would be 7.58 acres (Figure 3), and would be reclaimed down to 1.7 acres after drilling and completion of the wells (Figure 4).

Approximately 1.3 miles feet of new access road would be constructed. The initial disturbance width of the road would be approximately 30 feet, and would be maintained as an 18-22 foot running surface following completion of construction. The pipeline would be fully reclaimed upon completion, so there would be no long-term disturbance.

Cuttings generated during drilling would be deposited in a steel cuttings bin (approximately 45 feet by 12 feet by 10 feet) and a cuttings pile. Cuttings would be solidified with sawdust and would be moved from the steel cuttings bin to the cuttings area located on the cut slope of the pad. The cuttings would be managed per COGCC regulations. During interim reclamation, the cuttings would be buried on location in the cut slope and capped with a minimum of 3 feet of native material.

Approximately 1.4 miles of buried 8-inch-diameter steel, welded, buried natural gas gathering pipeline would be constructed to serve the proposed C26W pad. The width of the pipeline corridor would be 75 feet during construction and reduced to a permanent width of 30 feet. The gas gathering pipeline would be constructed, operated, and maintained by Grand River Gathering LLC.

Water used for drilling the proposed wells would be delivered to the pad by truck using the proposed access roads. The source of water for drilling and completion would be from Encana's water rights in the Colorado River. For completion, Encana would use a proposed temporary flexsteel surface waterline that

would run approximately 0.75 mile from the C26W pad along the proposed access road, and then another 1.1 miles to tie in with an existing water system located at the J25W pad, in NWSE Section 25, Township 7 South Range 93 West. Encana would frac from the J25W pit and flowback to tanks on the J25W pad. The water would be pumped through existing waterlines to the Hunter Mesa Water Treatment Facility. The temporary waterline would be located on BLM and Fee surface.

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.

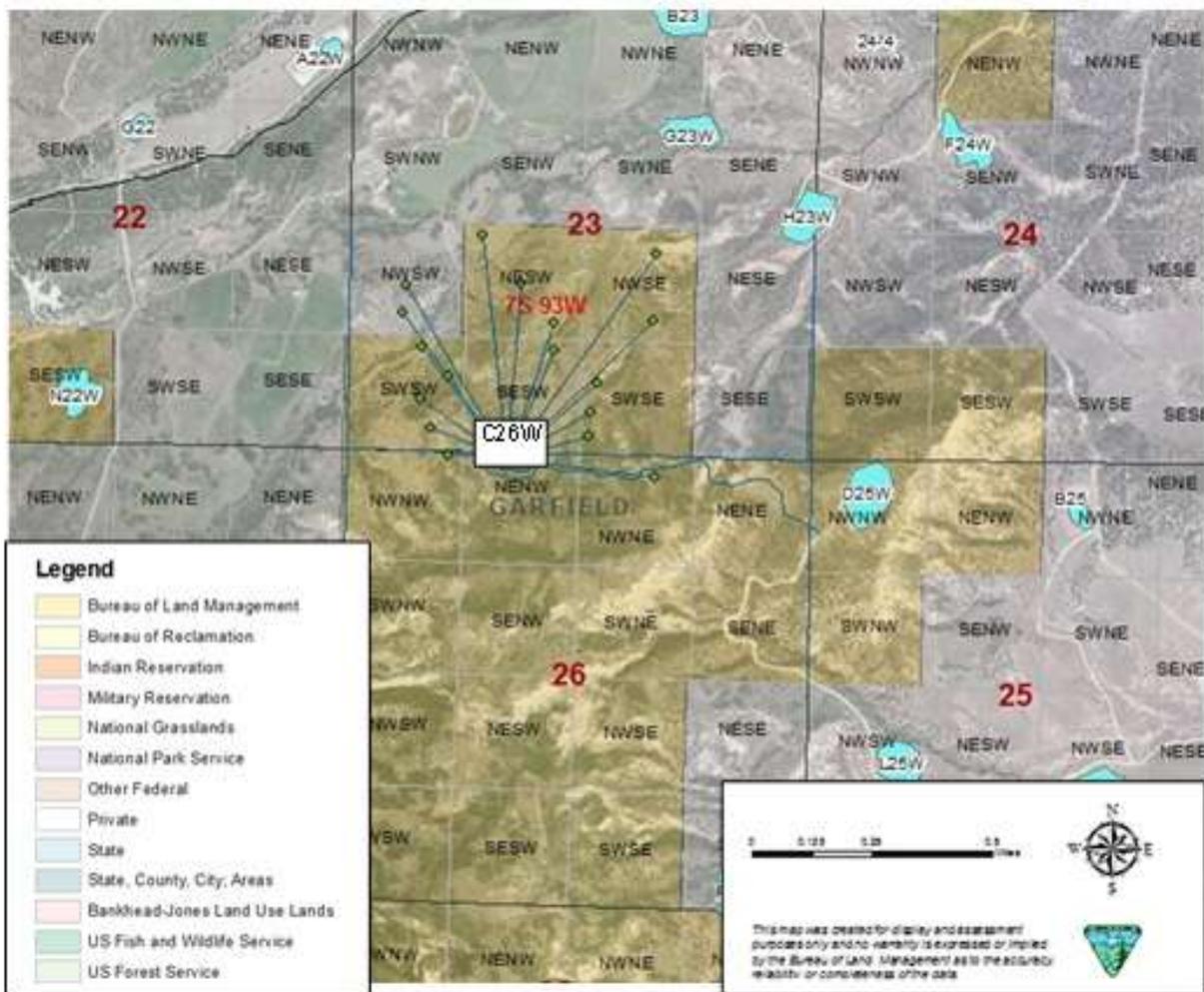


Figure 2. Location Map showing Proposed C26W Pad and Well Downhole Targets.

<b>Table 2. Surface and Bottomhole Locations of Proposed Federal Wells on C26W Well Pad</b>		
<b><i>Proposed Wells</i></b>	<b><i>Surface Locations</i></b>	<b><i>Bottomhole Locations</i></b>
HMU Federal 23-10A	T7S R93W, Section 26 NENW 53 FNL, 1824 FWL	T7S R93W, Section 23 NWSE 2280 FSL, 1773 FEL
HMU Federal 23-10D	T7S R93W, Section 26 NENW 54 FNL, 1841 FWL	T7S R93W, Section 23 NWSE 1527 FSL, 1791 FEL
HMU Federal 23-11B	T7S R93W, Section 26 NENW 50 FNL, 1791 FWL	T7S R93W, Section 23 NESW 2445 FSL, 1488 FWL
HMU Federal 23-11C	T7S R93W, Section 26 NENW 51 FNL, 1808 FWL	T7S R93W, Section 23 NESW 1907 FSL, 1929 FWL
HMU Federal 23-11D	T7S R93W, Section 26 NENW 60 FNL, 1815 FWL	T7S R93W, Section 23 NESW 1483 FSL, 2297 FWL
HMU Federal 23-15B	T7S R93W, Section 26 NENW 56 FNL, 1857 FWL	T7S R93W, Section 23 SWSE 804 FSL, 2421 FEL
HMU Federal 23-15C	T7S R93W, Section 26 NENW 65 FNL, 1864 FWL	T7S R93W, Section 23 SWSE 479 FSL, 2490 FEL
HMU Federal 23-15CC	T7S R93W, Section 26 NENW 63 FNL, 1848 FWL	T7S R93W, Section 23 SWSE 209 FSL, 2498 FEL
MCU Federal 23-13A	T7S R93W, Section 26 NENW 47 FNL, 1758 FWL	T7S R93W, Section 23 SWSW 1168 FSL, 833 FWL
MCU Federal 23-13AA	T7S R93W, Section 26 NENW 57 FNL, 1782 FWL	T7S R93W, Section 23 SWSW 847 FSL, 1116 FWL
MCU Federal 23-13D	T7S R93W, Section 26 NENW 45 FNL, 1742 FWL	T7S R93W, Section 23 SWSW 577 FSL, 811 FWL
MCU Federal 23-13DD	T7S R93W, Section 26 NENW 54 FNL, 1749 FWL	T7S R93W, Section 23 SWSW 250 FSL, 938 FWL
MCU Federal 23-14A	T7S R93W, Section 26 NENW 62 FNL, 1831 FWL	T7S R93W, Section 23 SESW 1162 FSL, 2299 FWL
MCU Federal 26-2B	T7S R93W, Section 26 NENW 57 FNL, 1873 FWL	T7S R93W, Section 26 NWNE 246 FNL, 1746 FEL
MCU Federal 26-4A	T7S R93W, Section 26 NENW 56 FNL, 1766 FWL	T7S R93W, Section 26 NWNW 48 FNL, 1132 FWL

**NO ACTION ALTERNATIVE**

The Proposed Action involves the drilling of 15 Federal wells from BLM surface into the subsurface minerals encumbered with Federal oil and gas leases COC52889, COC69615, and COC69516. Although the 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, the proposed Federal wells would not be approved. The two Fee wells would likely still be drilled.

**PURPOSE AND NEED FOR THE ACTION**

The purpose of the action is to develop oil and gas resources on Federal leases COC52889, COC69615 and COC69616 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.

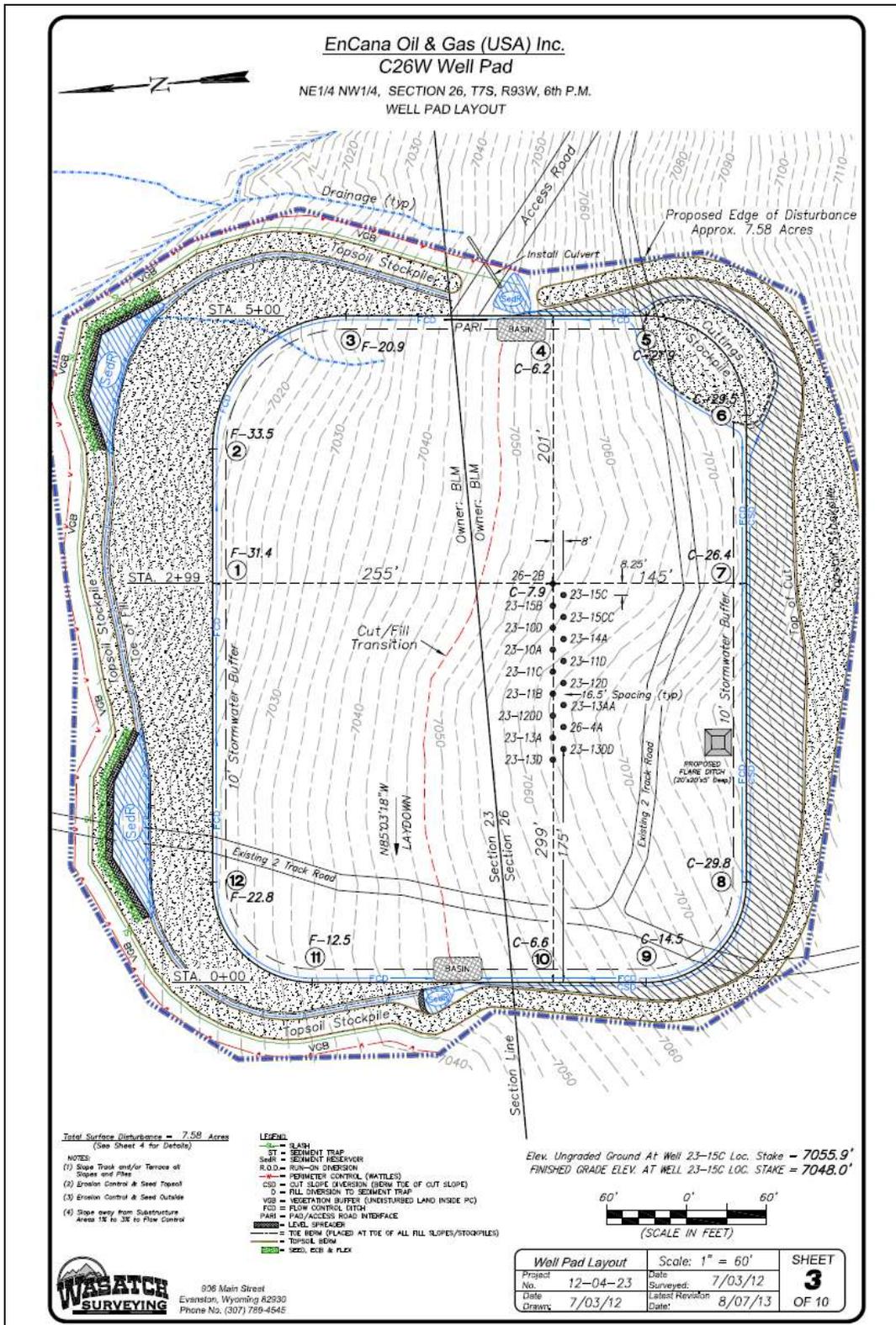


Figure 3. Pad Construction Layout.

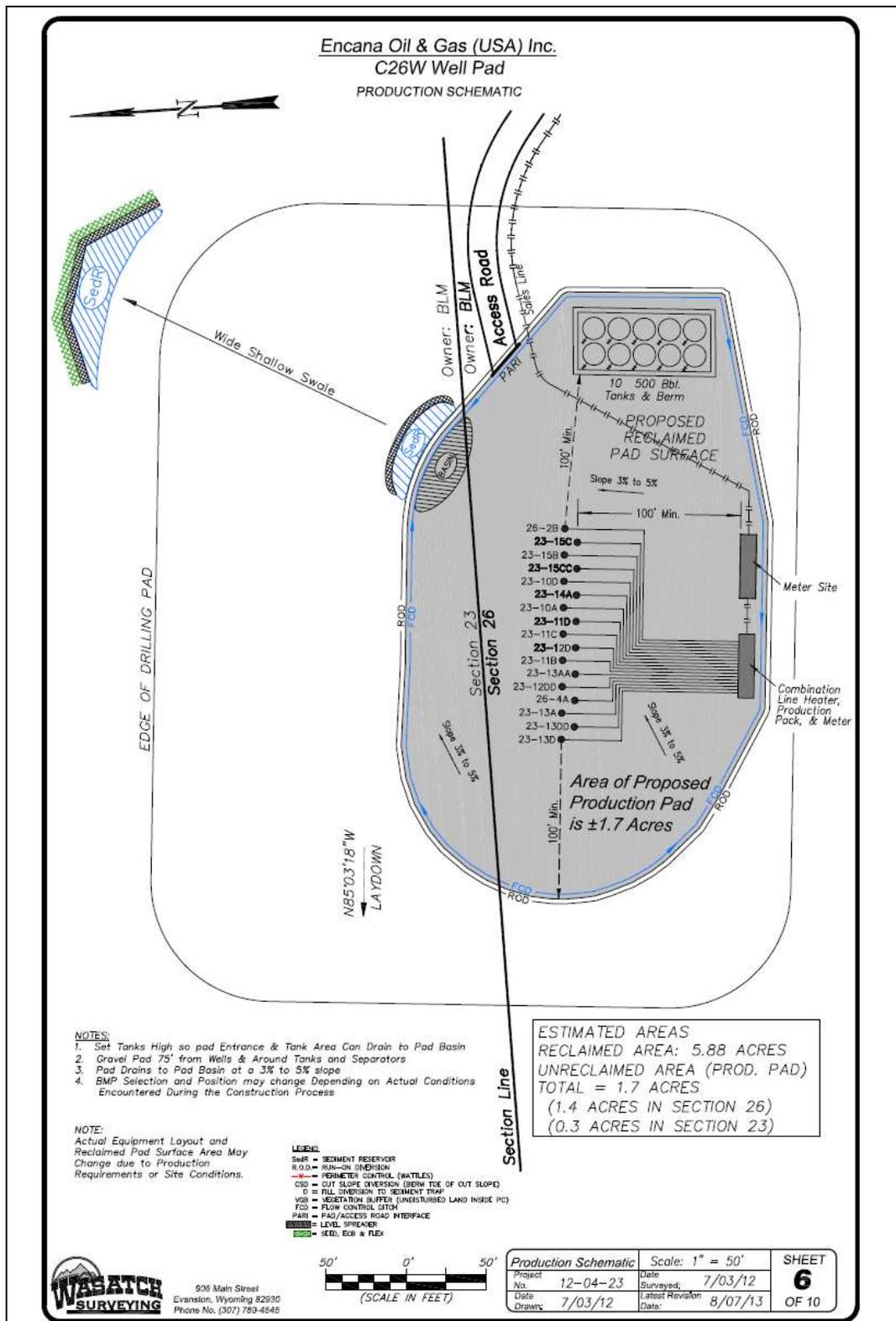


Figure 4. Interim Reclamation Layout.

**SUMMARY OF LEASE STIPULATIONS**

Lease stipulations associated with Federal leases COC52889, COC69615 and COC69616 are summarized in Table 3. In addition, site-specific COAs developed during the APD/Environmental Assessment (EA) review and onsite field consultation would apply to all pads and would be attached to the Federal APDs (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 Record of Decision 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 was designated as open to oil and gas leasing and development, and Federal lease COC51156 was duly leased pursuant to the 1999 RMP amendment. Furthermore, the Proposed Action is associated with and would occur within the boundaries of the *Gant Gulch GAP* (CO140-2005-134-EA). The Proposed Action is therefore in conformance with the current land use plan, as amended.

<b>Table 3. Summary of Applicable Lease Stipulations for the C26W Pad.</b>		
<i>Lease Number</i>	<i>Relevant Lease Stipulations</i>	<i>Lands Where Applicable</i>
<b>COC52889</b>	None	
<b>COC69615</b>		
<b>COC69616</b>	<b>Timing Limitation (TL)</b> – December 1 through April 30 to protect big game winter range.	<b>Sec. 26 N½, NW/SE</b>
	<b>Controlled Surface Use (CSU)</b> – To protect fragile soils.  <b>Controlled Surface Use (CSU)</b> – To protect scenic values of Class II Visual Resource Management Areas.	<b>All lands within the lease:</b>

## **AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

During its internal scoping process for this 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	Soils
Air Quality	Special Status Plant Species
Cultural Resources	Special Status Animal Species
Fossil Resources	Vegetation
Geology and Minerals	Visual Resources
Invasive Non-Native Plants	Wastes - Hazardous and Solid
Native American Religious Concerns	Water Quality - Surface and Ground, and Waters of the U.S.
Noise	Wildlife - Aquatic, Migratory Birds, and Other Terrestrial
Realty Authorizations	
Socioeconomics	

### **Access and Transportation**

#### **Affected Environment**

The project area would be located approximately 15 miles southeast of Rifle, Garfield County, Colorado. The primary light vehicle and heavy haul access route is as follows: From the town of Rifle, proceed east approximately 2 miles to the intersection with West Mamm Creek Road, County Road (CR) 319, then travel on West Mamm Creek Road approximately 8 miles to an intersection with an existing access road on the left. Turn left and proceed in a southerly and then northeasterly direction approximately 1.6 miles to the beginning of the proposed access road to the C26W pad on the left.

Approximately 1.3 miles of new access road would be required to reach the C26W pad. The initial disturbance width of the road would be approximately 30 feet, and would be maintained as an 18-22 foot running surface following completion of construction.

Maintenance and reclamation would conform to guidelines established in the BLM Gold Book (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 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 the Federal wells. The largest increase in truck use would be during rig-up, drilling, and completion activities. Approximately 1,160 truck trips over a 30-day period would be required to support the drilling and completion of each well (Table 4). 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.

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.

<b>Table 4. Traffic Associated with Drilling and Completion Activities</b>		
<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.

*No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to access and transportation. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

**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 (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter less than 10 microns (µ) in diameter (PM<sub>10</sub>), and particulate matter less than 2.5 µ in diameter (PM<sub>2.5</sub>).

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. Regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. The Garfield County Quarterly Monitoring Report summarizing data collected at monitoring sites in Parachute, Silt, Battlement Mesa, and Rifle in January through June 2012 (the most recent posting) confirms continuing attainment of the CAAQS and NAAQS (Garfield County 2012). Federal air quality regulations are enforced by the Colorado Department of Public Health and Environment (CDPHE).

Federal air quality regulations adopted and enforced by CDPHE through the Clean Air Act (CAA) Prevention of Significant Deterioration (PSD) Program limit incremental emissions increases of air pollutants from certain sources to specific levels defined by the classification of air quality in an area. 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, as is Dinosaur National Monument, located approximately 180 miles to the northwest. 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 Park (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east).

### Environmental Consequences

#### *Proposed Action*

The CDPHE, under its delegated authority from the U.S. Environmental Protection Agency (EPA) and in conformance with Colorado’s State Implementation Plan, is the agency with primary responsibility for air quality regulation and enforcement in connection with industrial developments and other air pollution sources in Colorado. Unlike the conceptual “reasonable but conservative” engineering designs used in NEPA analyses, CDPHE air quality preconstruction permitting is based on site-specific, detailed engineering values, which are assessed in CDPHE’s review of the permit application.

The Proposed Action includes building the C26W pad, access road, and pipeline on BLM and Fee surface and constructing, drilling, completing, and operating 15 new Federal wells. In addition, the total disturbance from construction of the pads and associated infrastructure would be approximately 21.4 acres, which would be reduced to 5.2 acres upon interim reclamation. Each well would require approximately 7 to 10 days to drill and 5 to 15 days to complete. Air quality in the project area 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 (PM<sub>10</sub> and PM<sub>2.5</sub>) with earthwork and construction equipment. Once construction activities are complete, air quality impacts associated with construction would cease, and impacts would transition to emissions associated with transportation of drilling and completion equipment. Fugitive dust and vehicle emissions from mobilization of equipment necessary for the drilling and completions phase and rigging up the drill rig would occur during the transitions between construction, drilling and completions phases. During drilling and completions work, air quality impacts would be caused by emissions from generators and engines to run equipment, onsite and offsite vehicle traffic, and escaped and flared gasses during drilling and flowback phases. Following the completion of these phases, emissions would 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 activity within the Colorado River Valley Field Office (CRVFO) was recently completed for the BLM by Tetra Tech, Inc. and its subcontractor, URS Corporation. The model addressed cumulative impacts of incremental oil and gas development in the modeling domain by assuming a range of BLM wells and associated infrastructure and mitigation scenarios. A total of 2,664 wells were modeled in the “no action” scenario, in which no additional mitigation above meeting CDPHE and EPA regulations and emissions standards was modeled. Within the range of alternatives, a total of 4,198 new BLM wells and associated facilities and infrastructure were modeled, including requiring air quality mitigation measures in addition to CDPHE and EPA regulations and emissions standards. In all scenarios analyzed in the Air Resources Technical Support Document (ARTSD), the air analysis shows impacts to air quality from proposed levels of Federal minerals development are estimated to be below applicable NAAQS, CAAQS, PSD increments, and visibility and deposition thresholds. In addition, cumulative impacts of all oil and gas development in conjunction with other major emissions sources were evaluated by assuming 15,664 future wells and a

cumulative total of over 44,000 Federal and non-Federal wells within the modeling domain over the next 20 years. The methods and results of the modeling are presented in the ARTSD (BLM 2011).

The air quality model addressed impacts associated with emissions of “criteria pollutants” (CO, NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>), hazardous air pollutants including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane, and greenhouse gases (GHGs). 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 either integrated into Encana’s project design or to be applied by the BLM as COAs (Appendix A). These include use of directional drilling to reduce the number of 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 also be reduced by BLM’s requirement that the operator 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). In addition, construction activities for the pad, access road, and pipelines would occur between the hours of 7:00 a.m. and 6:00 p.m. each day, which is generally a more favorable period for atmospheric dispersion due to warmer temperatures and less stable air. Fugitive dust emissions from vehicular traffic during drilling and completion would be further reduced if, as planned under the Proposed Action, these activities are allowed to occur during the winter season, when roads are frozen, snow-covered, or wet.

Emissions of volatile organic compounds (VOCs) such as the BTEX constituents of condensate vary depending on the characteristics of the condensate, the volume produced, and tank operations. Operators are required to control emissions of VOCs from condensate tanks under CDPHE Regulation 7. If deemed necessary by the State, the operator 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 (man-made) 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 of the modeled development scenarios, annual GHG emissions from Federal wells in the CRVFO would no more than 0.5% of the Colorado emissions from oil and gas projects in 2011 and 0.009% of total U.S. emissions (CCS 2007, USEPA 2013).

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*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to air quality. However, the two Fee wells would likely still be drilled and oil and gas activity would continue at adjacent locations on BLM and Fee land.

### **Cultural Resources**

#### **Affected Environment**

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects their actions would have on cultural resources. As a general policy, an agency must consider effects to cultural resources for any undertaking that involves Federal monies, Federal permitting/authorization, or Federal lands.

Four Class III (intensive pedestrian survey) cultural resource inventories (CRVFO# 5405-19, 15413-3, 5413-7 and 5413-14) were conducted within the proposed project area for adjacent pads, access roads and/or pipelines. Two of the four inventories (5413-7 and 5413-14) were conducted by Metcalf Archaeological Consultants specifically for this project, and included a 40-acre block inventory centered on the proposed pad, and approximately 15 acres of linear inventory for the proposed access road. A later reroute of the proposed access road added an additional 21 acres to the overall inventory.

Cultural inventories and pre-field file searches of the Colorado State Historic Preservation Officer (SHPO) database and BLM CRVFO cultural records identified two isolated finds within the project area and 11 cultural resources within a 1-mile search perimeter of the project area. Therefore, no historic properties are located in the immediate project Area of Potential Effect (APE). Sites eligible or potentially eligible for the National Register of Historic Places (NRHP) are referred to in Section 106 of the National Historic Preservation Act as “historic properties.”

## Environmental Consequences

### *Proposed Action*

No cultural resources within the Project Area were identified as eligible or potentially eligible for the NRHP. 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/SHPO Programmatic Agreement and Colorado Protocol]. 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.

Although unlikely, indirect, long-term cumulative damage 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, illegal collection and excavation.

A standard Education/Discovery COA for cultural resource protection would be attached to the EA. The importance of this COA would 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.

### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to cultural resources in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

## Fossil Resources

### Affected Environment

The predominant bedrock formations present at or near the surface within the project area are the Wasatch Formation (including the Fort Union Formation or equivalent at its base) and the Green River Formation. Both formations are overlain by areas of Quaternary gravels and earthflow deposits. Occurring in varying thicknesses, these Quaternary sediments are considered Potential Fossil Yield Classification Class 2, defined as having a low probability of fossil occurrence. Class 2 geologic units are not likely to contain vertebrate or scientifically significant invertebrate fossils.

Both the Wasatch and Green River Formations are considered BLM Condition 4 formations, 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; while the Eocene aged Green River Formation is divided into the Parachute Creek, Garden Gulch, Douglas Arch, Cow Ridge, and Anvil Points 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).

The Green River Formation consists of fine-grained lacustrine (lake-bed) or fluvial-lacustrine (streambed and lake-bed) sediments in the Eocene-age Lake Uinta. The lake expanded early in its history, during the Long Point transgression (Johnson 1989), to cover much of the Piceance and Uinta Basins. The Green River Formation has yielded hundreds of invertebrate and plant fossils and more than 60 vertebrate taxa have been described from the formation, including crocodiles, boa constrictors, and birds.

### Environmental Consequences

#### *Proposed Action*

Although mapped as the predominant surface formation of the project area, field inspection revealed the Wasatch exposed only in a few outcrops found on cliff faces and landslide exposures. 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 and Green Formations. The greatest potential for impacts is associated with excavation of shallow bedrock that may be unearthed during 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 there are no known fossil discovery sites within a 1-mile radius of the project area. Areas covered with vegetation and soil cover do not usually yield fossil resources, but inspections would be conducted for proposed facilities that are located on or within 200 feet of Wasatch or Green River Formation bedrock exposures. In the event paleontological resources are encountered, Best Management Practices (BMPs) related to the standard paleontological COA would be recommended (Appendix A).

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to fossil resources in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

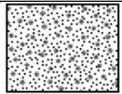
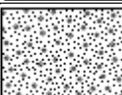
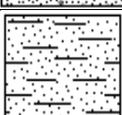
### Geology and Minerals

#### Affected Environment

The project 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). Table 5 lists the geologic formations within the project area.

The predominant bedrock exposures within the proposed development area are the Tertiary Green River and Uinta Formation. The formations are composed of alternating layers of fine grained sandstones and laminated to massive marlstone. The formations overlie the Wasatch Formation, which 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 feet 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.

<b>Table 5. Geologic Formations within the C26W Project Area</b>					
<i>Map Symbol</i>	<i>Lithology Pattern</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>Location</i>
Qc		Colluvium	Holocene	Poorly sorted sand, silt, pebbles, cobbles, and boulders	Slopes and fans
Qls		Landslide deposits	Holocene	Fragmented rock debris	North facing slopes
Qes		Colluvium and Sheet wash	Pleistocene	Pebble, cobble, and gravel in a poorly sorted matrix	Slopes and fans and valley floors.
Tw		Wasatch Formation	Eocene	Variegated light-brown to lavender lenticular medium-grained sandstone	Forms cliffs and outcrops

Source: Madole 1999

The Iles Formation of the Mesaverde Group is the target zone of the proposed drilling program. Comprised of the Williams Fork and Iles Formations, sediments of the Mesaverde Group are marine sandstones 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 and regressive sedimentary sequences of nearshore and offshore sediments that define the Mesaverde Group.

Production is derived from three reservoir intervals, which include the Wasatch, Williams Fork, and Iles Formations. The latter two make up the Upper Cretaceous Mesaverde Group. 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). The upper portions of the Williams Fork include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork Formation includes delta front, distributary channel, strandplain, 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. The reservoir rocks are the fine to medium-grained Williams Fork sandstones, varying in thickness from less than 10 feet to more than 50 feet (Spencer and Wilson 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the gas is both stratigraphic and diagenetic.

No commercial deposits of coal, oil shale, uranium, precious metals, limestone, sand and gravel, gypsum, or other leasable, locatable, or salable minerals are believed to occur within or beneath the project area.

### Environmental Consequences

#### *Proposed Action*

If the proposed wells are proven feasible, initial production rates would be expected to be highest during the first few years of production, then decline during the remainder of the economic lives of the wells. 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 would be utilized to create fractures within the formation to allow gas production from the wells. In recent years, public concern has been voiced regard potential impacts of hydraulic fracturing from “micro-earthquakes” and from contamination of freshwater aquifers. Potential impacts of hydraulic fracturing are addressed in the section on Water Quality-Ground.

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to geology and minerals in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

### **Invasive Non-Native Plants**

#### Affected Environment

Colorado’s list of noxious weeds is designated by the Colorado Department of Agriculture, and management of these weeds is regulated under the Colorado Noxious Weed Act, Title 35, Article 5.5. State listed noxious weeds are differentiated into List A species, designated for eradication, List B species, designated for containment to stop continued spread, and List C species, which are too widespread for containment, but whose negative impacts may be reduced by improved integrated weed management.

The project area is located in the headwaters of Mamm Creek near Gant Gulch, approximately 8 miles south of Rifle, Colorado, at elevations ranging from 6,940 to 7,200 feet. The proposed access road and pad would be located in habitats ranging from Gambel oak and mountain shrublands to sagebrush shrublands and pinyon-juniper woodlands. Most of the vegetation is dominated by native plant species, but a few noxious weeds and other non-native invasive species are scattered across the area.

Three noxious weed species were found in the project area during botany surveys in June and September 2013. Houndstongue (*Cynoglossum officinale*), a State List B noxious weed, occurs in scattered patches throughout the project area. Dalmatian toadflax (*Linaria dalmatica*), another State List B species, is present in a single small patch just north of the pad site. One State List C noxious weed, cheatgrass

(*Bromus tectorum*) is scattered throughout the project area. Several other non-native plant species with the potential to be invasive or interfere with establishment of native species are present on the site. These include alfalfa (*Medicago sativa*), kochia (*Bassia scoparia*), prostrate knotweed (*Polygonum aviculare*), red clover (*Trifolium repens*), Russian thistle (*Salsola tragus*), yellow sweetclover (*Melilotus officinale*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), Kentucky bluegrass (*Poa pratensis*), orchardgrass (*Dactylis glomerata*), and smooth brome (*Bromus inermis*).

## Environmental Consequences

### *Proposed Action*

Under the Proposed Action, a total of 21.4 acres would be disturbed. Following interim reclamation, 16.2 acres would be reclaimed and 5.2 acres would remain as long-term disturbance. Most of this disturbance area would occur on BLM land, but a short section of the access road and pipeline would cross privately owned land.

Surface-disturbing activities, such as those associated with this project, provide a niche for invasion and establishment of non-native plant species particularly when these species are already present in the surrounding area. The mechanisms for this invasion and establishment are multi-fold. Removal of native vegetation removes the competition from native plants for resources, including water and soil nutrients, opening up niches for invasive species (Parendes and Jones 2000). Linear disturbances, such as roads, provide corridors of connected habitat along which invasive plants can easily spread (Gelbard and Belnap 2003). Pad construction and subsequent well drilling and operations activities require construction equipment and motorized vehicles which often transport invasive plant seeds either alone or in mud clods on the vehicle undercarriage or tires and deposit them in disturbed habitats along access roads and at pad sites (Schmidt 1989, Zwaenepoel et. al. 2006).

Noxious weeds and other invasive species are well-adapted to colonize and dominate in disturbed ground. They generally do not require well-developed soils, can out-compete native species for resources, produce prodigious quantities of seeds, and have seeds which can survive for many years or even decades within the soil. When weeds establish on a site, they can also significantly alter the composition of the soil microbial community of bacteria and fungi, making it increasingly difficult over time for native species to reestablish on the site (Hierro et. al. 2006, Reinhart and Callaway 2006, Vinton and Goergen 2006, Vogelsang and Bever 2009). Due to the quantity and longevity of weed seeds and the effects of weeds on the soil, once invasive species have been established, they can be extremely difficult to eliminate.

Due to the current low-density presence of noxious weeds and other non-native invasive species within the project area, the potential for noxious weeds and other nonnative invasive species is moderate. Movement of soil by construction equipment could spread weed seeds throughout the project area. Vehicles and equipment could also transport new noxious weed species to the site, where they would have disturbed habitats in which to establish.

To mitigate the invasive species risk, the standard weed control COA would be attached to APDs to require periodic monitoring and weed control practices to ensure that noxious weeds are controlled (Appendix A). Establishment of desirable plant species is also crucial in preventing invasive non-native plant species establishment and spread. Therefore, the standard reclamation COAs would also be attached to APDs to require reclamation seeding and monitoring of seeding results (Appendix A). Most of the project would occur on BLM land, where a native seed mixes appropriate for the existing habitat types would be required. Along the portion of access road and pipeline crossing private land, the species composition of the reclamation seed mix would be at the discretion of the landowner.

### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to invasive non-native plants in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

## **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. Four Class III cultural resource inventories (see section on Cultural Resources) have been conducted in the Proposed Action's area of potential effect 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 were identified during the inventories. The Ute Tribe of the Uintah and Ouray Bands, one of the primary Native American tribes 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 for the current project.

If new data regarding cultural resources are identified or 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 NHPA requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer (AO) 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 AO, 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. Encana would 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 Education/Discovery COA for protection of Native American values would be attached to the APDs (Appendix A). The importance of these COAs would be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered. The proponent and contractors would also be made aware of requirements under the NAGPRA.

### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to Native American religious concerns in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land. The No Action Alternative would likely reduce, but not eliminate, the potential for accidental damage, vandalism, illegal collection and excavation on public lands.

## **Noise**

### Affected Environment

The project area would be located approximately 15 miles southeast of Rifle, Garfield County, Colorado. The primary vehicle access is County Road (CR) 315. The Proposed Action involves constructing the C26W pad, to drill and complete 15 new Federal wells, construct a new access road to serve the proposed pad, and install a gas gathering line to serve the proposed C26W pad. The Proposed Action would lie within a rural setting characterized by oil and gas development activities. Noise levels in the area are presently created by CR315 and traffic serving existing wells and ongoing drilling and completion activities. The proposed drilling activities would be located more than a mile away from the nearest residence.

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 on 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 (USEPA 1974, Harris 1991). As a basis for comparison, the noise level would be 60 dBA during a normal conversation between two people standing five feet apart.

### 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 6) at a distance of 350 feet.

Given the remote locations of the proposed project activities, with no reasonably close occupied structure or designated recreational area, the light industrial standard is applicable. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown (COGCC 2010). Short-term (7- to 14-day) increases in nearby noise levels would characterize road and pad construction while the existing cuttings pit is re-opened. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and an typical noise level for construction sites of 65 dBA at 500 feet (Table 7), project-related

noise levels would be approximately 59 dBA at a distance of 1,000 feet, approximating active commercial areas (US EPA 1974).

<b>Table 6. Noise Standards for Light industrial, Residential/Agriculture/Rural</b>		
<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

<b>Table 7. Noise Levels at Typical Construction Sites and along Access Roads</b>			
<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	63	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)

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 7 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.

*No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to noise in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

## **Realty Authorizations**

### **Affected Environment**

The Proposed Action would require a realty authorization by the BLM. The proposed access road and C26W pad would be authorized under the APD. The 8-inch natural gas pipeline would be constructed by Grand River Gathering, LLC, hereinafter referred to as “GRG” (Summit Midstream) and would be authorized under a new right-of-way (ROW) grant for which GRG has applied (COC76339). Table 8 lists existing Federal realty authorizations affecting BLM lands within the project area.

### **Environmental Consequences**

#### *Proposed Action*

The Proposed Action would be constructed in the spring of 2014. Potential impacts to existing Federal realty authorizations associated with construction may coincide with other projects in the area. A COA would be included in the ROW authorizations requiring Encana and GRG to coordinate with other ROW holders regarding pipeline alignments, locations, and crossings. Encana and GRG would be fully responsible for weed control and reclamation of the disturbed portions of the pipeline corridor.

<i>Case Number</i>	<i>Category</i>
COC055972X COC068997X	Unit
COC052889	Lease segregated into Lease COC69615
COC054738	Lease segregated into Lease COC69616
COC69616 COC69615 COC44745	Lease Committed to Middleton Creek Unit COC68997X
COC75516 & COC75516T	Natural Gas Pipeline, Grand River Gathering, LLC

#### *No Action Alternative*

The No Action Alternative would not require new realty authorizations, and no impacts would occur to the various existing authorizations.

## **Socioeconomics**

### **Affected Environment**

The project area is located entirely within Garfield County, Colorado, with a total county land area of 2,958 square miles (Garfield County 2013a). The county seat is Glenwood Springs; other towns include Carbondale, New Castle, Silt, Rifle, Battlement Mesa, and Parachute. Interstate 70 transects the county east to west with a network of county and private roads servicing the project area.

The population of the county grew by an average of approximately 2.5% per year from 2000 to 2011 but decreased by 2.6% from 2008 to 2011 due to the national economic downturn, resulting in a net increase of 27% from 44,259 to 56,270 residents (CDOLA 2013a). Population growth in Garfield County is expected to nearly double to 109,887 in 2040 (CDOLA 2012). In July 2011, the Garfield County

population was 70% urban and 30% rural, with a population density of approximately 19 people per square mile (City Data 2012). In February 2013, the total estimated civilian labor force was 34,107 with an unemployment rate of 7.8% (CDLE 2013). In the fourth quarter of 2011, the industry groups with the highest percentage of total employment were construction (14.4%), retail trade (13.7%), and Health Care and Social Assistance (13.5%). Table 9 lists the top 10 industries in Garfield County for the fourth quarter of 2011 (CDLE 2013).

<b>Table 9. Selected Industry Sectors for Garfield County</b>		
<b>Rank</b>	<b>Job Sector</b>	<b>Employees</b>
1	Construction (buildings and engineered projects)	2,901
2	Retail Trade	2,782
3	Health Care and Social Assistance	2,732
4	Education Services	2,484
5	Accommodation and Food Services	2,464
6	Mineral Extraction (including mining and oil and gas)	2,426
7	Public Administration	1,717
8	Professional, Scientific & Technical Services	1,047
9	Administration, Support, Waste Management, and Remediation	874
10	Transportation and Warehousing	782

Personal income in Garfield County has also risen, growing approximately 6% per year from \$1.3 billion in 2000 to \$2.1 billion in 2011. However, personal income dropped by nearly 10% from 2008 to 2011. Annual per capita income has grown in the same period approximately 3% per year, from \$29,081 to \$37,858, but annual per capita income dropped by nearly 11% from 2008 to 2011 (USDOC 2012).

The communities of Parachute, Rifle, Silt, and New Castle are considered to have the most affordable housing, while the communities of Glenwood Springs and Carbondale have the least affordable housing. In March 2012 the cost of living index in Garfield County was 88.6 (less than the U.S. average of 100) (City Data 2012).

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.

Production of natural gas in Garfield County increased dramatically during recent years, from approximately 70 billion cubic feet (BCF) in 2000 to 700 BCF in 2012 (COGCC 2013a). Approximately 1,286 drilling permits were approved in Garfield County between April 2, 2012 and March 29, 2013 (COGCC 2013b). However, U.S. natural gas prices have dropped in recent years from \$10.79 per thousand cubic feet (MCF) in July 2008 to \$1.89/MCF in April 2012 (USDOE 2013). The U.S. price of natural gas has begun to improve, in December 2012 it was \$3.35/MCF, but has not reached the prices of 2008. Natural gas development activity in Garfield County remains low.

Property tax revenue from oil and gas development is a source of public revenue in Garfield County. In 2012, oil and gas assessed valuation in Garfield County was approximately \$2.8 billion, or about 73% of total property tax assessed value distribution (Garfield County 2013b). The county's largest taxpayers are in the oil and gas industry (Garfield County 2013c).

The Federal government makes Payments in Lieu of Taxes (PILT) to local governments to help offset losses in property taxes due to nontaxable Federal lands within their boundaries (USDI NBC 2013). The PILT distributions are based on acres for all Federal land management agencies. Approximately 60% of all Garfield County lands are Federally owned (Garfield County 2013a). The amount may also be adjusted based on population and as apportioned by Congress. By formula, payments are decreased as other Federal funds, such as mineral royalty payments, increase. PILT amounts to Garfield County over the last five years ranged from \$1,732, 974 in 2008 to \$403,176 in 2012 (USDI NBC 2013).

In addition to PILT distributions, 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 (BLM 2007). Half the royalty receipts received from production are distributed to the state and county governments, which 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 (CDOLA 2013b). Statewide, the population of Hispanic/Latino residents grew 41.2% during the same 10-year period (CDOLA 2013c). African-American, American Indian, Asian, and Pacific Islander residents accounted for a combined 1.6% of the Garfield County population in 2010, compared to a statewide level of 7%.

### Environmental Consequences

#### *Proposed Action*

The Proposed Action would have minor positive impacts on 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. 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 the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to socioeconomics in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land. Therefore, impacts to socioeconomics—both negative and positive—would be reduced compared to the Proposed Action but not eliminated.

### Soils

#### Affected Environment

The C26W project is covered by the *Soil Survey of Rifle Area, Colorado* (USDA 1985) and would include surface-disturbing activities on three soil complexes, Morval-Tridell complex, Torriorthents-Camborthids-Rock Outcrop complex, and Badland.

Morval-Tridell complex is well drained, moderately sloping to hilly (6-25% slope) soil found on alluvial fans and the sides of mesas from 6,500 to 8,000 feet. Surface layer is brown loam about 5 inches thick. The upper part of the subsoil is brown and light brown clay loam and stony clay loam about 12 inches thick. The lower part of the subsoil is light brown stony clay loam about 10 inches thick. The permeability is moderate to moderately rapid, runoff is medium and erosion hazard is moderate. This soil is generally used for grazing.

Torriorthents-Camborthids-Rock Outcrop complex is well drained, moderately steep to very steep (15-70% slope) soil found on mountainsides from 5,000 to 8,500 feet. Torriorthents make up approximately 45% of the complex, Camborthids make up approximately 20%, and Rock Outcrop makes up approximately 15%. Torriorthents are shallow to moderately deep and are generally clayey to loamy and contain variable amounts of gravel, cobbles and stone. Camborthids are shallow to deep and are generally clayey to loamy, and have slightly more clay in the subsoil than in the surface layer. The surface layer is light in color. Rock Outcrop is mainly Mesaverde sandstone and Wasatch shale. Some areas are covered with basaltic boulders and stones. This soil is generally used for wildlife habitat, recreation, and grazing.

Badland is a broadly defined soil unit consisting of steep to very steep, nearly barren land dissected by many intermittent drainage channels that have cut into the soft shale and sandstone of the Green River Formation, and into the soft shale and siltstone of the Wasatch, Mancos, and Mesaverde Formations. It mainly occurs on steep foothills and mountainsides. The water erosion hazard is severe and erosion is active. The value for grazing is very limited.

#### Environmental Consequences

The Proposed Action would involve surface disturbance to construct the C26W pad, access road, and pipelines on BLM and Fee surface. The Proposed Action would result in 21.4 acres of new surface disturbance during construction of the pads, roads, and pipelines, and could result in some short-term vegetation loss and soil compaction and displacement on private lands. After reclamation of the pads the long-term surface disturbance would be reduced to 5.2 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 the Colorado River. In areas susceptible to erosion or possible slope instability issues proper erosion control and construction techniques and geotechnical analysis may be required in the site-specific COAs.

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.

Throughout the affected area, 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

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to soils in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

**Special Status Species – Plants**

***Federally Listed, Proposed, or Candidate Species***

**Affected Environment**

According to the latest species list from the USFWS, four Federally listed plant species may occur within or be impacted by actions occurring in Garfield County. Table 10 lists these species and summarizes information on their habitat associations, potential for occurrence in the project vicinity based on known geographic range and habitats present, and potential for adverse impacts from the Proposed Action. Botany surveys were conducted in June and September 2013, and no suitable habitat for any Federally listed plant species was found in or adjacent to the project area.

<b>Table 10. Potential for Occurrence of Threatened or Endangered Plant Species</b>				
<b><i>Species and Status</i></b>	<b><i>Occurrence</i></b>	<b><i>Habitat Association</i></b>	<b><i>Range or Habitat in Vicinity?</i></b>	<b><i>Potentially Affected?</i></b>
Parachute penstemon ( <i>Penstemon debilis</i> ) – Threatened	Sparsely vegetated, south-facing, steep, white shale talus of the Parachute Creek Member of the Green River Formation; 8,000 to 9,000 feet	Other oil shale endemic species, such as Roan Cliffs blazing-star, Cathedral Bluffs meadow-rue, dragon milkvetch, Piceance bladderpod, and oil shale fescue	No	No
DeBeque phacelia ( <i>Phacelia submutica</i> ) – Threatened	Sparsely vegetated, steep slopes in chocolate-brown, gray, or red clay on Atwell Gulch and Shire Members, Wasatch Formation; 4,700 to 6,200 feet	Desert shrubland with four wing saltbush, shadscale, greasewood, broom snakeweed, bottlebrush squirreltail and Indian ricegrass, grading upward into scattered junipers	No	No
Colorado hookless cactus ( <i>Sclerocactus glaucus</i> ) – Threatened	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities; often with well-formed microbiotic crusts; can occur in dense cheatgrass 4,500 to 6000 feet	Desert shrubland with shadscale, galleta grass, black sagebrush, Indian ricegrass grading upward into big sagebrush and sagebrush/pinyon-juniper	No	No
Ute lady’s tresses orchid ( <i>Spiranthes diluvialis</i> ) – Threatened	Subirrigated alluvial soils along streams and in open meadows in floodplains; 4,500 to 7,200 feet	Box-elders, cottonwoods, willows, scouring rushes, and riparian grasses, sedges, and forbs	No	No

**Environmental Consequences**

***Proposed Action***

Because the habitats in and around the project area are unsuitable for any of the Federally listed plant species with the potential to occur in Garfield County, the No Action Alternative would have “**No Effect**” on these species.

*No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to Federally listed, proposed or candidate plant species in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

***BLM Sensitive Plant Species***

Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County are listed in Table 11, along with summaries of their habitat requirements, potential for occurrence within the project area, and potential to be impacted by the Proposed Action. The only BLM sensitive plant species with the potential to occur within the project area is Harrington’s penstemon. Botany surveys were conducted in June and September 2013, and no Harrington’s penstemon plants were found. No suitable habitat for any other BLM sensitive plant species exists within or adjacent to the project area.

<b>Table 11. Potential for Occurrence of BLM Sensitive Plant Species</b>				
<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
DeBeque milkvetch ( <i>Astragalus debequaeus</i> )	Varicolored, fine-textured, seleniferous or saline soils of Wasatch Formation; 5,100 to 6,400 feet	Pinyon-juniper woodlands and desert shrublands	No	No
Naturita milkvetch ( <i>Astragalus naturitensis</i> )	Sandstone mesas, ledges, crevices and slopes in pinyon/juniper woodlands; 5,000 to 7,000 feet	Pinyon-juniper woodlands	No	No
Piceance bladderpod ( <i>Lesquerella parviflora</i> )	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas; 6,200 to 8,600 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No
Roan Cliffs blazing-star ( <i>Mentzelia rhizomata</i> )	Steep, eroding talus slopes of shale, Green River Formation; 5,800-9,000 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No
Harrington's beardtongue ( <i>Penstemon harringtonii</i> )	Flats to hillsides with rocky loam and rocky clay loam soils derived from coarse calcareous parent materials or basalt; 6,200-9,200 feet	Sagebrush shrublands, typically with scattered pinyon-juniper	Yes	No
Cathedral Bluffs meadow-rue ( <i>Thalictrum heliophilum</i> )	Endemic on sparsely vegetated, steep shale talus slopes of the Green River Formation; 6,300-8,800 feet	Pinyon-juniper woodlands and shrublands; often with other oil shale endemics, sometimes with rabbitbrush or snowberry	No	No

Environmental Consequences

*Proposed Action*

Because no occurrences of BLM sensitive plants have been identified within or near the project area, the project would have no impact on any BLM sensitive plant species.

*No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to BLM sensitive plant species in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

**Special Status Animal Species**

***Federally Listed, Proposed, or Candidate Animal Species***

**Affected Environment**

Federally listed, proposed, or candidate vertebrates potentially occurring within or affected by actions in Garfield County are listed in Table 12. Species indicated as potentially present and potentially adversely affected by the Proposed Action are described in greater detail following the table.

<b>Table 12. Potential for Occurrence of Listed, Proposed, or Candidate Threatened or Endangered Animal Species</b>				
<i>Species and Status</i>	<i>Distribution in Region</i>	<i>Preferred Habitats</i>	<i>Potentially Present in Vicinity?</i>	<i>Potentially Adversely Affected?</i>
Canada lynx ( <i>Lynx canadensis</i> ) – Threatened	Dispersed use in in upper montane and subalpine zones of Colorado mountains.	Subalpine spruce-fir forests; also lodgepole pine and aspen to as low as the upper montane.	No	No
Greater Sage-grouse ( <i>Centrocercus urophasianus</i> ) – Candidate	Concentrated use during courtship; more dispersed use during nesting, brood-rearing, and winter seasons	Mature sagebrush shrublands providing dense cover and a diverse understory of perennial grasses and forbs	No	No
Western yellow-billed cuckoo ( <i>Coccyzus americanus</i> ) – Proposed	Major rivers and tributaries of western, northwestern, and south-central Colorado.	Large cottonwood stands with tall shrub understory along rivers.	No	No
Mexican spotted owl ( <i>Strix occidentalis lucida</i> ) – Threatened	No historic occurrence in area; present in southwestern Colorado and southern Front Range.	Rocky cliffs in canyons with closed-canopy coniferous forests.	No	No
Razorback sucker ( <i>Xyrauchen texanus</i> ) – Endangered	Colorado River and major tributaries, including mainstem Colorado River upstream to town of Rifle in CRVFO.	General: Deep, slow runs, pools, and eddies. Spawning: silt to gravel substrates in shallow water and seasonally flooded overbank areas.	Yes	<b>Yes</b>
Colorado pikeminnow ( <i>Ptychocheilus lucius</i> ) – Endangered			Yes	<b>Yes</b>
Humpback chub ( <i>Gila cypha</i> ) -- Endangered	Mainstem Colorado River and major tributaries – upstream to Black Rocks near Utah state line.	Rocky runs, riffles, and rapids in swift, deep rivers.	No	<b>Yes</b>
Bonytail chub ( <i>Gila elegans</i> ) – Endangered			No	<b>Yes</b>
*Lineage GB cutthroat trout ( <i>Oncorhynchus clarki</i> ssp.) – Threatened	Identified in 60 streams in Colorado River basin including the CRVFO area.	Clean, cool headwaters streams and ponds isolated from other strains of cutthroat trout.	No	No
*Lineage GB = Relict populations of cutthroat trout indigenous to the Colorado/Gunnison/Dolores River drainages. Currently protected under the ESA pursuant to prior listing of the greenback cutthroat trout ( <i>O. c. stomias</i> ) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.				

## Environmental Consequences

### *Proposed Action*

Canada Lynx, Greater Sage-grouse, Mexican Spotted owl, and Western Yellow-billed Cuckoo (distinct population segment). These species are not expected to occur in the project vicinity based on documented occurrences and habitat types present. Therefore, the Proposed Action would have “**No Effect**” on these species.

Razorback Sucker, Colorado Pikeminnow, Humpback Chub, and Bonytail Chub. 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. This portion of the Colorado River lies a few miles northeast of the project area. The nearest known habitat for the humpback chub and bonytail is within the Colorado River approximately 70 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.

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 0.77 acre-feet of Colorado River water is consumed during activities related to each oil and gas well. This is equivalent to 0.04 to approximately 0.04 cubic feet per second (cfs) of water throughout the typical 10-day drilling period for an oil and gas well in the CRVFO area.

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 endangered species through restoration of habitat, propagation, and genetics management, instream flow identification and protection, program management, non-native fish management, research and monitoring, and public education.

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. Construction activities would increase the potential for soil erosion and sedimentation. Although a minor temporary increase in sediment transport to the Colorado River may occur, it is unlikely that the increase would be detectable above current background levels. In any case, the Federally listed, proposed, or candidate fish species associated with the Colorado River are adapted to naturally high sediment loads and would not be affected.

In contrast to inflow of sediments, the inflow of chemical pollutants could impact the endangered big-river fishes if concentrations are 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 into an ephemeral drainage that could flow to the Colorado River, the operator would be required to implement its Spill Prevention, Control, and Countermeasures (SPCC) plan, including such cleanup and mitigation measures as required by BLM or the State. For these reasons, and because any spills 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.

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

*No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to Federally listed, proposed or candidate animal species in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

***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 13.

<b>Table 13. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area</b>		
<b><i>Common Name</i></b>	<b><i>Habitat</i></b>	<b><i>Potential for Occurrence</i></b>
Fringed myotis ( <i>Myotis thysanodes</i> )	Roosting: Caves, trees, mines, and buildings.	Possible
Townsend’s big-eared bat ( <i>Corynorhinus townsendii</i> )	Foraging: Pinyon-juniper, montane conifers, and semi-desert shrubs.	
Northern goshawk ( <i>Accipiter gentilis</i> )	Montane and subalpine coniferous forests and aspen forests; may move to lower elevation pinyon/juniper woodland in search of prey in winter.	Possible
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Nesting/Roosting: Mature cottonwood forests along rivers. Foraging: Fish and waterfowl along rivers and lakes; may feed on carrion, rabbits, and other foods in winter.	Nests and roosts along Colorado River
Peregrine falcon ( <i>Falco peregrinus</i> )	Nesting: Cliffs, usually near a river, large lake, or ocean. Foraging: Waterfowl on rivers and lakes; upland fowl in open grassland or steppe.	Unlikely
Brewer’s sparrow ( <i>Spizella breweri</i> )	Extensive stands of sagebrush, primarily Wyoming sagebrush on level or undulating terrain.	Possible – habitat marginal
Midget faded rattlesnake ( <i>Crotalus oreganus concolor</i> )	Cold desert of NW Colorado, SW Wyoming, and NE Utah, primarily in sagebrush with rock outcrops and exposed canyon walls.	Possible – habitat marginal

<b>Table 13. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area</b>		
<i>Common Name</i>	<i>Habitat</i>	<i>Potential for Occurrence</i>
Great Basin spadefoot ( <i>Spea intermontana</i> )	Permanent or seasonal ponds and slow-flowing streams in pinyon-juniper woodlands and semi-desert shrublands.	No suitable habitat
Northern leopard frog ( <i>Lithobates pipiens</i> )	Clean perennial waters in slow-flowing streams, wet meadows, marshes, and shallows of clean ponds and lakes.	Possible along Colorado River
Bluehead sucker ( <i>Catostomus latipinnis</i> )	Primarily smaller streams with a rock substrate and mid- to fast- moving waters; also shallows of larger rivers.	Not present
Flannelmouth sucker ( <i>Catostomus discobolus</i> )	Runs, riffles, eddies, and backwaters in large rivers.	Present in Colorado River
Roundtail chub ( <i>Gila robusta</i> )	Slow-moving waters adjacent to fast waters in large rivers.	
*Lineage CR cutthroat trout ( <i>Oncorhynchus clarki</i> ssp.)	Headwaters streams and ponds with cool, clear waters isolated from populations of non-native cutthroats and rainbow trout.	Not present
*Lineage CR = Relict populations of cutthroat trout indigenous to the Yampa/Green River drainages but widely transplanted throughout the state. Managed as a BLM sensitive species pursuant to prior designation of the Colorado River cutthroat trout ( <i>O. c. pleuriticus</i> ) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.		

Environmental Consequences

Proposed Action

Of the species indicated in Table 13 as potentially present, specifics of the project, or construction season, habitat requirements and uses of the indicated species, and mitigation measures to be applied as COAs (Appendix A), none is expected to be significantly affected by the Proposed Action. The bases for this determination are summarized below.

Fringed Myotis and Townsend’s Big-eared Bat – No caves or other suitable roosting sites occur in the project area. Loss of large trees, potentially 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 – Although this species nests at elevations higher than the project area, goshawks may move to lower elevation oakbrush and pinyon-juniper habitats in search of prey during winter. However, because these vagrant hawks are not tied to specific territories, and hunt across broad areas, short-duration disturbance from the project would not be expected to affect their hunting success.

Bald Eagle – Formerly listed as endangered, downlisted to threatened, and then removed from the endangered species list, the bald eagle remains protected by the Bald and Golden Eagle Protection Act. The Colorado River in the vicinity of Rifle and Silt supports both resident breeding bald eagles and seasonal wintering eagles.

Brewer’s Sparrow – This migratory songbird is a near-obligate on sagebrush shrublands and is most common in extensive stands of Wyoming or mountain big sagebrush on gentle or rolling terrain at lower and middle elevations. The project area includes potentially suitable sagebrush stands, and construction during the nesting season could result in direct loss of nests, eggs, or young as well as displacement of

nesting adults due to the operation of heavy equipment and other construction-related activities. However a standard COA (Appendix A) would prohibit vegetation removal and other surface-disturbing activities during the period May 1 to June 30 unless a survey during the nesting season demonstrates no Brewer's sparrows are nesting within the affected area (also see the section on Migratory Birds).

Midget Faded Rattlesnake – This small viper was formerly considered a small, pale-colored subspecies of the common and widespread prairie or western rattlesnake (*Crotalus viridis*), but more recent taxonomic analysis has led to its being considered a subspecies of the Great Basin rattlesnake (*C. oreganus*). The midget faded rattlesnake is sometimes considered a genetically distinct species. Although movement patterns of this species are not well known, individuals are believed to be limited to a few hundred meters from den sites. The limited distribution and small home range make this snake susceptible to impacts from human disturbance (USGS 2007). Threats include direct mortality from vehicles traveling on roads and pads, off-highway vehicle use throughout the landscape, capture by collectors, and livestock grazing. As access increases into previously undeveloped areas, the risk of encounters with humans would increase, resulting in some cases of mortality or collection.

Northern Leopard Frog – The northern leopard frog is limited to perennial waters, including ponds and slow-flowing perennial streams or persistent portions of intermittent streams. This species requires aquatic habitats providing good water quality and abundant aquatic or shoreline vegetation. The proposed project does not cross good-quality leopard frog habitat. Although leopard frogs may occur in overbank waters in the Colorado River floodplain, these areas would not be directly affected because a pipeline would be bored beneath the river, and its two terminus locations would be outside any potential habitat.

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

### No Action Alternative

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to BLM sensitive animal species in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

## Vegetation

### Affected Environment

The project area is located in upper Mamm Creek near Gant Gulch, on generally north-facing slopes at elevations ranging from 6,940 to 7,200 feet. The proposed pad would be located primarily in sagebrush habitat, with patches of Gambel oak, mountain shrub habitat, and pinyon-juniper woodlands in and around the pad site. The access road and pipeline route begins in the mountain shrub zone and drops down into pinyon juniper woodlands and sagebrush habitat. Common species in the mountain shrub habitats include bitterbrush (*Purshia tridentata*), Gambel oak (*Quercus gambelii*), green rabbitbrush

(*Chrysothamnus viscidiflorus*), mountain mahogany (*Cercocarpus montanus*), mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos rotundifolius*), mat penstemon (*Penstemon caespitosus*), mules ears (*Wyethia amplexicaulis*), Rocky Mountain penstemon (*Penstemon strictus*), showy goldeneye (*Heliomeris multiflora*), tailcup lupine (*Lupinus caudatus*), elk sedge (*Carex geyeri*), green needlegrass (*Nasella viridula*), and muttongrass (*Poa fendleriana*). Common species in the patchwork of sagebrush and pinyon-juniper habitats include Utah juniper (*Juniperus osteosperma*), pinyon pine (*Pinus edulis*), broom snakeweed (*Gutierrezia sarothrae*), green rabbitbrush, mountain sagebrush, Junegrass (*Koeleria macrantha*), needle-and-thread grass (*Hesperostipa comata*), slender wheatgrass (*Elymus trachycaulus*), squirreltail grass (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), arrowleaf balsamroot (*Balsamorhiza sagittata*), ballhead sandwort (*Eremogone congesta*), lambs-tongue groundsel (*Senecio integerrimus*), longleaf phlox (*Phlox longifolia*), mat penstemon (*Penstemon caespitosus*), Nuttall's larkspur (*Delphinium nuttallianum*), orange globemallow (*Sphaeralcea coccinea*), pale bastard toadflax (*Comandra umbellata* ssp. *pallida*), rock goldenrod (*Petroradia pumila*), rosy pussytoes (*Antennaria rosea*), showy goldeneye (*Heleomeris multiflora*), white peavine (*Lathyrus leucanthus*), and yarrow (*Achillea millefolium*). Non-native species are scattered throughout the surrounding vegetation, including cheatgrass, crested wheatgrass, intermediate wheatgrass, Kentucky bluegrass, orchardgrass, smooth brome, alfalfa, houndstongue, Kochia, red clover, and yellow sweetclover, and one small patch of Dalmatian toadflax.

All of the project area has experienced prior impacts to the native vegetation from livestock grazing, as well as vehicle traffic along existing two-track roads southwest and east of the pad site. These activities have provided vectors for non-native plant species to enter the project area.

### Environmental Consequences

#### *Proposed Action*

Under the Proposed Action, a total of 21.4 acres of new disturbance would occur within the mix of mountain shrub, pinyon-juniper woodland, and sagebrush shrub habitat types. Following project completion, reclamation would occur on 16.2 of these acres. A total 5.2 acres would remain as long-term disturbance within the functioning pad and access road. Reclamation would consist of seeding in accordance with the reclamation COAs presented in Appendix A. Seed mixes for BLM portions of the project would consist of native species. For the portion of the access road crossing private land, the composition of plant species used for reclamation would be at the discretion of the landowner.

Adjacent vegetation would not be directly impacted, but could be indirectly impacted by increased dust deposition on leaves. Dust levels would be expected to increase above ambient levels in the short term from pad completion and increased vehicle traffic associated with well drilling. Increased dust levels can negatively impact plants by clogging stomata openings in the leaves, impeding gas exchange and reducing the ability of plants to take in carbon dioxide. Dust on the leaf surface can also effectively reduce light availability at the leaf surface. Light and carbon dioxide are critical for plants to conduct photosynthesis. Reductions in either can reduce the quantity of carbohydrates plants can produce through photosynthesis, thereby reducing plant growth and seed production. Dust on leaf surfaces can also facilitate plant tissue uptake of toxic pollutants (Thompson et. al. 1984, Farmer 1993, Sharifi et. al. 1997).

Additional indirect impacts to adjacent vegetation could occur from noxious weeds and other non-native plants associated with project area disturbances. Herbicide treatments of noxious weeds can also result in negative effects or mortality to native plants if they are co-occurring or located nearby (BLM 2007b). Implementing standard COAs for noxious weeds and temporary reclamation (Appendix A) would reduce

the risk of noxious weed and invasive species establishment and spread through the combination of chemically treating noxious weeds while re-establishing desirable vegetation through interim reclamation.

Cumulative impacts from the proposed project development and plant habitat loss, in combination with previous oil and gas development in this area, could also indirectly impact adjacent vegetation through negative effects on pollinators. Pollinators depend on both appropriate floral communities and on appropriate nesting habitat. Many pollinators show fidelity to specific habitat areas, and if these sites become isolated from contiguous habitat by disturbances such as roads, pollinators may be reluctant to cross these barriers to utilize other habitats (Bhattacharya et. al. 2003, Osborne and Williams 2001). Roads and pad construction can negatively impact pollinators by creating barriers, by removing habitat as a result of new construction, and by direct mortality through collisions with vehicles.

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to vegetation in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

### **Visual Resources**

#### Affected Environment

The Proposed Action is located on Fee land (private surface-private minerals) and BLM land approximately 8 air-miles south of Rifle, Colorado. The BLM land is classified as Visual Resource Management (VRM) Class II and Class III as identified by the 1984 Glenwood Springs RMP (Figure 5). The objectives for VRM Class II and III, as defined in the BLM's Manual H-8410-1 – Visual Resource Inventory (BLM 1986), are described below.

- The objective of VRM Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- 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 Proposed Action is located with Visual Resource Inventory Class II, Scenic Quality B, Sensitivity Level High, and is within the Foreground/Middle Ground and Background.

On non-BLM lands, VRM objectives do not apply, and visual values for those lands are protected by landowner discretion. The BLM can only make recommendations to mitigate impacts to scenic values. The proposed C26W Pad would occur entirely on BLM land classified as VRM Class II. The proposed access road would occur on BLM land classified as VRM Class II and Class III and private land.

The project area consists of flat to gently sloping agricultural fields leading to rolling hills that rise from the Gant Gulch drainage. The Proposed Action would occur along the slopes of the rolling hills in a

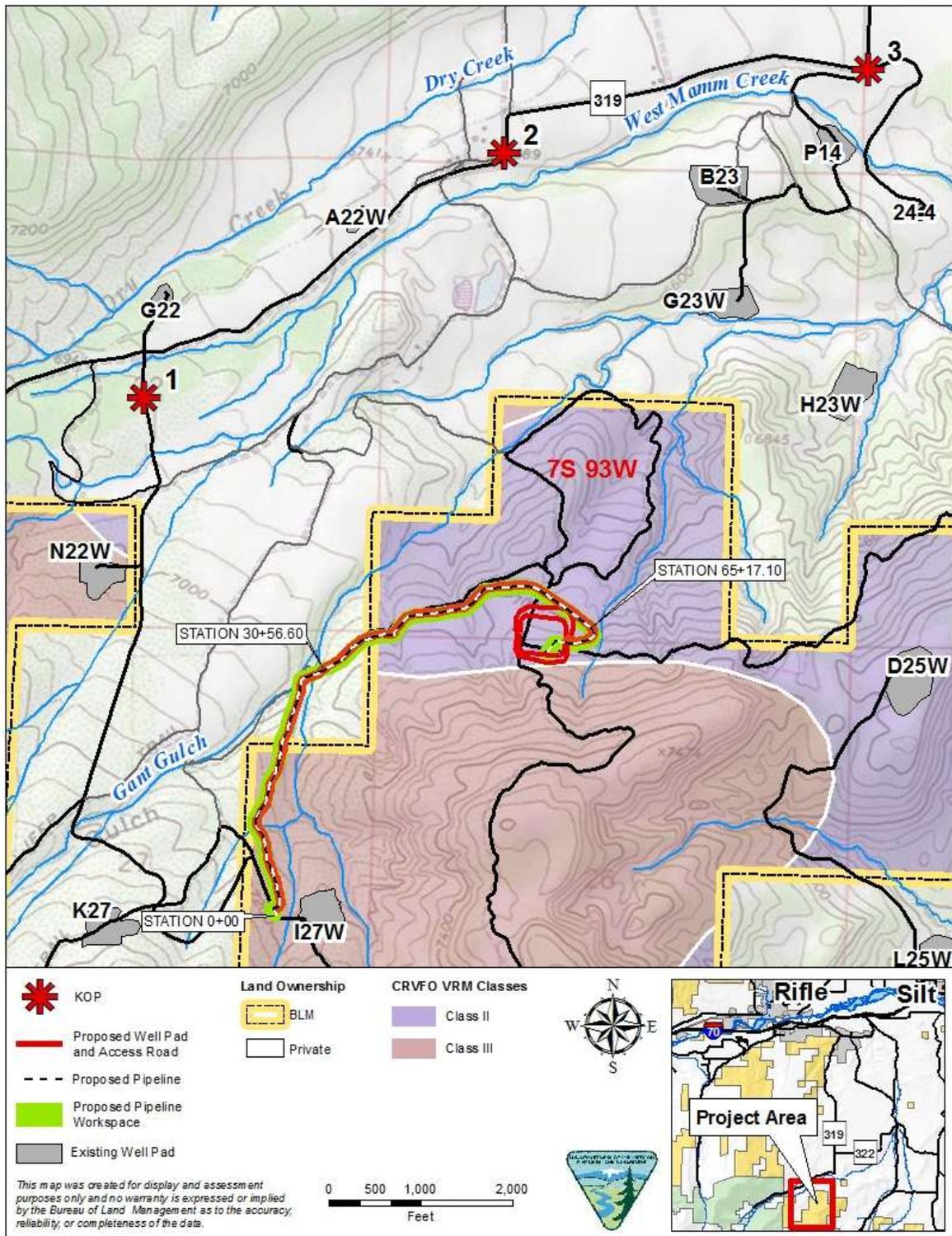
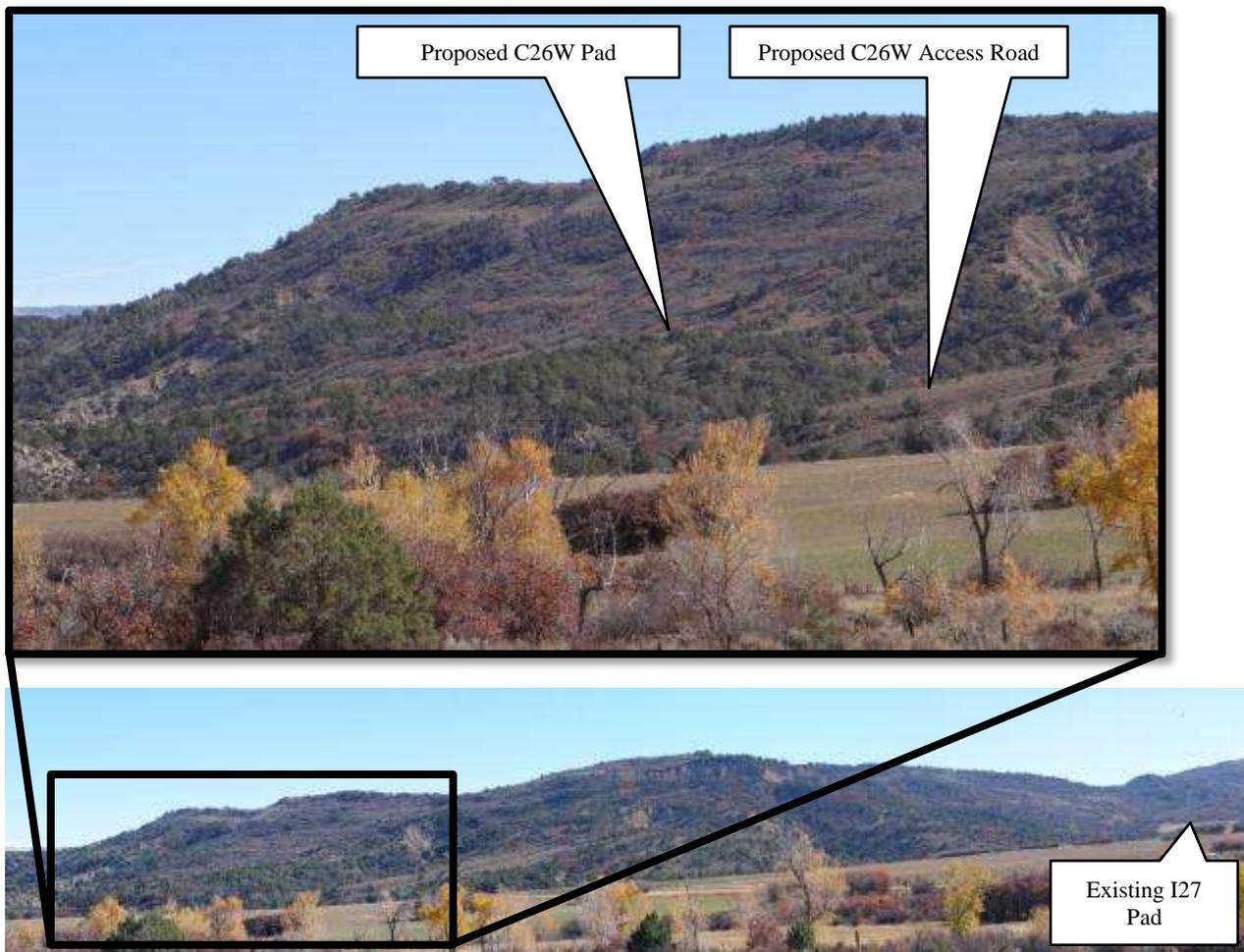


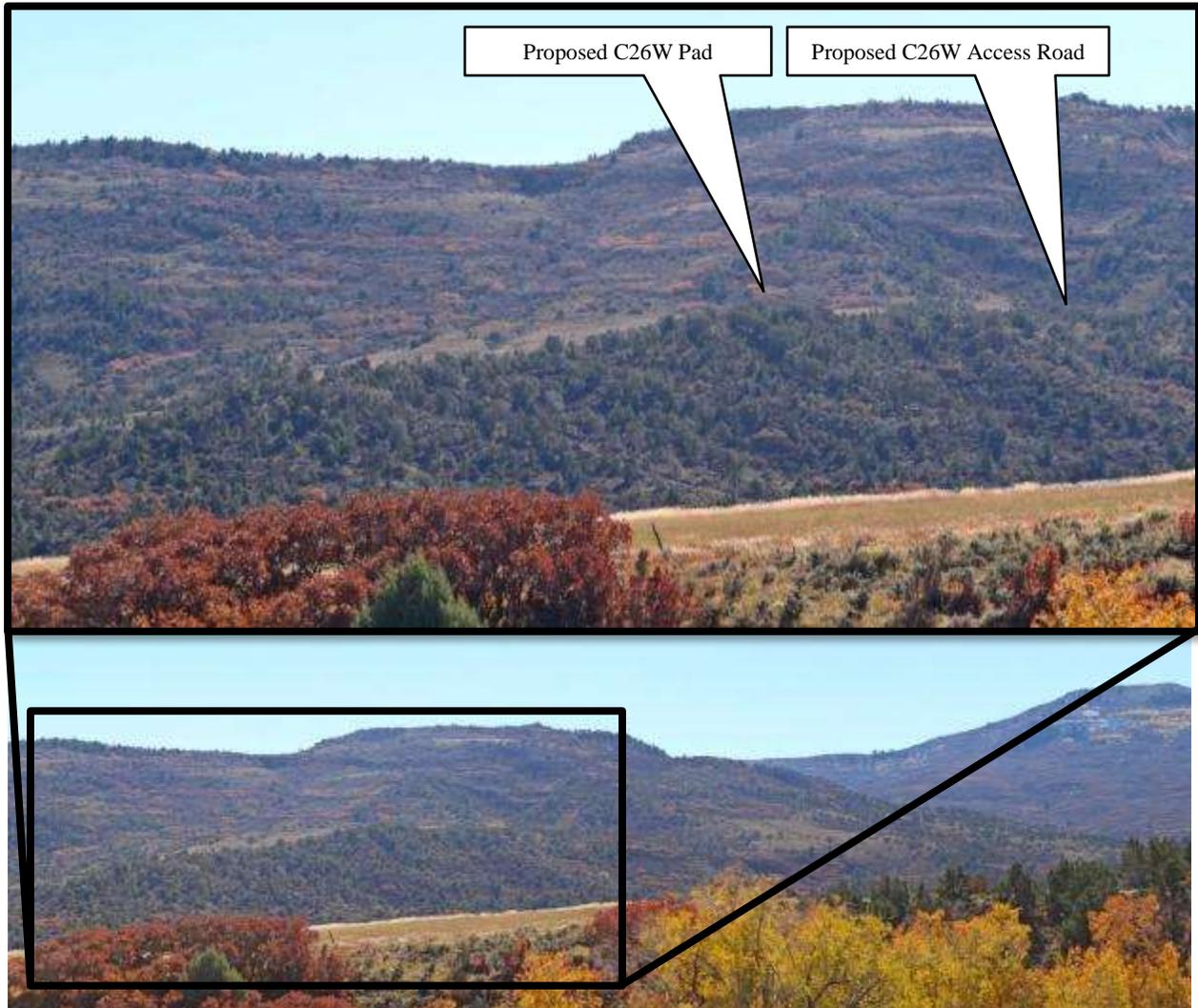
Figure 5. Proposed Action Relationship to CRVFO Visual Resource Management (VRM) Class

flat sagebrush flat surrounded by pinyon-juniper woodlands with scattered pockets of Gambel oak and mixed mountain shrub habitat and exposed tan colored soils. The area is characteristic of rural agricultural/ranching land, scattered rural residences, and oil and gas development. The project area is bound by Gant Gulch to the west and north and an unnamed ridgeline to the south and east.

The visual impact analysis is based on views from three Key Observation Points (KOPs) representing one linear and three stationary viewing locations, viewing angles, and viewing directions with the highest frequency of viewers. The three KOPs represent typical views that a viewer would see while traveling east, west, or south along CR319 and from nearby rural residences. This viewshed is important, being viewed by people who live, work, and recreate in the area. The Proposed Action would be implemented in the viewer's foreground/middleground and within one mile from CR319. BLM guidance states that lands with high visual sensitivity are those within a five miles of a primary travel corridor and of moderate to very high visual exposure, where details of vegetation and landform are readily discernible and changes in visual contrast can easily be noticed by the casual observer. The KOPs are shown in Figures 6, 7, and 8 respectively.



**Figure 6.** KOP 1 along CR319 represents a typical view while traveling east. The Proposed Action would attract attention but would not dominate the view from this location because of the angle of view screening from existing vegetation.



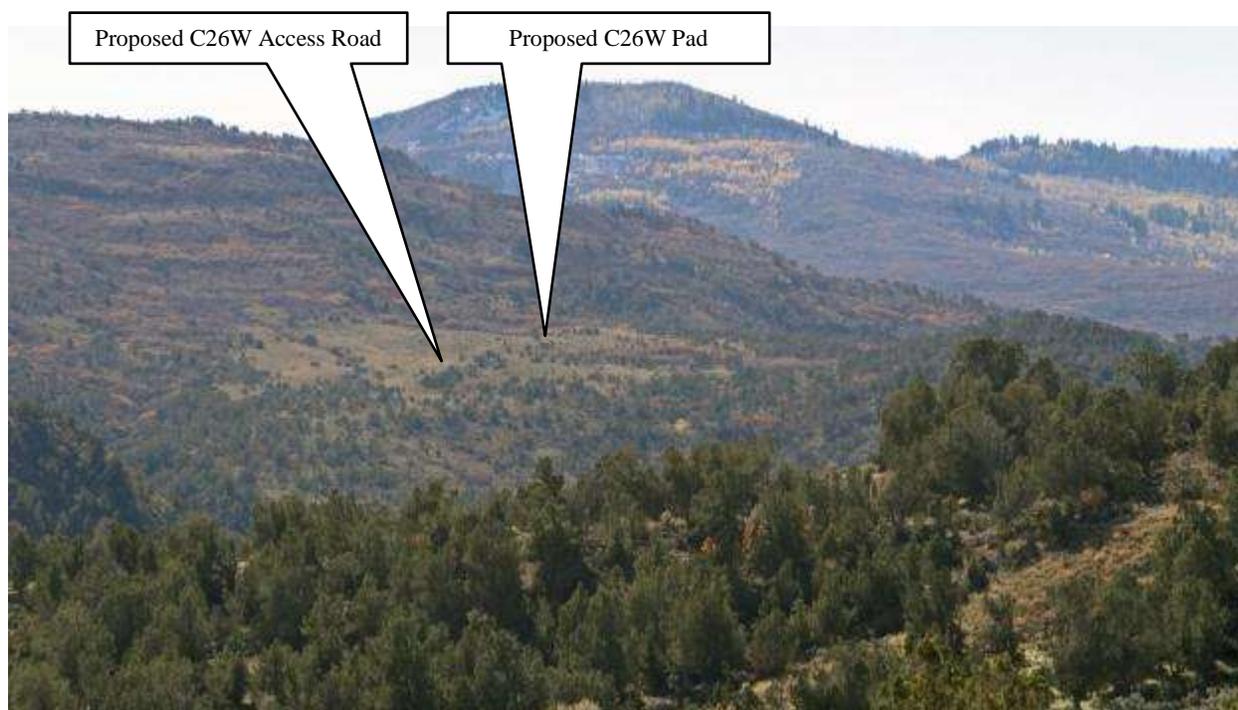
**Figure 7.** KOP 2 represents a typical view while traveling both east and west along CR319 and from nearby residences. The Proposed Action would attract attention, and portions (cut-slopes) would dominate the view from this KOP. The viewer would be lower than the Proposed Action from this location, and the existing vegetation would provide some visual screening.

#### Environmental Consequences

##### *Proposed Action*

The Proposed C26W pad was proposed as the N23W pad in the Gant Gulch GAP CO140-2005-134 EA (Figure 9). The proposed N23W pad and access road was deferred until appropriate visual resource mitigation was developed to address VRM Class II objectives. When the Gant Gulch GAP was approved, such mitigation measures had not been thoroughly completed. The C26W and N23W pads are in the same location, however the proposed C26W access road varies slightly from what was proposed in the Gant Gulch Gap (Figure 9).

Short-term visual impacts due to pipeline installation, access road and pad construction, drilling and completion activities would occur within the project area. The construction of the pad and access road would create contrast within the landscape by removing existing vegetation, exposing bare ground, and creating distinct lines and forms. Construction would also increase the presence of drilling rigs, heavy equipment (e.g., dozers, graders, etc.), and vehicular traffic with an associated increase in dust, light pollution, and well flaring. The C26W pad and portions of the access road and pipeline would be constructed on public land and would be subject to BLM VRM Class II and III objectives.



**Figure 8.** KOP 3 represents a typical view while traveling south and west on CR319 and from nearby residences. The Proposed Action would attract attention and would dominate the view from this KOP. The viewer would be lower than the Proposed Action from this location, but there is not as much existing vegetation to provide visual screening as seen from KOP 1 or KOP 2.

### C26W Pad

The C16 pad would be located entirely on BLM surface designated as VRM Class II. The total short-term disturbance would be approximately 7.58 acres. After Drilling and well completion work, the pad would be reshaped and seeded reducing the pad size to approximately 1.70 acres.

Portions of the pad, located within a sagebrush opening surrounded by pinyon juniper woodlands, would be visible from County Road 319. During drilling and completion phases of the project, the 30-foot cut slope along the southern edge of the pad would be evident. The scale of the 30-foot fill slope along the northern edge would be screened to some degree by existing vegetation, topography, and the angle of view of the casual observer while traveling along County Road 319. To meet VRM Class II objectives, mitigation requirements are summarized in Table 14 and applied as COAs (Appendix A).

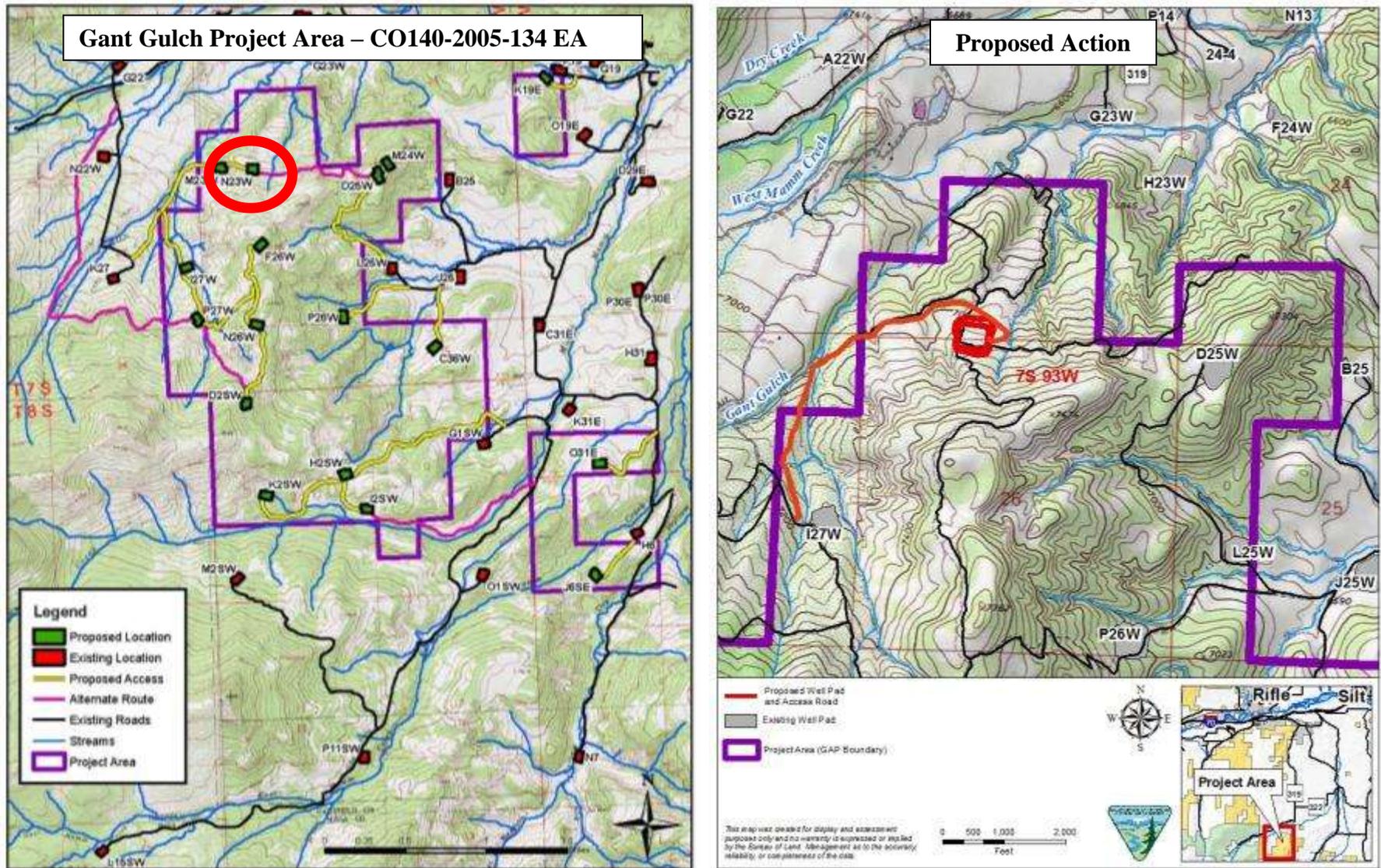


Figure 9. Comparison of Proposed Action to the Proposed N23W Pad and Access Road in the Gant Gulch GAP.

<b>Table 14. Summary of VRM Class Designations Applicable to the Proposed Action</b>			
<i>Project Component</i>	<i>CRVFO VRM Class Designation</i>		<i>Total on BLM Land</i>
	<i>Class II</i>	<i>Class III</i>	
C26W Pad	7.58 acres	0 acres	7.58 acres
Proposed Access Road (22-foot driving surface)	3,127 feet 1.6 acres	1,924 feet 0.97 acre	5,051 feet 2.57 acres
Proposed Pipeline (55-foot corridor)	3,404 feet 4.3 acres	2,022 feet 2.6 acres	5,426 feet 6.90 acres
Total	13.48 acres	3.57 acres	17.05 acres

Note: Calculations are derived using GIS data provided by the operator. Each project component was clipped to its associated VRM Class Designation, and the length in feet was calculated for each segment.

Access Road and Pipeline

Note that the numbers in Table 14 reflect overlap between the access road and the pipeline right-of-way. Specifically, a 15-foot-wide portion of the pipeline permanent right-of-way would be included within the 22-foot-wide access road corridor. The remaining 15 feet of the pipeline permanent right-of-way and a 25-foot-wide temporary construction workspace for the pipeline would be located outside but adjacent to the access road corridor.

Portions of the access road and pipeline would be located on BLM surface designated as VRM Class II and Class III. The road would be approximately 6,995 feet in length and would provide access from the existing I27 pad access road to the C26W pad. The road would follow the natural contours, which would minimize the visual effect. The road would be 30-feet in width during construction and would be maintained as a 22-foot running surface (including ditches) following construction.

The 8-inch natural gas pipeline would be approximately 7,155 feet in length and would be installed on the downhill side (Figure 10) of the access road from the point of beginning at station 0 + 00 to station 30 + 56.6. Once the pipeline reaches station 30 + 56.6 it would cross the access road and shift to the uphill side of the access road until it reaches station 65 + 17.10. At station 65 + 17.10 the pipeline would cross the access road again and would be located along the uphill side of the access road until it reached the point of ending located at the C26 pad. The access road and pipeline corridors would overlap by 15 feet as illustrated in Figure 10. The pipeline would be approximately 160 feet longer than the road.

To meet VRM Class II and Class III objectives, mitigation requirements are summarized in Table 15 and applied as COAs (Appendix A). A summary of the surface disturbance associated with the Proposed Action and VRM Class designations is provided in Table 15.

*No Action Alternative*

Under the No Action alternative, none of the components of the Proposed Action would be approved and there would be no new surface disturbance. This would eliminate new impacts to the visual environment and impacts to VRM Class II and Class III lands.

**Table 15. Summary of Mitigation Measures to Meet VRM Class II and Class III Objectives**

***C26 Pad, Access Road, and Pipeline***

Construction

- All woody vegetation (live and dead) (Figure 11) should 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 should be saved during the construction process; care should be taken to preserve the canopy of the woody material while storing and transporting.

Interim Reclamation

- All woody vegetation left standing at the toe and at top of the cut slope should be protected and remain standing and undamaged when fill material is pulled back to recontour the pad.

***C26 Pad***

Construction

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

Interim Reclamation

- Cut and fill slopes should have rough, undulating contours that emulate slopes seen in adjacent landscapes to encourage vegetation growth and reflect light in irregular patterns to break up texture and color of exposed slopes.
- Rocks and woody debris saved during construction process should 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.
- A berm along the northern edge of the pad should be utilized to interrupt the sightline from viewers located below the pad. The berm would help break up the form and texture of the facilities; and the scale of the cut slope; and should appear to be a natural extension of the landscape.

***Access Road and Pipeline Corridor***

Construction

- The road/pipeline corridor should follow the natural contours so that they conform to the landscape and reduce the amount of cut and fill required to meet grade and to eliminate distant, straight line impacts.
- The cut and fill slopes should meet the existing grades at natural angles to create a more natural appearance without creating a visually apparent transition line.
- The upper edge of the cut slopes should undulate and take advantage of opportunities where existing topography and openings in vegetation provide locations where more gradual contours can be created during interim reclamation. This would add visual variety to the width of the line of the bare soil created by the cut slope as seen from the KOPs. The cut slopes on the road/pipeline corridor could be step-terraced with some terrace widths designed to allow the placement of cleared trees for visual mitigation. The less steep cut slopes could be laid back to 2:1 slope to allow for more favorable slope for reclamation establishment.
- Spoils from the road should not be side cast and should be used in areas short of fill.
- Berming and contouring should be utilized on the fill slope by rising above and dipping below, which would interrupt the perceived line created by the edge of the standard slope surface (Figures 12 and 13).

Interim Reclamation

- After construction, the road alignment should be reviewed to see if the surface color contrasts with the surrounding landscape and if it detracts from viewshed (as seen from the KOPs). Dust abatement measures should be required to help darken the color of the road so that it blends with surrounding landscape.

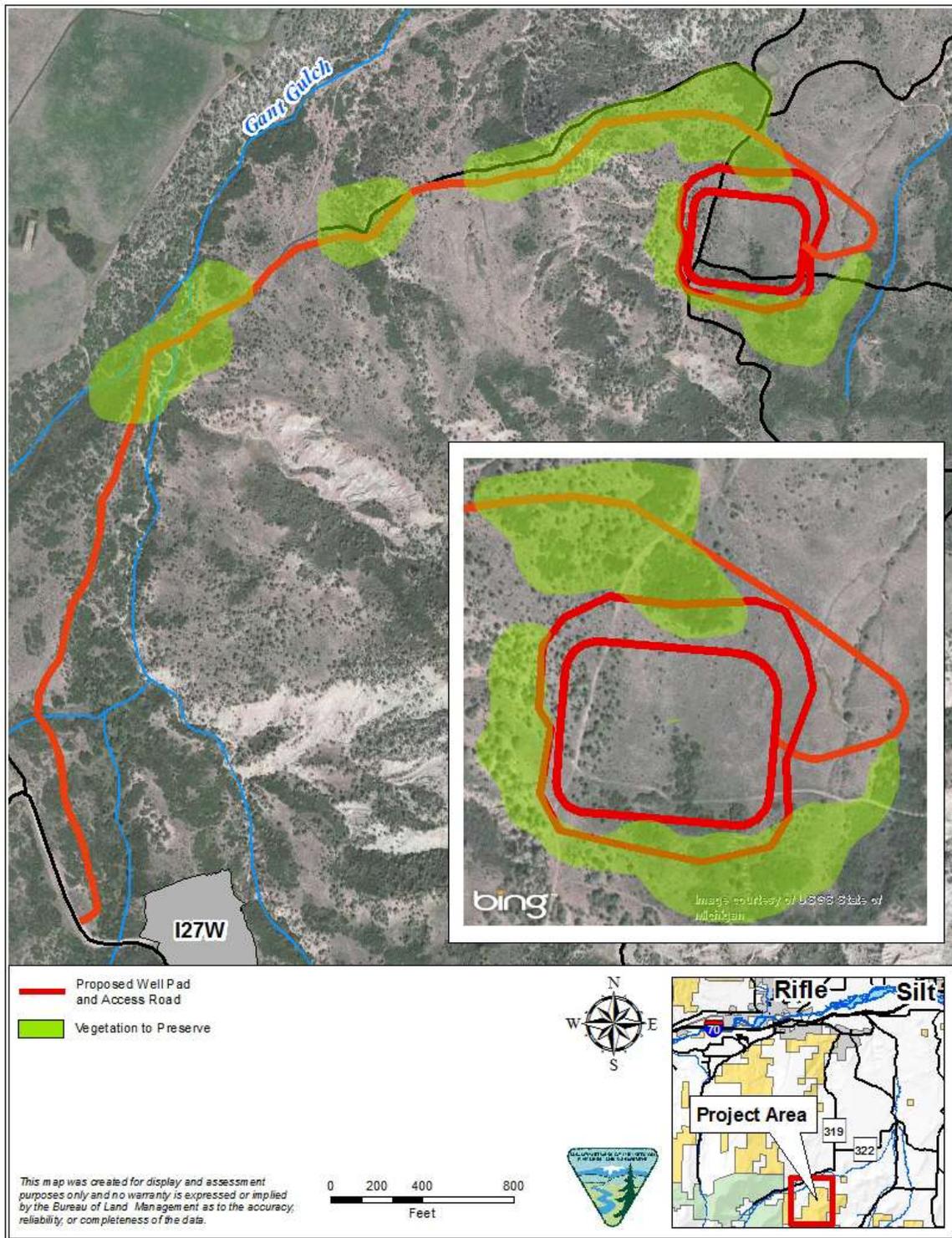
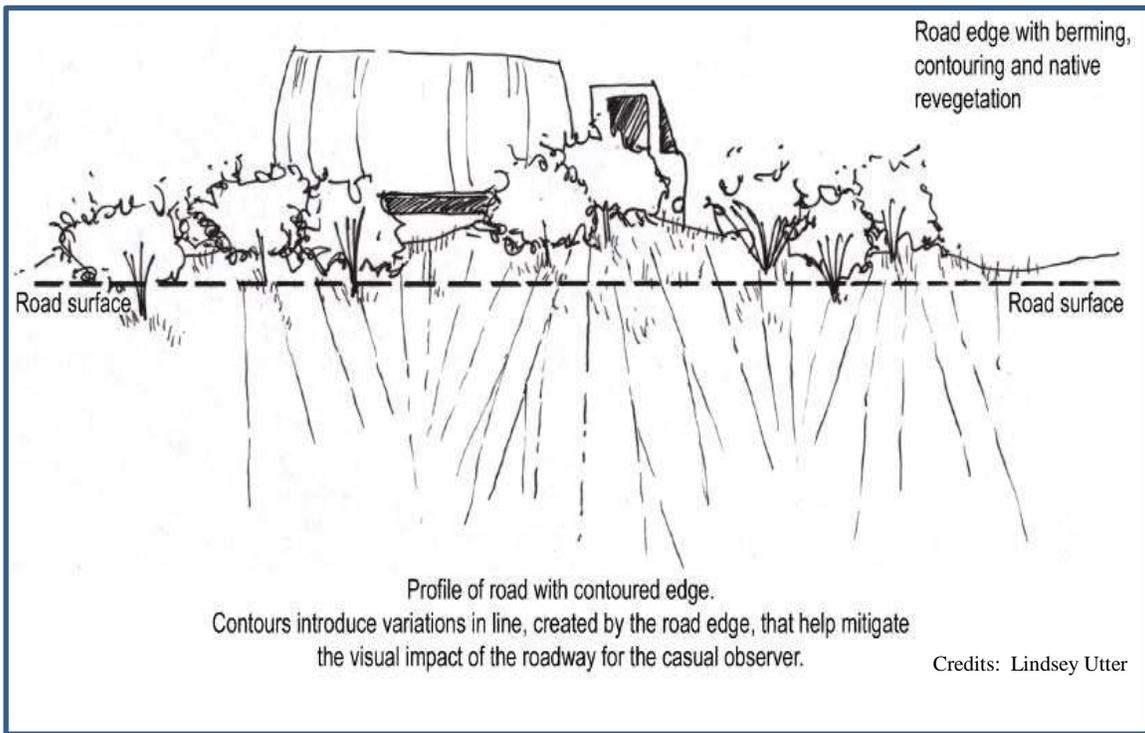
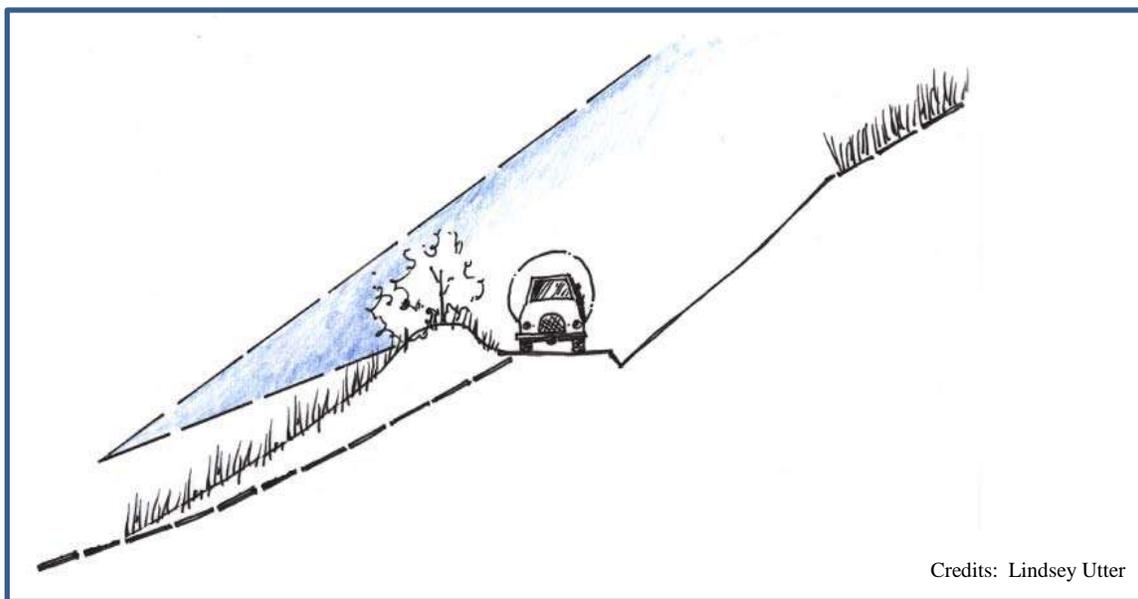


Figure 11. Areas Specified for Preserving Vegetation.



**Figure 12. Use of berming and contouring to intercept the sight line from KOPs.**



**Figure 13. Use of berming and contouring to intercept the sight line from KOPs.**

## **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 commonly used for oil and gas projects and a description of common industry practices for use of these materials and disposal of waste products. These practices are dictated by various Federal and State laws and regulations, and BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis. The most pertinent of Federal laws dealing with hazardous materials are:

- 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 for ROW holders.

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, transmission of natural gas through gathering lines, and 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, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to wastes in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

### **Water Quality, Surface and Ground**

#### ***Surface Water***

##### **Affected Environment**

The project area is within West Mamm Creek 6<sup>th</sup> code hydrologic unit, which drains to the Colorado River. The pad and access road would drain to an unnamed ephemeral stream approximately 500 feet east of the location. This stream drains to West Mamm Creek approximately 1.5 miles northeast, which flows Mamm Creek approximately 3.5 miles northeast and then to the Colorado River approximately 7

miles north of the project location. This drainage meets criteria established by the U.S. Army Corps of Engineers (USACE) as a jurisdictional Waters of the U.S. pursuant to the Clean Water Act (CWA). The project design does not include construction activities or the placement of fill within this drainageway except upstream from the portion with a distinct bed and banks (distinct channel), i.e., upstream from the jurisdictional portion. However, to protect the jurisdictional portion, a site-specific COA in Appendix A specifies the placement of a silt fence between the pad construction area and the top of the drainage sideslopes. Upon successful interim reclamation, the fence would be removed along with accumulated sediments bare areas reseeded.

The proposed activities for the C26W pad would occur within West Mamm Creek watershed unit which empties directly into the Colorado River approximately 7 miles north of the project. According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37) (CDPHE 2007), unnamed ephemeral drainages that drain most of the project vicinity are within segment 4a, which includes tributaries to the Colorado River from its confluence with Mamm Creek. Following is a brief description of segment 4a.

- 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 suitable or intended to become suitable for potable water supplies and agricultural purposes that include irrigation and livestock use.

All streams within segment 4a are on the State of Colorado's *303(d) List of Impaired Waters and Monitoring and Evaluation List* (CDPHE, WQCC Regulation No. 93) (CDPHE 2010) for naturally high levels of selenium. *Colorado's Monitoring and Evaluation List* identifies waterbodies suspected of having water quality problems but for which uncertainty exists regarding one or more factors. The tributaries to the Lower Colorado River which include the project area are on the State of Colorado's *Monitoring and Evaluation List* for sediment load. The USGS has collected surface water flow and quality data from the Colorado River below the project area near Rifle in 1978 and 2003 (Table 16).

Sediment is a pollutant of concern for the Colorado River Basin (CDPHE, WQCC Regulation No. 93). The closest downstream sediment measuring station on the Colorado River is USGS station 9093700 near De Beque, Colorado. For the period of 1974 to 1976 the mean sediment yield was 1,818 tons per day and varied between 8 and 41,300 tons per day. The median value for the same period was 267 tons/day. (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*

Potential impacts to surface water associated with the Proposed Action include increased erosion and sedimentation of streams, changes in channel morphology due to road and pipeline crossings, and contamination by drilling fluids, produced water, or condensate. Surface waters would be most

susceptible to sedimentation during construction, drilling, and completion activities, which would collectively last approximately 150 days. After this period, reclamation activities would substantially reduce surface exposure, decreasing the risk to surface waters over the long term.

<b>Table 16. Selected Water Quality Data for Sampling Locations near the Project Area</b>			
<i>Parameter</i>	<i>Colorado River Near Cameo, CO, USGS Site #0909550 8/8/2013</i>	<i>Colorado River Above S. Canyon USGS Site #09085150 7/1/2013</i>	<i>Colorado River below Rulison CO, USGS Site #09092570 7/8/1977</i>
Instantaneous discharge (cfs)	2,160	3,040	2,000
Temperature, water (°C)	18.4	17.1	21
Field pH (standard units)	8.3	7.9	8.3
Specific conductance (µS/cm/cm at 25°C)	847	728	970
Total Dissolved Solids (mg/L)	NA	586	585
Hardness as CaCO <sub>3</sub> (mg/L)	116	119	230
Chloride (mg/L)	NA	192	180
Selenium (µg/L)	NA	0.38	1
Dissolved oxygen (mg/L)	7.7	8.5	9.2
Note: NA = data not available			
Source: USGS 2013 <a href="http://nwis.waterdata.usgs.gov">http://nwis.waterdata.usgs.gov</a>			

Although surface waters would be most susceptible to sedimentation over the short-term, access roads would remain in place over the life of the well (i.e., 20 to 30 years) and would channel runoff during periods of precipitation. Sedimentation and stream channel impacts associated with roads would be reduced through the implementation of BMPs and other preventative measures. As proposed, these measures would include limiting cut slope steepness, step-cutting, limiting road grade to 10%, crowning road surfaces, installing culverts and drainage systems, and applying gravel to all new or upgraded BLM roads in the project area to a compacted thickness of 6 inches (Appendix A).

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 in a cuttings trench. A traditional reserve pit would not be constructed.

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 must be decontaminated to COGCC standards prior to pit closure; the table of applicable standards can be found at [http://cogcc.state.co.us/RR\\_docs\\_new/rules/900Series.pdf](http://cogcc.state.co.us/RR_docs_new/rules/900Series.pdf)

Refer to Appendix A for standard COAs to mitigate impacts to surface water. Through the use of COAs and BMPs associated with construction activities, prompt interim reclamation, and implementation of preventative measures associated with treatment of fluids, impacts to surface waters would be minimized.

### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to waters in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

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

#### Affected Environment

Waters of the U.S. located in the project vicinity include an unnamed ephemeral tributary to the Colorado River. Section 404 of the CWA requires a Department of the Army permit from the USACE prior to discharging dredged or fill material into waters of the U.S. as defined by 33 CFR Part 328.

#### Environmental Consequences

#### *Proposed Action*

Impacts to waters of the U.S., the rerouting of the drainages and any upgrades to the road and pipeline crossings of drainages within the project would be authorized by the USACE. A COA listed in Appendix A required that the operator obtain a formal jurisdictional determination by USACE prior to any construction that could affect waters of the U.S. and verification that the impacts do not require a permit.

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to wastes in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

### ***Groundwater***

#### Affected Environment

The Lower Piceance Basin contains alluvial and bedrock aquifers (Colorado Geological Survey 2003). Unconsolidated alluvial aquifers are the most productive aquifers in the region (USEPA 2004) and are defined as narrow, thin deposits of sand and gravel formed primarily along stream courses, in this case, 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 design, sediment type and saturated thickness. Domestic wells are limited to 15 gallons per minute administratively, while municipal wells are designed and constructed for maximum potential yield.

The principal bedrock aquifers of the Piceance Basin are the Uinta Formation and the Parachute Creek Member of the Green River Formation, and are defined as the upper and lower Piceance Basin aquifer systems. The Uinta Formation consists of discontinuous layers of sandstone, siltstone, and marlstone and is less permeable than the hydrologically connected upper Parachute Creek Member (Robson and Saulnier 1981). The uppermost Uinta Formation also contains a shallow, perched aquifer that is separate from the upper aquifer unit (Cole et al. 1995). The upper Piceance Basin aquifer is underlain by the Mahogany confining unit, and correlates with the Mahogany Zone, the principal oil shale unit of the Piceance Basin. The Mahogany Zone separates the upper aquifer from the lower. The lower aquifer consists of the fractured marlstone of the lower part of the Parachute Creek Member. The thickness of the

upper and lower aquifer units average 700 and 900 feet, respectively (CGS 2003). Both upper and lower aquifer systems are found within the surrounding cliffs of the project area, but no water wells are completed within either the upper or lower bedrock aquifers units as described above. Beneath these two aquifer systems is a confining unit consisting of the Wasatch Formation and the lower two members of the overlying Green River Formation. Some fresh-water wells are completed in localized water-bearing intervals within this unit. Below 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, 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 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 (USEPA 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 (USEPA 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 throughout the basin. Only very shallow waters such as those from the surficial Wasatch Formation are used for drinking water (USEPA 2004).

According to the CDWR database, there are no domestic water wells located within a 1-mile radius of the proposed well site.

### 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 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 otherwise trapped gas to migrate up the borehole for production.

Hydraulic fracturing 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 that the cementing and casing programs are adequate to protect all downhole resources. With proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers is anticipated to result from the project (Appendix A).

#### Potential Impacts of Hydraulic Fracturing During Oil and Gas Well Completions

For decades, oil and gas companies and independent geophysicists have used state of the art equipment to monitor microseismic activity—defined as a “faint” or “very slight” tremor—during hydraulic fracturing to optimize well completions and to gather information about fracture dimensions and propagation (Warpinski 2011). These data give an indication about the magnitude of seismic activity associated with

hydraulic fracturing, dimensions of resultant fractures in geologic formations, and probability for induced fractures to extend into nearby aquifers, if present. Research indicates that microseismic activity created by hydraulic fracturing occurs at Richter magnitude 1 or less (Warpinski and Zimmer 2012). In comparison, a magnitude 3 earthquake is the threshold that can be felt at the ground surface. The Richter magnitude scale is base-10 logarithmic, meaning that a magnitude 1 tremor is 1/100th the amplitude of a magnitude 3 tremor. The NAS reviewed more than 100,000 oil and gas wells and waste water disposal wells around the world and concluded that “incidences of felt induced seismicity appear to be very rare,” with only one such documented occurrence (NAS 2012).

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

Hydraulically induced fracture orientation in relation to the wellbore depends upon the downhole environment (i.e., rock mechanics, minimum and maximum principle stress directions, rock physical properties, etc.) and the wellbore trajectory. In vertical or normal directional wells such as in the Mesaverde formation—the predominant hydrocarbon-producing formation in the CRVFO area—fracture growth is primarily lateral or outward from the wellbore, with minimal secondary fractures extending at some angle away from the lateral fractures. In horizontal wells such as being used to develop deep marine shales, fracture growth from the wellbore is mainly determined by the orientation of the wellbore in relation to the principal stresses of the rock. Fracture growth toward the surface is limited by barriers such as variations in stress and lithology, as is also the case in vertical and normal directional wells. In some horizontal wells, fracture growth is similar to that in vertical or normal directional wells due to wellbore trajectory along the maximum principal stress direction. Analysis of data from thousands of wells indicates fracture extent (length) of less than 350 feet in the vast majority of cases, with outliers of 1,000 to 2,000 feet (Maxwell 2011, Davies et al. 2012). The extreme outlier lengths are associated with fractures in thick deposits of lithologically uniform marine shales.

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

Based on a review of available information on microseismic monitoring and fracture dimensions, Fisher and Warpinski (2011) concluded that fractures from deep horizontal wells are not a threat to propagate across the long distances (thousands of feet) needed to reach fresh-water aquifers much closer to the surface. This conclusion applies to the CRVFO area, and is also applicable to much shallower potable groundwater sources consisting of unconsolidated alluvium (streambed deposits) associated with the Colorado River and major tributaries. In general, alluvial water wells in the CRVFO extend to depths

of less than 200 feet, with few in the range of 400 feet. Typical water levels in these wells range from 50 to 100 feet deep. Impacts to water quality of these shallow fresh-water wells is highly improbable as a result of hydraulic fracturing, which occurs at depths of 5,000 to 11,000 feet below ground surface.

In addition to vertical separation of several thousand feet between the upper extent of fractures and fresh-water aquifers, there are requirements by the BLM and COGCC for proper casing and cementing of wellbores to isolate the aquifers penetrated by a wellbore. BLM requires surface casing be set from 800 to 1,500 feet deep, based on a geological review of the formations, aquifers, and groundwater. Cement is then pumped into the space between the casing and surrounding rock to prevent fluids from moving up the wellbore and casing annulus and coming in contact with shallow rock layers, including fresh-water aquifers. BLM petroleum engineers review well and cement design and final drilling and cementing logs to ensure the cement has been properly placed. When penetration of groundwater and freshwater aquifers is anticipated, BLM inspectors may witness cementing of surface casing and subsequent pressure testing to ensure the annular space between the casing and borehole wall is properly sealed.

No single list of chemicals currently used in hydraulic fracturing exists for western Colorado, and the exact combinations and ratios used by operators are considered proprietary. However, the general types of compounds and relative amounts used are well known and relatively consistent (Table 17). Since fracture jobs are tailored to the downhole environment, and companies are aware of the concerns involving hydraulic fracturing, the chemicals listed in Table 17 may or may not be used, and the information is provided solely as general information. Although a variety of chemicals additives are used in hydraulic fracturing—the examples in Table 17 being drawn from a total of 59 listed on the FracFocus website—the vast bulk of fluid injected into the formation during the process is water mixed with sand, representing 99.51% of the total by volume in the typical mixture. The sand acts as a proppant, or propping agent, to help keep the newly formed fractures from closing.

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

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

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

Based on the information summarized above, the CRVFO has concluded that properly implemented hydraulic fracturing of oil and gas wells drilled within its boundaries for the purpose of accessing Federal fluid minerals or for accessing private fluid minerals from BLM surface lands does not represent a significant adverse impact to human health and the environment.

<b>Table 17. Constituents of Typical Hydraulic Fracturing Operation in Tight Gas Formations</b>				
<i>Additive Type*</i>	<i>Typical Example*</i>	<i>Percent by Volume**</i>	<i>Function*</i>	<i>Common Use of Example Compound</i>
Acid	Hydrochloric acid	0.123	Dissolves mineral cement in rocks and initiates cracks	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	0.001	Eliminates bacteria in water that produce corrosive or poisonous by-products	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium persulfate	0.010	Allows delayed breakdown of gelling agent	Hair coloring, disinfectant, and manufacture of plastics
Clay stabilizer	Potassium chloride	0.060	Creates brine carrier fluid that prevents fluid interaction with formation clays	Low-sodium table salt substitute, medicines, IV fluids
Corrosion inhibitor	Formic acid	0.002	Prevents corrosion of well casing	Preservative in livestock feed; Lime remover in toilet cleaners
Crosslinker	Borate salts	0.007	Maintains fluid viscosity as temperature increases	Laundry detergents, hand soaps, and cosmetics
Friction reducer	Polyacrylamide	0.088	“Slicks” water to minimize friction	Flocculant in water treatment and manufacture of paper
Gelling agent	Guar gum	0.056	Thickens water to help suspend sand propping agent	Thickener, binder, or stabilizer in foods
Iron control	Citric acid	0.004	Prevents precipitation of metal oxides	Flavoring agent, food preservative
Surfactant	Lauryl sulfate	0.085	Increases fluid viscosity	Soaps, shampoos, detergents, foaming agents
pH adjusting agent	Acetic acid, sodium hydroxide	0.011	Adjusts pH of fluid to maintain effectiveness of other components	Sodium hydroxide in soap, drain cleaner; acetic acid as chemical reagent, vinegar ingredient
Scale inhibitor	Sodium polycarboxylate	0.043	Prevents scale deposits in pipes	Dishwashing liquids and other cleaners
Winterizing agent	Ethanol, isopropyl alcohol, methanol	--	Stabilizer, drier, and anti-freezing agent	Various cosmetic, medicinal, and industrial uses
<b>Total Additives</b>		<b>0.49</b>		
<b>Total Water and Sand</b>		<b>99.51</b>		
*FracFocus Chemical Disclosure Registry, <a href="http://fracfocus.org/chemical-use/what-chemicals-are-used">fracfocus.org/chemical-use/what-chemicals-are-used</a>				
**DOE 2009				

*No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to groundwater in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

**Wildlife – Aquatic Species**

Affected Environment

Aquatic habitat is limited in the Gant Gulch area given the intermittent nature of project area streams. Because of their small size and limited and flashy flows, Gant Gulch and Dry Creek do not support fish.

## Environmental Consequences

### *Proposed Action*

Since aquatic habitats do not occur within the project area, the Proposed Action would not have any direct impact on aquatic wildlife. Potential indirect effects to endangered fishes in the Colorado River are discussed under the section on Special Status Species.

### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to aquatic wildlife in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

## **Wildlife - 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.

A variety of migratory bird species occupy, or have the potential to occupy, the Grass Mesa geographic 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 Wildlife and Fish 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 more than 100 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 Gant Gulch area that are listed by the USFWS as BCC species (USFWS 2008), focusing on them and on non-BCC species that are Neotropical (long-distance) migrants or raptors—three groups highly vulnerable to habitat loss or modification on their breeding grounds.

Species on the BCC list potentially present in the Gant Gulch project area, based on habitat preferences and known geographic ranges, include the flammulated owl (*Psiloscoops flammeolus*), Lewis’s woodpecker (*Melanerpes lewis*), pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), Brewer’s sparrow (*Spizella breweri*), and Cassin’s finch (*Haemorhous cassinii*). The flammulated owl and Brewer’s sparrow are also listed as BLM sensitive species and addressed in the section on Special Status Wildlife and Fish. The potential for occurrence of Lewis’s woodpecker is low due to its close association with riparian woodlands and to pinyon-juniper habitats with a component of ponderosa pine—neither of which is a major habitat type within the project vicinity.

Among the other BCC species listed above, the pinyon jay and juniper titmouse are almost totally associated with extensive stands of pinyon pine (*Pinus edulis*) and junipers (Rocky Mountain juniper [*Juniperus scopulorum*] and Utah juniper [*J. utahensis*]), not prevalent in the project area but extensive in the project vicinity. Cassin's finch nests at higher elevations, primarily in ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), or mixed stands of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies latifolium*). However, Cassin's finches often disperse to lower elevations following the breeding season and may remain there until the following spring. Mixed mountain shrub habitats containing large, tree-like Gambel's oaks (*Quercus gambeli*) are among the vegetation types sometimes supporting winter use by Cassin's finch.

Non-BCC species likely to occur in the project area or vicinity include several Neotropical migrants associated with mixed mountain shrub habitats. These include the common nighthawk (*Chordeiles minor*) (not a raptor), common poorwill (*Phalaenoptilus nuttallii*), broad-tailed hummingbird (*Selasphorus platycercus*), dusky flycatcher (*Empidonax oberholseri*), western scrub-jay (*Aphelocoma californica*), Virginia's warbler (*Oreothlypis virginiae*), orange-crowned warbler (*O. celata*), MacGillivray's warbler (*Oporornis tolmiei*), lazuli bunting (*Passerina amoena*), lesser goldfinch (*Spinus psaltria*), black-headed grosbeak (*Pheucticus melanocephalus*), and spotted towhee (*Pipilo maculata*). The western wood-pewee (*Contopus sordidulus*), cordilleran flycatcher (*Empidonax difficilis*), warbling vireo (*Vireo gilvus*), Bullock's oriole (*Icterus bullockii*), and blue grosbeak (*Passerina caerulea*) are associated primarily with trees but may occur in mixed mountain shrub habitats containing tree-form Gambel's oaks or species protruding above shrub layer.

Non-BCC species likely to occur in the minor pinyon-juniper 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*), plumbeous vireo (*V. plumbeus*), black-throated gray warbler (*Dendroica nigrescens*), and chipping sparrow (*Spizella passerina*). Two other Neotropical migrants, the ash-throated flycatcher (*Myiarchus cinerascens*) and gray flycatcher (*Empidonax wrightii*) are potentially present, although the project area is at the eastern edge of their range.

Raptors use the area for nesting and hunting activities. Nesting habitat is primarily found in the Gambel oaks and pinyon-juniper woodlands of the project vicinity. Species most likely to nest within or near the project areas include the American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipiter striata*), Cooper's hawk (*A. cooperi*), red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginiana*), and northern pygmy-owl (*Glaucidium gnoma*). Six raptor nest structures were found within the 0.25-mile buffer south of the proposed C26W pad location during project-specific surveys. One of the nests appeared to have been used in the 2012 nesting season, most likely by a Cooper's hawk (Wildlife Specialties 2013).

## Environmental Consequences

### *Proposed Action*

Direct impacts to migratory birds from the Proposed Action include the loss or fragmentation of approximately 21.4 acres of foraging/hunting and nesting habitat. Removal of sagebrush and mixed mountain shrub species would result in a loss of existing and potential nesting sites. Loss of habitat and impacts on populations would be more severe for high-priority species such as BCC species, other Neotropical migrants, and raptors. While project impacts may affect individual birds, it is not expected to adversely impact a species as a whole.

If construction, drilling, or completion activities occur during the spring/summer season, equipment operations and noise near active nests could cause nest failure or nest abandonment and a reduction in productivity. Construction activity during the nesting season could also result in the destruction of clutches and/or mortality of nestlings/fledglings.

Throughout the project life, Encana remains subject to the MBTA, administered by the USFWS, which precludes the “take” of any raptor or most other native species. The MBTA prohibits the “take” of a protected 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 timing limitation (TL) would be applied as a COA to any activities authorized pursuant to this EA. Because the nests are most likely those of an accipiter (Cooper’s hawk), the COA would be applied to prohibit construction, drilling, or completion activities during the period May 1 to July 1. A separate TL would be applied to the same dates of May 1 to July 1 to prohibit any vegetation removal as a means of reducing adverse impacts to other migratory birds such as BCC species. Appendix A provides details of these COAs and describes potential bases for the granting of an exception to the TLs.

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to migratory birds in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

### **Wildlife, Terrestrial**

#### Affected Environment

##### *Mammals*

The site is located within winter range and severe winter range for and Rocky Mountain elk (*Cervus elaphus nelsoni*) and winter range for mule deer (*Odocoileus hemionus*) as mapped by CDOW (2008). Winter range is the portion of the overall range of a species in which 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 (CDOW 2008). Severe winter range is that part of the range of a species 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 (CDOW 2006). Field surveys indicate that the project area is occupied winter range for elk and that mule deer occupy on a year-round basis.

Large carnivores present in the project vicinity include the mountain lion (*Puma concolor*) and black bear (*Ursus americanus*). CDOW (2008) has mapped all of the analysis area as black bear (*Ursus americanus*) overall range. In addition, the southeastern portions of the analysis area are at the periphery of a black bear fall concentration area (CDOW 2008), reflecting the abundance of calorie-rich acorns and berries provided by the oaks and rosaceous shrubs (serviceberry, chokecherry). 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 throughout 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 planning area include rodents such as the rock squirrel (*Otospermophilus variegatus*), golden-mantled ground squirrels (*Callospermophilus lateralis*), least chipmunk (*Neotamias minimus*), and packrat (bushy-tailed woodrat) (*Neotoma cinerea*), as well as the mountain cottontail (*Sylvilagus nuttallii*). Rodents and, to a lesser extent rabbits, are the primary prey base for a variety of avian and mammalian predators.

### *Birds*

Raptors potentially nesting in the large Gambel's oaks throughout the project vicinity include two small resident hawks (Cooper's hawk, sharp-shinned hawk) and, where taller conifers are present for nesting or perching, two larger resident raptors (red-tailed hawk and great horned owl). Other birds of prey potentially present include three small owls: the migratory flammulated owl and the resident northern pygmy owl and northern saw-whet owl, the latter two primarily where tall conifers or tall deciduous trees are present among the shrubs.

Other residents or short-distance migrants in the project vicinity include the northern flicker (*Colaptes auratus*), common raven (*Corvus corax*), black-billed magpie (*Pica hudsonia*), western scrub-jay (*Aphelocoma californica*), mountain and black-capped chickadees (*Poecile gambeli*, *P. atricapillus*), American robin (*Turdus migratorius*), Townsend's solitaire (*Myadestes townsendii*), blue-gray gnatcatcher (*Poliophtila caerulea*), and house finch (*Haemorhous mexicanus*). See the sections on Migratory Birds and Special Status Species for discussions of other birds in the area.

One upland gamebird species occurs in the project vicinity, the wild turkey (*Meleagris gallopavo*). Although the area is not mapped by CDOW as a turkey concentration area, the abundant acorns and berries that attract black bears are likely to also attract turkeys, particularly in fall, but also in other seasons when they can forage for other plant and invertebrate food items in the dense leaf litter.

### *Reptiles and Amphibians*

The project area is above the elevational range of most reptile species known to occur in Garfield County. Species most likely to occur include the western fence lizard (*Sceloporus undulatus*) and gopher snake (bullsnake) (*Pituophis catenifer*) in xeric shrublands or grassy clearings and the western terrestrial garter snake (*Thamnophis elegans*), smooth green snake (*Liochlorophis vernalis*), and milk snake (*Lampropeltis triangulum*) in mesic sites. Being closely tied to waters for breeding, amphibians are not expected to occur within or near the project area. However, the amphibian with the greatest potential for occurrence, the western chorus frog (*Pseudacris triseriata*), can breed and reside in small, temporary wetland areas.

## Environmental Consequences

### *Proposed Action*

The Proposed Action would result in the initial loss and fragmentation of 21.4 acres of wildlife habitat. Following partial reclamation of new pads and roads, long-term forage disturbance would be reduced to approximately 5.2 acres for the Proposed Action. 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 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 geographic 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 Invasive Non-Native Plants section of this EA would minimize the potential for invasion and establishment of the Grass Mesa geographic area by undesirable plants.

Indirect impacts on wildlife, especially big game and raptors, would be the 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 types of disturbance or move to different areas screened by vegetation screening 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 (BLM 1999a).

The Proposed Action would occur on Federal Leases COC52889, COC69615 and COC69616. As shown in Table 3, Summary of Lease Stipulations, a timing limitation would be enforced from December 1 through April 30 to protect big game use of winter habitats.

#### *No Action Alternative*

Under the No Action Alternative, the proposed Federal wells would not be approved. The C26W pad, access road, and buried pipeline would not be constructed, resulting in no new impacts to terrestrial wildlife in the project area. However, oil and gas activity would continue at adjacent locations on BLM and Fee land.

### **SUMMARY OF CUMULATIVE IMPACTS**

Historically, habitat loss or modification in the CRVFO areas was characteristic of agricultural, ranching lands, rural residential, with localized industrial impacts associated with the railroad and I-70 corridors and the small communities. More recently, the growth of residential and commercial uses, utility corridors, oil and gas developments, and other rural industrial uses (e.g., gravel mining along the Colorado River) has accelerated the accumulation of impacts in the area. Cumulative impacts have included (1) direct habitat loss, habitat fragmentation, and decreased habitat effectiveness; (2) increased potential for runoff, erosion, and sedimentation; (3) expansion of noxious weeds and other invasive species; (4) increased fugitive dust from construction of oil and gas pads, roads, and pipelines and associated truck travel; (5) increased noise, especially along access and haul roads; (6) increased potential for spills and other releases of chemical pollutants; and (7) decreased scenic quality.

Although none of the cumulative impacts was described in the 1999 Final Supplemental Environmental Impact Statement (BLM 1999a) as significant, and while new technologies and regulatory requirements have reduced the impacts of some land uses, various past, present, and reasonably foreseeable future actions have had and would continue to have adverse effects on various elements of the human and

natural environment. Anticipated impacts for existing and future actions range from negligible to locally major, and primarily negative, for specific resources.

The primary bases for this assessment are twofold: First, although the rate of development, including oil and gas development, has slowed in recent years due to the general economic downturn and depressed natural gas prices, some development continues to occur, adding to the previous residential, commercial, and industrial growth, the previous habitat loss, modification, and fragmentation, and the amount of vehicular traffic and equipment operations associated with long-term production and maintenance. Second, most of the oil and gas development has occurred on private lands where mitigation measures designed to protect and conserve resources may not be in effect to the same extent as on BLM lands. However, COGCC regulations enacted in recent years have closed considerably the former gap between the potential environmental impacts associated with development of private versus Federal fluid mineral resources.

A cumulative impact of particular and growing concern to the public is that of cumulative air-quality impacts associated with the ever-increasing number of producing oil and gas wells and of emissions associated with operation and maintenance of the wells, other surface facilities, and tailpipe emissions from service vehicles. Results of the 2011 air quality modeling used as a basis for evaluating project-specific air quality impacts included an analysis of cumulative impacts from non-project federal wells and from private wells within the CRVFO and the surrounding airshed.

Based on the above, 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, native vegetation, migratory birds, terrestrial wildlife, and other resources.

**PERSONS AND AGENCIES CONSULTED**

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**INTERDISCIPLINARY REVIEW**

BLM staff who participated in the preparation of this EA are listed in Table 18.

<b>Table 18. BLM Interdisciplinary Team Authors and Reviewers</b>		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Vanessa Caranese	Natural Resource Specialist	EA Project Lead, Access & Transportation, Socioeconomics, Wastes-Hazardous or Solid.
Peter Cowan	Petroleum Engineer	Downhole COAs
Allen Crockett, Ph.D., J.D.	Supervisory Natural Resource Specialist	NEPA Review, General Technical Review
Shauna Kocman, Ph.D., P.E.	Petroleum Engineer, Air Program Lead	Air Quality, Noise, Soils, Surface Water, Waters of the U.S.
Julie McGrew	Natural Resource Specialist	Visual Resources, Lands and Realty

<b>Table 18. BLM Interdisciplinary Team Authors and Reviewers</b>		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
Judy Perkins, Ph.D.	Botanist	Invasive Non-native Species, Special-status Species (Plants), Vegetation
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special-status Species (Animals), Wildlife, Aquatic and Terrestrial
Todd Sieber	Geologist	Geology, Paleontology, Groundwater

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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-N040-2013-0116**

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 pads. In cases of discrepancies, the following COAs supersede earlier versions.

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

1. Administrative Notification. The operator shall notify the BLM representative at least 48 hours prior to initiation of construction. If requested by the BLM representative, the operator shall schedule a pre-construction meeting, including key operator and contractor personnel, to ensure that any unresolved issues are fully addressed prior to initiation of surface-disturbing activities or placement of production facilities.
2. 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. 15 or mark.a.gilfillan@usace.army.mil.

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 jurisdictional waters may require mitigation. Contact the USACE Colorado West Regulatory Branch at 970-243-1199 ext. 17 or mark.a.gilfillan@usace.army.mil. 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. 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 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 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 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 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 reseeding to identify if and what type of soil amendments may be required to enhance revegetation success. At a minimum, the soil tests shall include texture, pH, organic matter, sodium adsorption ratio (SAR), cation exchange capacity (CEC), alkalinity/salinity, and basic nutrients (nitrogen, phosphorus, potassium [NPK]). Depending on the outcome of the soil testing, the BLM may require the operator to submit a plan for soil amendment. Any requests to use soil amendments not directed by the BLM shall be submitted to the CRVFO for approval.

- e. Seed Mixes. A seed mix 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 October 23, 2012).

For private surfaces, the menu-based seed mixes are recommended, but the surface landowner has ultimate authority over the seed mix to be used in reclamation. The seed shall contain no prohibited or restricted noxious weed seeds and shall contain no more than 0.5% by weight of other weed seeds. Seed may contain up to 2.0% of “other crop” seed by weight, including the seed of other agronomic crops and native plants; however, a lower percentage of other crop seed is recommended. Seed tags or other official documentation shall be submitted to BLM at least 14 days before the date of proposed seeding for acceptance. Seed that does not meet the above criteria shall not be applied to public lands.

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

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

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 BMPs approved by the BLM. Additional BMPs such as biodegradable wattles, weed-free straw bales, or silt fences shall have be employed as necessary to reduce transport of sediments into the drainages. The BLM may, in areas with high erosion potential, require use of hydromulch or biodegradable blankets/matting to ensure adequate protection from slope erosion and offsite transport of sediments and to improve reclamation success.
- i. Site Protection. 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, including the monitoring protocols used, 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 the 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, and Pesticide Application Records (PARs) shall be submitted to BLM by **December 1**.
9. Big Game Winter Range Timing Limitation. To minimize impacts to wintering big game, no construction, drilling or completion activities shall occur during a Timing Limitation (TL) period from **December 1 to April 30 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, should 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 resulted in the location of one or more raptor nest structures within 0.25 mile of a pad 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 prohibit initiation of construction, drilling, or completion activities within the buffer widths specified from **May 1 to July 1**. The same 60-day TL shall also apply to prohibit initiation of construction, drilling, or completion activities during subsequent nesting seasons unless subsequent surveys determine that no nests are unoccupied during the normal breeding period for the particular species. The BLM may grant an exception to the TL in subsequent nesting seasons without requiring a follow-up survey if the nest was severely dilapidated when identified, indicating protracted disuse and low likelihood of reuse.

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

12. Migratory Birds – Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all vegetation removal or surface disturbance in previously undisturbed lands providing potential nesting habitat for Birds of Conservation Concern (BCC) is prohibited from **May 1 to July 1**. An exception to this TL may be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no 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 auidial 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 – General. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to “take” of migratory bird species, which includes injury and direct mortality resulting from human actions not intended to have such result. To minimize the potential for the take of a migratory bird, the operator shall take reasonable steps to prevent use by birds of fluid-containing pits associated with oil or gas operations, including but not limited to reserve pits, produced-water pits, hydraulic fracturing flowback pits, evaporation pits, and cuttings trenches. Liquids in these pits—whether placed or accumulating from precipitation—may pose a risk to birds as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation.

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

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

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 minimize the potential for triggering or expanding an outbreak of the *Ips* beetle, the BLM may require any pinyon trees inadvertently damaged or intentionally trimmed during road, pad, or pipeline construction to be cut to the ground or grubbed from the ground and either chipped and buried in the toe of the fill slope or removed within 24 hours to a location approved by the Colorado State Forest Service. Prior to authorizing use of any slash from pinyon pines for purposes of visual mitigation, erosion control, as a coarse mulch, or to impede travel along a pipeline route by off-highway vehicles, the BLM will inspect the affected stand for signs of *Ips* beetle infestation. No slash or pruned material from an infected stay shall be used for such purposes.
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. 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 with BLM Standard Environmental Color **Shadow Gray** to minimize contrast with adjacent vegetation or rock outcrops.

To the extent practicable, all woody vegetation (live and dead) shall remain standing at the toe of the fill slopes and at the top of the cut slopes of the pad, access road, and pipeline corridor to provide visual screening. All woody vegetation left standing at the toe and at the top of the cut slopes shall be protected and remain standing and undamaged when fill material is pulled back to recontour the pad, access road, and pipeline corridor.

During construction, BLM and Encana representatives shall jointly review construction measures to determine effectiveness in meeting visual resource mitigation measures, and if subtle changes in construction techniques are warranted.

After construction, the road alignment and pad shall be reviewed to determine if the surface color detracts from the viewshed (as viewed from the KOPs). If it is determined that the road and/or pad surface color contrasts with the surrounding landscape, dust abatement measures, as approved by the BLM authorized officer, shall be required. The operator shall implement a regularly scheduled dust abatement application so that the road and pad surface takes on and maintains a dark appearance when the road is viewed from the KOPs. The level and type of treatment may be changed in intensity and must be approved by the BLM authorized officer.

Where sideslopes exceed 50%, no sidecasting from road construction shall be allowed; excavated material shall be end-hauled or machine-drifted to a location with gentler slopes – preferably where additional fill material will be needed. Where feasible in areas with sideslopes less than 50%, cuts shall be laid back to 2:1 slope in order to break up the visual scar and facilitate reclamation.

A berm along the northern edge of the pad shall be constructed to interrupt the sightline from viewers located below the pad and from the KOPs. The slopes of the berm shall mimic those found in the adjacent landscape, gradually transitioning to meet grade. Where the berm begins to meet the adjacent contours, the edge shall be transitioned; it shall not form a visually disruptive line where it meets the existing grade.

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. Steep or Unstable Slopes. For projects involving cuts and fills on slopes steeper than 50%, on erosive soils with slopes steeper than 30%, or other potentially unstable slopes, the BLM may require a professional geotechnical analysis prior to construction.
21. Reserve Pit. If a reserve pit is used, the pit shall be maintained with a minimum of 2 feet of freeboard as measured from the highest level of drilling fluids and cuttings in the reserve pit to the lowest surface elevation of the ground at the reserve pit perimeter.

#### **GENERAL TERMS AND CONDITIONS OF THE RIGHT-OF-WAY GRANT**

These General Terms and Conditions are applicable to all activities within the GRG (COC76339 and COC76339T), unless otherwise specified.

1. Administrative Notification. The operator shall not initiate any construction or other surface disturbing activities on the ROW without prior written authorization of the BLM. Such authorization shall be a written *Notice to Proceed* (Form 2800-15). Any *Notice to Proceed* shall authorize construction or use any as therein expressly stated and only for the particular location or use therein described.
2. Pre-construction Meeting. The operator shall schedule and conduct a pre-construction meeting with BLM prior to the operator's commencing construction and/or surface disturbing activities on the ROW. The operator, its agent, its contractor(s), and other parties involved with construction and/or any surface-disturbing activities associated with the ROW shall attend this meeting to review the stipulations of the ROW grant, including the POD as applicable, as well as required safety regulations, if appropriate.
3. Gold Book Standards. The pipeline shall be installed to industry and BLM "Gold Book" standards. The pipeline(s) shall be buried with at least 36 inches of cover from the top of the pipe to the surface, and within the 55-foot ROW corridor. Overall construction width including the 25-foot temporary use permit shall not exceed 55 feet. The centerline of the ROW and the exterior limits shall be clearly flagged prior to any construction activity.
4. APD Approval. No surface disturbing activities shall take place on the subject right-of-way until the associated APD is approved. The operator will adhere to special stipulations in the Surface Use Program of the approved APD, relevant to any right-of-way facilities.
5. Limits of Disturbance. The operator shall conduct all activities associated with the construction, operation, and termination of the ROW within the authorized limits of the granted ROW.
6. Weed Control. The operator shall be responsible for weed control on disturbed areas within the limits of the right-of-way. The operator is responsible for consultation with the authorized officer and/or local authorities for acceptable weed control methods (within limits imposed in the grant stipulations).
7. Saturated Soils Conditions. When saturated soil conditions exist on or along the proposed ROW prior to removal of vegetation or stripping of topsoil in an area, construction in that areas shall be halted

until soil material dries out or is frozen sufficiently for construction to proceed without undue damage and erosion to soils.

8. Copy of Stipulations Maintained Onsite. A copy of these stipulations, including exhibits and the Plan of Development, if required, shall be kept on the project area and made available to persons directing equipment operation.
9. Utilities Locations. All existing pipelines, surface valves, and other utilities shall be field located, clearly marked, and the appropriate Utility Notification Center ([www.unc.org](http://www.unc.org)) shall be notified before any construction/surface work occurs. All publicly owned underground facilities shall be marked according to the APWA color code.
10. Warning Signs. Pipeline warning signs shall be installed within 5 days of completion of construction and prior to use of the pipeline for transportation of product. Pipeline warning shall be installed at all road crossings and shall be visible from sign to sign along the ROW. For safety purposes each sign shall be permanently marked with the operator's name and shall clearly identify the owner (emergency contact) and purpose (product) of the pipeline.
11. Sanitary Site Conditions. Construction sites shall be maintained in a sanitary condition at all times; waste materials at those sites shall be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment. Disposal of all liquid and solid wastes produced during construction or operation of the pipeline shall be in an approved manner so as to not adversely affect the air, soil, water, vegetation, or wildlife.
12. Other Required Approvals and Permits. This authorization is contingent upon receipt of and compliance with all appropriate Federal, state, county and local, permits. The operator shall be responsible for obtaining all necessary environmental clearances and permits from all agencies (U.S. Army Corps of Engineers, Colorado Parks and Wildlife, U.S. Fish and Wildlife Service, Colorado Department of Transportation, Colorado Department of Public Health and Environment, Garfield County Road and Bridge, and City of Rifle) before commencing any work under this permit. Without all clearances and permits, this permit shall be not in effect. Operator shall assume all responsibility and liability related to potential environmental hazards encountered in connection with work under this permit.
13. Compliance with Federal Regulations. This grant amendment is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulations parts 2800 and 2880.
14. Compliance with Laws. The operator shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the operator shall comply with the Toxic Substances Control Act of 1976 (TSCA), as amended (15 U.S.C. 2601 *et seq.*) with regard to any toxic substances that are used, generated by, or stored on the ROW or on facilities authorized under this ROW grant (40 CFR Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193). Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release of spill of any toxic substances shall be furnished to the BLM concurrently with the filing of the reports to the involved Federal agency or State government.

15. Indemnification. The operator agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601 *et seq.* or the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6901, *et seq.*) on the ROW (unless the release or threatened release is wholly unrelated to the operator's activity in the ROW). This agreement applies without regard to whether a release is caused by the operator, its agent, or unrelated third parties.
16. Paint Color. All above ground structures not subject to safety requirements shall be painted by the operator to the specifications of the BLM in order to meet the Visual Resource Management (VRM) requirements for the area.
17. As-Built Survey. An "as-built" center line survey of the right-of-way crossing Federal land, provided by a Certified Land Surveyor licensed to work in the State of Colorado, shall be provided to the BLM within 2 months of completion of the project.
18. Open Trenches. All open trenches shall be maintained in a safe condition to ensure no side-wall collapsing occurs and that all personnel, livestock, and wildlife are safe from falling into an open trench or being trapped or injured within the trenches.

Some protective systems may include (*Reference: OSHA 29 CFR 1926.650*):

- Shoring by installing supports to prevent soil movement for trenches that do not exceed 20 feet in depth.
- Shielding to protect workers by using trench boxes or other types of supports to prevent soil cave-ins.
- Always provide a way to exit a trench, such as a ladder or ramp, no more than 25 feet of lateral travel for personnel, livestock, or wildlife in the trench.
- Keep spoils at least 2 feet back from the edge of a trench.
- Make sure that trenches are inspected by competent personnel prior to entry and after any hazard-increasing event such as a rainstorm, etc.

Trenches adjacent to access roads and/or public or private dwellings shall be covered and/or warning barriers erected upon completion of daily construction or at any time personnel are not present on the construction site.

19. Welding of Pipeline. All wells shall be X-rayed 100% and reviewed and approved by a level 2 or 3 qualified inspector per 49 CFR 192. All welders shall be appropriately certified. (*Ref. 49 CFR 192.227, Qualifications of Welders*).
20. Fire Suppression. Welding or other use of an acetylene or other torch with open flame shall be operated in an area barren or cleared of all flammable materials at least 10 feet on all sides of equipment. Internal combustion engines must be equipped with approved spark arrestors which meet either (a) the USDA Forest Service Standard 5100-1a or (b) Society of Automotive Engineers (SAE) recommended practices J335(b) and J350(a).
21. Pipeline Testing. The entire pipeline shall be tested in compliance with DOT regulations (49 CFR Part 192). Incremental segments of the pipeline shall be filled to the desired maximum pressure and held for the duration of the test (8 hours minimum). (*Ref. 49 CFR 192.503.c*).

Notification to all nearby residents as well as the appropriate County Dispatch Center shall be made no less than 24 hours prior to the pressure test and blow down. All necessary and reasonable precautions shall be taken to ensure the safety of the employees and the general public, the lands, domestic animals and wildlife, etc. This may include, but not be limited to, restriction of access to the pipe being tested, temporary warning signs installed in appropriate locations, effective communication.

22. Notification of Other ROW Holders. The holder shall notify all existing ROW holders in the project area prior to beginning any surface disturbance or construction activities. It is the holder's responsibility to coordinate with all other ROW holders and resolve any conflicts.
23. Restrictions on Onsite Materials Storage. The operator shall not store hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating activities within 200 feet of any water body or dry drainage. Equipment or vehicles that are crossing or working within 200 feet of water bodies shall not be refueled unless the Environmental Inspector gives a specific exception. If any hazardous material must be temporarily stored or transferred within 200 feet of a water body (i.e., stationary pumps), it must be placed within a secondary containment structure that is capable of containing 110% of the volume of the stored material.
24. Traffic Control. Appropriate precautions for traffic control on public lands shall be in place and conform to the guidelines of the "Manual on Uniform Traffic Control Devices (MUTCD): Temporary Traffic Control Elements". A copy of the traffic control plan shall remain on site at all times during construction activities.
25. Survey Monuments. The operator shall protect all survey monuments found within the right-of-way. Survey monuments include, but are not limited to, General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the holder shall immediately report the incident, in writing, to the authorized officer and the respective installing authority if known. Where General Land Office or Bureau of Land Management right-of-way monuments or references are obliterated during operations, the holder shall secure the services of a registered land surveyor or a Bureau cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the Manual of Surveying Instructions for the Survey of the Public Lands in the United States, latest edition. The holder shall record such survey in the appropriate county and send a copy to the authorized officer. If the Bureau cadastral surveyors or other Federal surveyors are used to restore the disturbed survey monument, the holder shall be responsible for the survey cost.
26. Transportation/Road Maintenance. Commuting construction crews shall car pool to reduce the number of vehicle trips on local area roads and associated wear and tear. Operator shall ensure the commuting construction crews comply with posted speed limits on public roads and limit driving speeds to 20 mph on more primitive access roads to reduce the potential for vehicle collisions as well as to reduce traffic related noise and air pollution.

## BUREAU OF LAND MANAGEMENT

Colorado River Valley Field Office  
2300 River Frontage Road  
Silt, CO 81652

### DOWNHOLE CONDITIONS OF APPROVAL Applications for Permit to Drill

Operator: Encana Oil & Gas (USA) Inc.  
Case Numbers: COC55972E (Lease COC52889)  
COC68997X (Leases COC69615 and COC69616)  
Pad(s): C26W  
Engineer: Peter Cowan  
Surface Location: Garfield County; NENW Sec. 26 T7S R93W

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; Tim Barrett, PET; Alex Provstgaard, PET; Brandon Jamison, 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 Shauna Kocman or Peter Cowan for verbal approvals (contact information below).
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, Shauna Kocman or Peter Cowan 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. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall be effectively anchored, have flanged connections, and configured to the manufacturer's specifications. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the authorized officer/inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.
6. 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 pit volume totalizer, stroke counter, and flow sensor.

7. 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.
8. 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.
9. 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 ([picowan@blm.gov](mailto:picowan@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 Shauna Kocman or Peter Cowan. A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.
10. 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.
11. 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](mailto:asieber@blm.gov) for clarification.
12. 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).
13. 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, Shauna Kocman or Peter Cowan 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.

14. 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 Shauna Kocman or Peter Cowan immediately.
15. Per 43 CFR 3162.4-1(c), no later than the 5<sup>th</sup> 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.
16. After drilling the surface casing for all wells, email Julie King, jjking@blm.gov, the casing tally and cementing report.

**Contact Information**

**Shauna Kocman, PhD, PE**  
Petroleum/ Environmental Engineer  
Office: (970) 876-9061  
Cell: (970) 456-5602  
skocman@blm.gov

**Peter Cowan**  
Petroleum Engineer  
Office: (970) 876-9049  
Cell: (970) 309-8548  
picowan@blm.gov

<b>List of Wells</b>				
<i>Pad</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottom Hole Locations</i>	<i>Case (Lease)</i>
C26W Pad (BLM Surface)	HMU Federal 23-10A	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 NWSE	COC55972E (COC52889)
	HMU Federal 23-10D	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 NWSE	COC55972E (COC52889)
	HMU Federal 23-11B	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 NESW	COC55972E (COC52889)
	HMU Federal 23-11C	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 NESW	COC55972E (COC52889)
	HMU Federal 23-11D	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 NESW	COC55972E (COC52889)
	MCU Federal 23-13A	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSW	COC68997X (COC69615)
	MCU Federal 23-13AA	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSW	COC68997X (COC69615)
	MCU Federal 23-13D	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSW	COC68997X (COC69615)
	MCU Federal 23-13DD	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSW	COC68997X (COC69615)
	MCU Federal 23-14A	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SESW	COC68997X (COC69615)
	HMU Federal 23-15B	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSE	COC55972E (COC52889)
	HMU Federal 23-15C	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSE	COC55972E (COC52889)
	HMU Federal 23-15CC	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 23 SWSE	COC55972E (COC52889)
	MCU Federal 26-2B	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 26 NWNE	COC68997X (COC69616)
	MCU Federal 24-4A	T7S R93W, Sect. 26 NENW	T7S R93W, Sect. 26 NENW	COC68997X (COC69616)



**FONSI**  
**DOI-BLM-CO-N040-2013-0116-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.

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) and as Terms and Conditions for issuance of the associated Right-of-Way grant.
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 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 pursuant to 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 APDs for the Federal wells drilled on the proposed pads.

NAME OF PREPARER: Christine Cimiluca, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



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

DATE: Feb 3, 2014