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

ENVIRONMENTAL ASSESSMENT

NUMBER

DOI-BLM-CO-N040-2011-0110-EA

CASEFILE NUMBER

Surface holes of all wells and bottomholes for Federal wells are located within Federal Lease COC70018. Fee wells planned for the pad would be permitted with BLM Right-of-Way COC75120.

PROJECT NAME

Proposal to Drill up to 60 Wells from the Proposed WF H15 596 Pad Located on Public and Private Lands along West Fork Parachute Creek, Garfield County, Colorado.

PAD LOCATION

Township 5 South (T5S), Range 96 West (R96W), Section 15, SE¼NE¼, Sixth Principal Meridian

APPLICANT

Encana Oil & Gas (USA) Inc. Contact: Heather Mitchell, 370 Seventeenth Street, Suite 1700, Denver, Colorado 80202.

PROPOSED ACTION

Encana Oil & Gas (USA) Inc. (Encana) proposes to drill and develop up to 60 new oil and gas wells from the proposed WF H15 596 pad (four Federal wells and 56 fee wells) located along West Fork Parachute Creek. The proposed pad would mostly be constructed on a 40-acre tract of public land surrounded by Encana's North Parachute Ranch; the surface-hole locations for the 60 wells would be on BLM land, while the east and south edges of the pad would be on adjacent Encana property (Figure 1). At this time, directional and horizontal wells are being planned for the site, with the initial Federal well proposed as a conventional directional well.

The initial drilling visit, scheduled for 2012, would include drilling and completing one Federal directional well and 17 fee wells (Table 1). The remaining 60 wells would be drilled in another one to two drilling visits. Two banks of cellarholes would be planned for the site, making it possible to stage two rigs on the location for follow-up drilling beyond 2012 (Figure 2). The planned wells would be remotely completed by using an approved frac pit and staging well completion equipment on the nearby existing WF A15 pad. The well completion work would occur simultaneously once the well drilling process has begun.

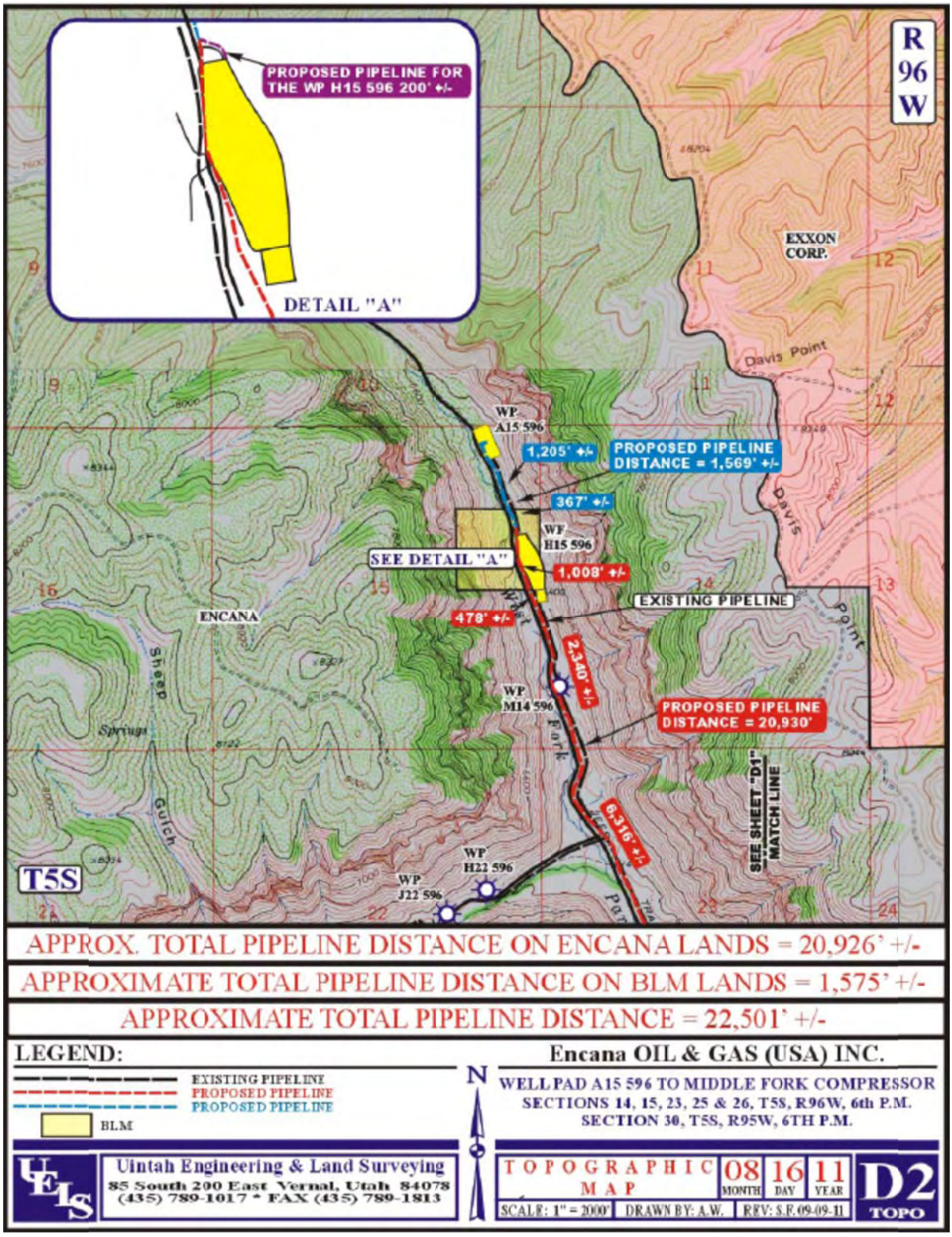

Figure 1. Location Map Featuring Proposed Pad and Western Extent of Proposed Pipelines.

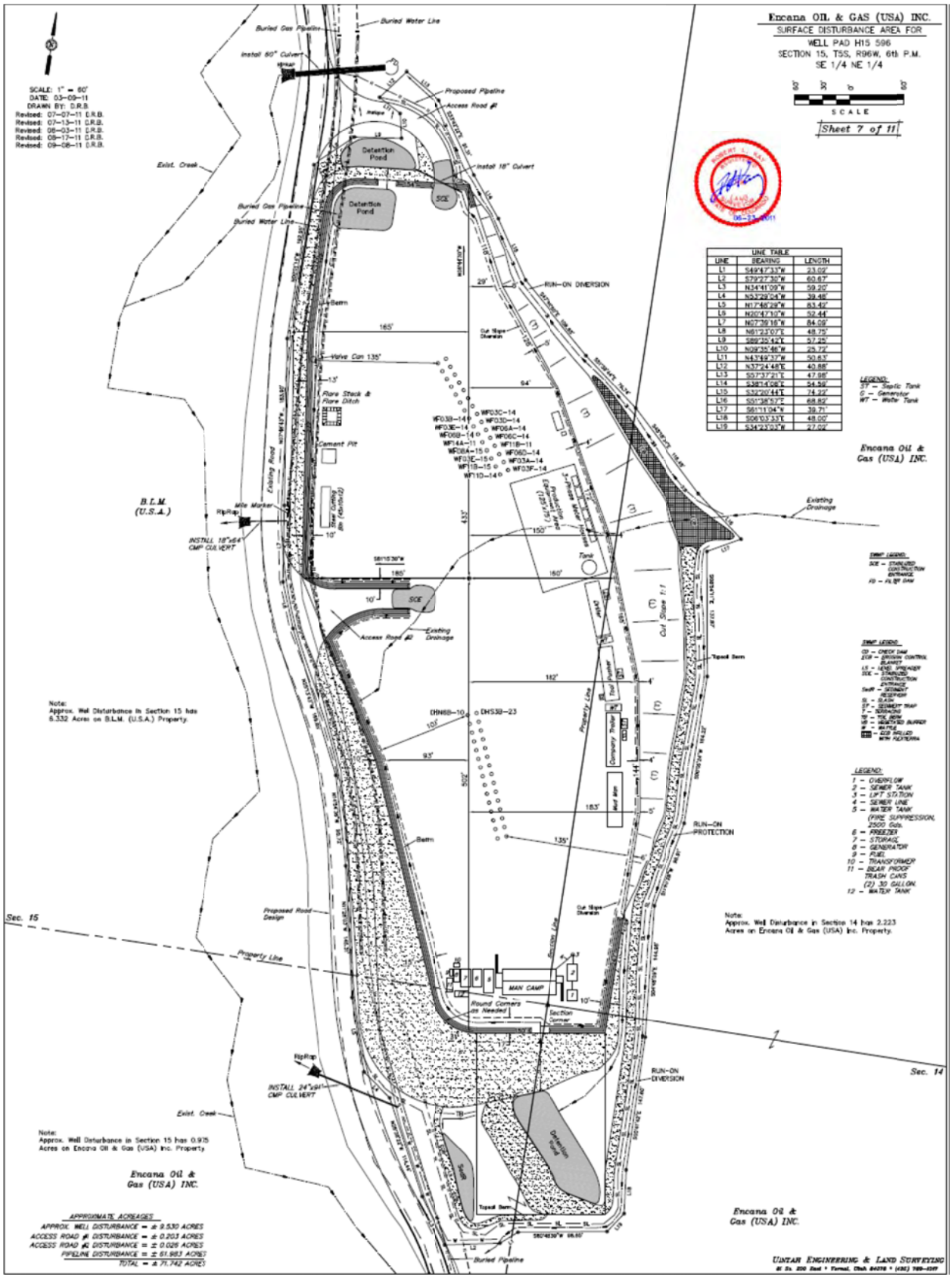

Figure 2. WF H15 596 Pad Construction Layout.

Table 1. Surface and Bottomhole Locations of Proposed Federal Well		
Proposed Well	***Surface Location***	***Bottomhole Location***
N Parachute Federal WF08A-15 (WF H15 596 pad)	T5S R96W, Section 15 SENE, 2,031 feet FNL, 155 feet FEL	T5S R96W, Section 15 SENE 1,486 feet FNL, 1,276 feet FEL

In order to occupy the BLM surface to drill the 17 initial fee wells and eventual 39 additional wells, the operator has submitted an SF299 application for a BLM Right-of-Way Grant. The grant would authorize Encana to occupy the surface of the WF H15 596 pad on BLM land to drill, complete, and produce the proposed fee wells, operate a man camp during the drilling and completion periods, and install buried pipelines on the 40-acre BLM parcel to serve the planned wells.

No public access is available to the project site; Encana maintains a guard station at the end of Garfield County Road (CR) 215 as it enters onto the North Parachute Ranch property. The WF H15 596 pad, lying in mountain shrub vegetation dominated by serviceberry, mountain mahogany, and oakbrush, is located approximately 14.8 miles north of Parachute. The proposed WF H15 596 pad, which has a 9.5-acre pad disturbance footprint, would measure 350 feet at the widest point near the pad center and 940 feet in length with an additional 175 feet of length at the south end to accommodate topsoil storage. Of the 9.5 acres pad disturbance, 6.3 acres would be on BLM land (Figure 2).

The overall pad size was designed to accommodate two drill rigs operating over two separate cellar banks for the directional and/or horizontal wells planned on the pad. After the two to three drilling visits and the associated well completion work, the pad would be reshaped and seeded reducing the working area of the pad to approximately 3.4 acres. The pad layout has been designed with balanced earthwork volumes.

Approximately 175 feet of new 22-foot-wide road would be built at the north end of the pad and another pad entrance would be constructed at the pad center (25 feet in length) to provide two access points to the pad. Separate access points were planned to provide safe routes during drilling and completion operations, particularly if two rigs occupy the pad at the same time. The disturbance area attributable to the road construction would amount to 0.2 acre on BLM land.

To gather the expected gas volumes from the WF H15 596 pad, approximately 20,930 linear feet of maximum 24-inch steel pipeline would be buried along an existing pipeline corridor between the WF H15 596 pad and the operating Middle Fork Compressor Station located on Encana property in NE¼NE¼ Section 30, T5S, R96W (Figures 1 and 3). Only 1,010 feet of the 24-inch gas line would be buried on BLM, essentially underneath the planned H15 pad footprint. The planned disturbance width for the 24-inch gas pipeline on private land would not exceed 120 feet although the actual disturbance would be limited, where feasible, to 50 feet in width. The 24-inch line would function as a 3-phase line, which would move all fluids associated with the producing gas downstream to a planned tank farm located at the Middle Fork Compressor Station where separation of natural gas, produced water, and condensate would occur. The disturbance footprint associated with the 24-inch gas pipeline (using a length of 20,930 feet) would occur solely on private land and amount to 57.7 acres.

Three additional buried pipelines (6-inch steel remote frac line, 10-inch steel flowback line, and 16-inch lined steel produced water line) would be installed from the WF H15 596 pad northward to support the remote well completion operations staged on the WF A15 pad. The 1,570 feet of pipeline distance for these 3 lines would encompass a maximum disturbance width of 120 feet resulting in 4.3 acres of disturbance. Of this total, a 367-foot length representing approximately 1.0 acres of new disturbance would occur on the BLM 40-acre parcel.

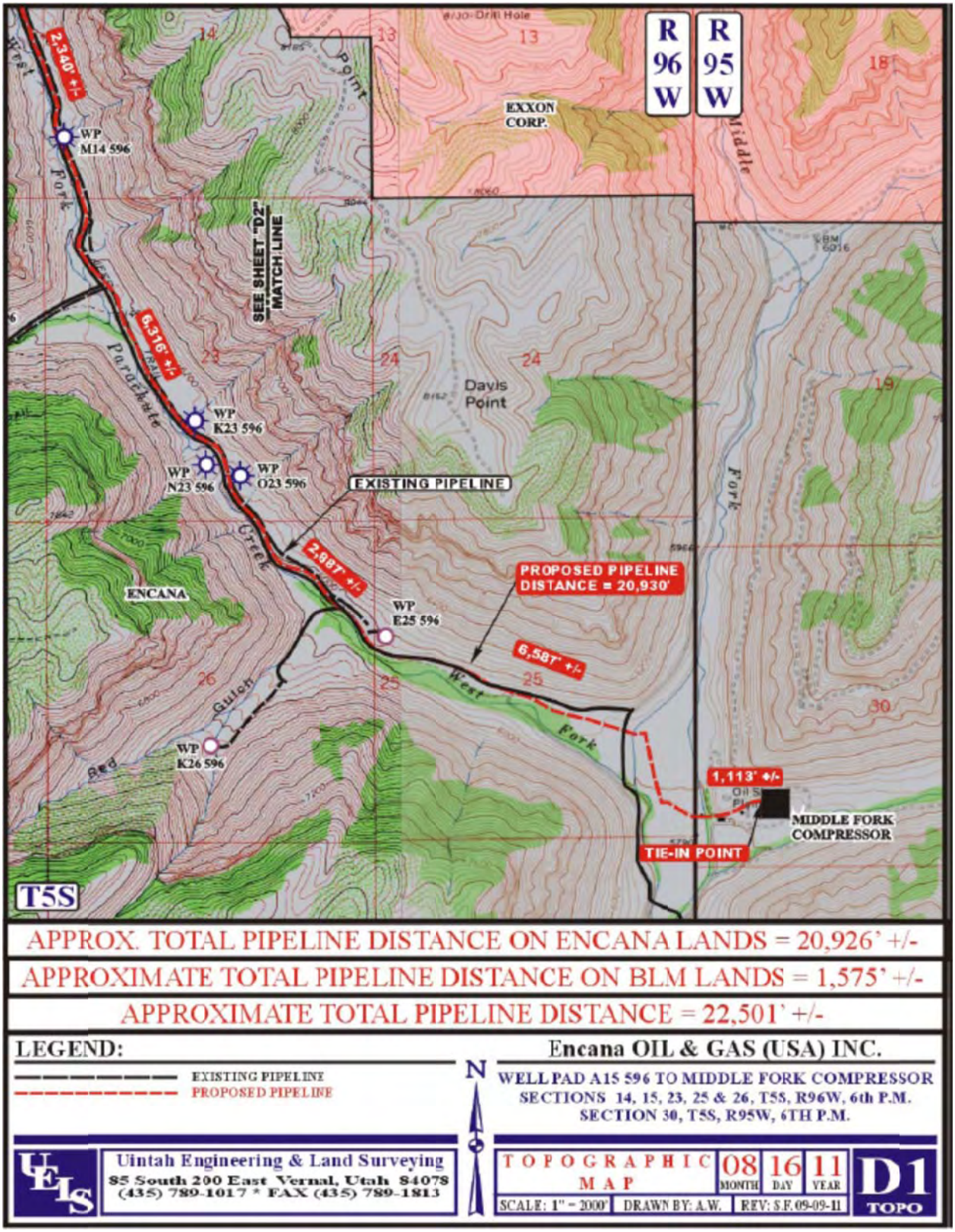

Figure 3. Proposed Pipeline Construction on Private Land.

Total surface disturbance for the WF H15 596 pad, road and pipeline construction would amount to 71.7 acres. The total disturbance occurring on BLM would be 7.5 acres, representing approximately 10% of the surface disturbance planned for the project. Approximately 64.2 acres of disturbance would occur on Encana's North Parachute Ranch property. The long-term disturbance for the project would entail 3.6 acres (0.2 acre attributed to new road spurs and 3.4 acres representing the pad working area for 30 years).

The southern extent of the pad would accommodate man camp facilities serving as many as 22 persons. The camp would have a kitchen, permitted through the State, providing meals to the workers. During the drilling and completion process, the man camp would be occupied 24 hours per day, 7 days per week with two crews working 12-hour shifts. While providing food and lodging for the workers, support services such as bear-proof trash storage, potable and sewer water storage, generator and transformer settings, a fuel storage area and a freezer for food storage would be provided to complete the plans for the man camp. Potable water (one 4,200 gallon water supply tank and three 3,300 gallon water supply tanks) and septic service (seven 2,000 gallon above-ground septic tanks with overflow tanks and alarms) would be provided every 2 to 3 days by certified water and septic providers licensed by the State.

When pad construction is initiated, the brushy site would be hydro-axed to integrate organic material into topsoil to be stripped and stockpiled at either end of the pad. Topsoil would be shaped into detention ponds at the north and south ends of the pad catching directed storm water sediments from diversion ditches installed above the pad perimeter (Figure 2). Cuttings generated from the numerous planned well bores would be worked through a shaker system on the drill rig, mixed with sawdust in a steel cuttings bin, and piled on location against the cutslope for later burial during the interim reclamation earthwork.

As shown on Figure 2, storage tanks would be staged within the planned production equipment area to support the fluids generated from the planned horizontal wells drilled on the pad. The initial rig visit in 2012 would result in the drilling of one or two horizontal wells of the planned 17 total wells.

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

The Proposed Action would include drilling and completion, production of natural gas and associated liquid condensate, proper handling and disposal of produced water, and interim and final reclamation.

The Proposed Action would be implemented consistent with Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the Applications for Permit to Drill (APDs). Appendix A lists the specific Surface Use Conditions of Approval that would be implemented as mitigation measures for this project. The operator would be responsible for continuous inspection and maintenance of the access roads, pads and pipelines.

NO ACTION ALTERNATIVE

The Proposed Action involves drilling 56 fee wells in addition to four Federal wells from BLM surface. Although the BLM cannot deny the right to drill and develop the Federal oil and gas lease, individual APDs can be denied to prevent unnecessary and undue degradation. In addition, the BLM can deny Encana the ability to use BLM surface lands to access the non-Federal (fee) mineral estate.

The No Action Alternative constitutes denial of the Federal APD(s) and denial of the Right-of-Way Grant needed for Encana to access Federal minerals from BLM surface. Consequently, none of the planned development activities outlined in the Proposed Action would occur. However, in the event that the No Action Alternative were selected by the BLM as an outcome of this EA process, Encana would probably relocate the pad differently in order to avoid the BLM surface. Because the WF H15 596 pad site is located in a narrow canyon, it is likely that implementation of the No Action Alternative would result in greater surface disturbance—including sensitive aquatic and riparian habitats associated with West Fork of Parachute Creek than would result from the Proposed Action.

PURPOSE AND NEED FOR THE ACTION

The purpose of the Proposed Action is to develop oil and gas resources on Federal lease COC70018 consistent with existing Federal lease rights. The action is needed to increase the development of oil and gas resources for commercial marketing to the public.

SUMMARY OF LEASE STIPULATIONS

The Federal wells would be directionally or horizontally drilled from the proposed WF H15 596 pad located on BLM and private land. The planned surface holes for all 60 wells would occur on BLM land. Table 2 lists the various no surface occupancy (NSO), controlled surface use (CSU), and timing limitation (TL) stipulations pertinent to the 40-acre BLM parcel as shown on Federal oil and gas lease COC70018.

PLAN CONFORMANCE REVIEW

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

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

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

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

Table 2. COC70018 Lease Stipulations		
Lease Number	***Description of Lands***	***Stipulations***
COC70018 (2007)	**ALL LANDS within lease**	**NSO for Steep Slopes:** No surface use is allowed on steep slopes greater than 50% to maintain site stability and site productivity. This NSO does not apply to pipelines. Exception may be granted if lessee demonstrates that operations can be conducted without causing unacceptable impacts and that less restrictive measures will protect the public interest. **NSO for Riparian and Wetland Vegetation:** To maintain the proper function of riparian zones, activities associated with oil and gas development, including roads, transmission lines and storage facilities are restricted to an area beyond the outer edge of the riparian vegetation. Exception criteria: A) An exception may be granted if the BLM determines that the activity will cause no loss of riparian vegetation or that the vegetation lost can be replaced within 3 to 5 years with vegetation of like species and age class. B) Within the riparian vegetation, an exception is permitted for stream crossings if an area analysis indicates that no suitable alternative is available. **NSO for Raptor Nest Site:** No surface use is allowed within 0.125-mile radius of a nest site to protect raptors. Exceptions may be granted depending on the active status of the nest site or the geographical relationship to the nest site of topographic barriers and vegetation screening. **NSO for Threatened or Endangered Species Habitat:** Exception Criteria: surface occupancy may be authorized pending Section 7 consultation with USFWS or Colorado Parks and Wildlife (if State-listed). The BLM will consider the type and amount of surface disturbance, plant frequency and density, relative abundance of habitat, species and location, topography, and other related factors. **TL for Big Game Winter Range:** Big Game Winter Habitat (December 1 to April 30). Exception may be granted under mild winter conditions for the last 60 days. **TL for Raptor Nesting and Fledging Habitat:** Raptor Nesting and Fledgling Habitat Protection. No surface use is allowed from February 1 to August 15 within 0.25 mile around nest site. Exceptions may be granted during years when the nest is unoccupied, when occupancy ends by or after May 15, or once the young have fledged and dispersed from the nest. **CSU for Fragile Soils:** Protection of fragile soils with submittal of plan of development demonstrating performance objectives and standards. **CSU for Erosive Soils on Slopes Steeper than 30%:** Special design, construction, and implementation measures will be required to limit the amount of surface disturbance, to reduce erosion potential, to maintain site stability and productivity, and to ensure successful reclamation. **CSU for VRM Class II Areas:** Special design requirements, relocation of operations by more than 200 meters, and other measures to retain overall landscape character will be required. **CSU for Historic Properties:** Protection of historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O 13007, or other statues and executive orders. **CSU for BLM Sensitive Species:** Special design, construction, and implementation measures including relocation of operations by more than 200 meters may be required. For plants, habitat areas include occupied habitat and habitat necessary for the maintenance or recovery of the species or communities. For animals, habitat areas are areas that are important during some portion of the lifecycle, such as nesting and production areas or communal roost areas. **CSU for Riparian and Wetland Zones:** Within 500 feet of the outer edge of riparian or wetland vegetation, activities associated with oil and gas exploration and development, including roads, pipelines and wellpads, may require special design, construction, and implementation measures, including relocation beyond 200 meters.

STANDARDS FOR PUBLIC LAND HEALTH

In January 1997, Colorado BLM approved the Standards for Public Land Health. The five standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. The environmental analysis must address whether impacts resulting from the Proposed Action or alternatives being analyzed would maintain, improve, or deteriorate land health conditions relative to these resources. These analyses are conducted in relation to baseline conditions described in land health assessments (LHAs) completed by the BLM. The Proposed Action would occur in an area that was included in the Rifle-West Watershed LHA (BLM 2005).

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

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

Access and Transportation

Affected Environment

The project area would be located approximately 14.8 miles north of Parachute, Colorado, The proposed pad would be accessed from Interstate 70, Parachute exit by traveling north on CR215 for 10.8 miles to Encana's North Parachute Ranch (NPR) Guard Station. After gaining clearance from the guard, the proposed WF H15 596 pad would be located by traveling approximately 0.7 mile north on the Middle Fork Road and taking a left on West Fork Road for approximately 3.3 miles to the staked pad site.

The existing NPR road system would adequately serve the planned well development and pipeline construction on a 24 hour, 7 days per week basis. CR215 is paved to the Encana Guard Station and the NPR roads are graveled and hardened for all-weather use throughout the year. The presence of the NPR Guard Station restricts all traffic to Authorized Personnel only. BLM employees are asked to show documentation and sign liability waiver forms to gain access to NPR.

Environmental Consequences

Proposed Action

The existing NPR private roads would serve the proposed WF H15 596 well pad and the nearby A15 596 pad which is the proposed remote well completion site for the H15 wells. Aside from two short road spurs totaling 200 feet in length to be constructed at the north and west-side center of the pad, no new construction is planned. The two road entrances to the pad would be built with a 22-foot width and surfaced with gravel.

The Proposed Action would result in a substantial increase in truck traffic related to the eventual development of 60 wells over 2-3 drilling visits. The largest increase in truck use would be during rig-up, drilling, and completion activities. Data indicate that approximately 1,160 truck trips over a 30-day period would be required to support the drilling and completion of each well (Table 3). Once the wells are producing, traffic would decrease to occasional visits for monitoring or maintenance activities. Each well may have to be recompleted once per year, requiring three to five truck trips per day for approximately 7 days.

Table 3. Traffic Associated with Drilling and Completion Activities

Vehicle Class	*Trips per Well*	*Percent of Total*
16-wheel tractor trailers	88	7.6%
10-wheel trucks	216	18.6%
6-wheel trucks	452	39.0%
Pickup trucks	404	34.8%
Total	1,160	100.0%

Source: BLM 2006. Note: Trips by different vehicle types are not necessarily distributed evenly during the drilling process. Drilling and completion period is approximately 30 days per well.

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

No Action Alternative

Under this alternative, no development would occur on the 40-acre BLM parcel precluding any new traffic impacts related to drilling, completing, servicing or producing wells or gas gathering operations.

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_2), sulfur dioxide (SO_2), ozone (O_3), particulate matter less than 10 microns (μ) in diameter (PM_{10}), and particulate matter less than 2.5 μ in diameter ($PM_{2.5}$).

The project area lies within Garfield County, which has been described as an attainment area under CAAQS and NAAQS. An attainment area is an area where ambient air pollution quantities are below (i.e., better than) NAAQS standards. As shown in Table 4, regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. Federal air quality regulations are enforced by the Colorado Department of Public Health and Environment (CDPHE). The Prevention of Significant Deterioration (PSD) program within CDPHE is designed to limit incremental increases for specific air pollutant concentrations above a legally defined baseline level, as defined by an area's air quality classification. Incremental increases in PSD Class I areas are strictly limited.

Federal air quality regulations adopted and enforced by CDPHE limit incremental emissions increases to specific levels defined by the classification of air quality in an area. The PSD Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict.

The project area and surrounding areas are classified as PSD Class II. The PSD Class I areas located within 100 miles of the project area are Flat Tops Wilderness (approximately 25 miles north), Maroon Bells – Snowmass Wilderness (approximately 35 miles south), West Elk Wilderness (approximately 60 miles southeast), Black Canyon of the Gunnison National Monument (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east). Dinosaur National Monument (approximately 120 miles northwest) is listed as a Federal Class II. Regional background pollutant concentrations and applicable standards or limits are listed in Table 4**.**

Table 4. Air Pollutant Background Concentrations, Colorado and National Ambient Air Quality Standards, and Prevention of Significant Deterioration Increments.

Pollutant/Averaging Time		***Measured Background***	***CAAQS/or NAAQS***	***Incremental Increase Above Legal Baseline***	
				Class I	***Class II***
Carbon Monoxide (CO) [1]	1-hour 8-hour	4,656 µg/m^3 2,328 µg/m^3	40,000 µg/m^3 (35 ppm) 10,000 µg/m^3 (9 ppm)	n/a n/a	n/a n/a
Nitrogen Dioxide (NO_2)[2]	Annual Arithmetic Mean	0.016 ppm	0.053 ppm	2.5 µg/m^3	25 µg/m^3
Ozone[1]	8-hour	0.065 ppm (Rifle)	0.075 ppm	n/a	n/a
Particulate Matter (PM_{10}) [3]	24-hour Annual	67 µg/m^3 (Rifle) 25.7 (Rifle)	150 µg/m^3 50 µg/m^3	8 µg/m^3 4 µg/m^3	30 µg/m^3 17 µg/m^3
Particulate Matter ($PM_{2.5}$) [1]	24-hour Annual	34.5 µg/m^3 (GJ) 9.3 µg/m^3(GJ)	35 µg/m^3 15 µg/m^3	2 µg/m^3 1 µg/m^3	9 µg/m^3 4 µg/m^3
Sulfur Dioxide (SO_2)[4]	3-hour 24-hour Annual	66.7 µg/m^3 34.6 µg/m^3 5.3 µg/m^3	700 µg/m^3 (0.27 ppm)[5] 365 µg/m^3 (0.14 ppm) 80 µg/m^3 (0.03 ppm)	25 µg/m^3 5 µg/m^3 2 µg/m^3	512 µg/m^3 91 µg/m^3 20 µg/m^3

[1] Background data collected in Rifle, 2010 (Chick 2011)
[2] Background data collected by Encana at site north of Parachute, 2007 (Chick 2008)
[3] Background data collected in Grand Junction, 2010 (Chick 2011)
[4] Background data collected at Unocal site, 1983-1984 (Chick 2008).
[5]Colorado 3-hour AAQS = 700 µg/m^3.

Environmental Consequences

Proposed Action

The CDPHE, under its EPA-approved state implementation plan, is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made; those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. CDPHE has the ultimate responsibility for reviewing and permitting any project's air quality impacts prior to its operation. Unlike the conceptual "reasonable but conservative" engineering designs used in NEPA analyses, any CDPHE air quality preconstruction

permitting required would be based on site-specific, detailed engineering values, which would be assessed in CDPHE's review of the permit application.

The WF H15 596 pad includes constructing, drilling, completing, and operating up to 4 new federal wells and 56 fee wells in three visits spaced over the next 5 years. Although the impacts to air quality from these wells are disclosed in this EA, the drilling and operation is permitted with the approval of an APD for each well. Individual wells would require approximately 7 to 10 days to drill and approximately 5 to 15 days to complete. Horizontal wells would require approximately 15-30 days to drill and 10-45 days to complete. Air quality would decrease during construction of access roads, pads, and pipelines and drilling and completing the wells. Pollutants generated during construction activities would include combustion emissions and fugitive dust associated (PM_{10} and $PM_{2.5}$) with construction equipment and vehicles. Construction activities for the well pad, access road, and pipelines would occur between the hours of 7:00 a.m. and 6:00 p.m. each day. Once construction activities are complete, air quality impacts associated with these activities would also cease. Fugitive dust from mobilization and rigging up the drill rig would also occur however impacts associated would be minor and short lived. Emissions associated with drilling and completing the wells would also be greatly reduced to emissions associated with long term natural gas and condensate production.

A regional air model addressing air quality impacts of current and future oil and gas activities within the CRVFO has recently been completed for the BLM by Tetra Tech, Inc. and its subcontractor, URS Corporation. The methods and results of that modeling are presented in an Air Resources Technical Support Document (ARTSD) (BLM 2011). The air quality model addressed impacts associated with emissions of greenhouse gases (GHGs), "criteria pollutants" (CO, NO_2, SO_2, ozone, PM_{10}, and $PM_{2.5}$), hazardous air pollutants (HAPs) including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane. The modeling also addressed potential impacts on visibility due to particulates and "photochemical smog" (caused by chemical reactions in the atmosphere) and on lake chemistry of selected pristine lakes due to modeled deposition rates of sulfur and resultant impacts on acid neutralizing capacity of the lake waters. The visibility analysis predicted a slight impact (one day per year with a reduction in visibility of 1deciview or greater) in the Flat Tops Wilderness and no days with 1 deciview or greater reduction in visibility at all other modeled Class I and II receptors. For the remaining pollutants analyzed, modeled levels of future oil and gas development within the CRVFO would have no or negligible long-term adverse impacts on air quality. Since the Proposed Action is within the scope of the future development modeled, no significant adverse impacts on air quality are anticipated.

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

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

Emissions of volatile organic compounds (VOCs) such as the BTEX constituents of condensate vary depending on the characteristics 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, Encana 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 "greenhouse gases" (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 scenarios modeled, the GHG emissions would not increase the total US natural gas sector emissions by more than 0.5%. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of climate change on the specific area of the Proposed Action. While any oil and gas development project may contribute GHGs to the atmosphere, these contributions would not have a significant effect on a phenomenon occurring at the global scale believed by some to be due to more than a century of human activities.

No Action Alternative

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

Cultural Resources

Affected Environment

Seven Class III cultural resource inventories (CRVFO# 1106-4, 1105-1, 14505-3,1199-4, 5495-3a, 9489, and 1285A) were conducted either in the area of the proposed well pad or the proposed pipeline corridor. The field inventories and pre-field file searches of the Colorado SHPO database and BLM Colorado River Valley Field Office cultural records identified one historic homestead within the project area. The historic site (5GF3808) has been determined to be not eligible for the National Register of Historic Places (NRHP). Eligible or potentially eligible sites are referred to in Section 106 of the National Historic Preservation Act as "historic properties."

Environmental Consequences

Proposed Action

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

A standard Education/Discovery COA for cultural resource protection is included in Appendix A and would be attached to APDs approved under this 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.

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on cultural resources would be similar to those under the Proposed Action.

Fossil Resources

Affected Environment

The current classification system utilized by the BLM for assessing impacts to fossil resources is the Potential Fossil Yield Classification System (PFYC). This system classifies geologic units based on the relative abundance of vertebrate fossils or scientifically important invertebrate and plant fossils and their sensitivity to adverse impacts. This classification is applied to a geologic formation, member, or other distinguishable unit. This classification system recognizes that although significant fossil localities may occasionally occur in a geologic unit, a few widely spaced localities do not necessarily indicate a higher class. The primary purpose of the PFYC is to assess the possible impacts from surface disturbing activities and help determine the need for pre-disturbance surveys and monitoring during construction.

The only significant surface formation found within the proposed development is the Tertiary Green River Formation. The Green River Formation is divided into five separate members in the project area: Jack Rabbit Ridge, Stewart Gulch Tongue, Coughs Creek Tongue, Parachute Creek, and Lower Green River, though only the top three of these are exposed (O'Sullivan et al. 1981). Fossils historically identified in the Green River are generally isolated to the Parachute Creek and Lower Green River members.

The Green River Formation is ranked under the PFYC system as a Class 3/5 formation, with the Parachute Creek member ranked as a 5/5. Class 5 units predictably and consistently produce significant fossils. Although the Parachute Creek member is ranked high under the PFYC system—classes 4 and 5—most specimens occur on ridge tops or within the canyon walls. Furthermore, the thickness of the overlying alluvium on the canyon floor greatly lowers the risk of human-caused adverse impacts and natural degradation on unexposed bedrock within the proposed new well pad area.

Environmental Consequences

Proposed Action

Two paleontological discovery sites have been identified within a 2-mile radius of the proposed well sites. The nearest identified sites are located in Section 11, T5S, R96W, approximately 1.5 miles northeast of (and 500 feet above) the proposed activities. Paleontological resources should not be impacted; therefore, no new surveys would be required. If any fossils are noticed at any time, the BLM must be notified so the resource can be recorded, evaluated, stabilized, or mitigated. The standard paleontology condition of approval identified in Appendix A shall be applied to these APDs.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. Therefore, impacts of the No Action Alternative on fossil resources would be similar to those under the Proposed Action.

Geology and Minerals

Affected Environment

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

Bedrock exposures within the proposed project area are the Tertiary Uinta and Green River Formations. The Uinta Formation consists of tuffaceous and argillaceous (clayey) sandstone and ranges from 100 to 400 feet thick. Exposures of the Green River Formation: Jack Rabbit Ridge, the Stewart Gulch Tongue, and the Cough Creek Tongue respectively, are comprised of marlstone (limy shale) and thin beds of oil shale (O'Sullivan et al. 1981). Below this sequence is the Wasatch Formation, which is not exposed in this area of the basin but is identified in cross-section. The Wasatch Formation, in turn, is underlain unconformably by the Mesaverde Group. The Mesaverde Group is composed of mudstones and sandstones with interlayered coal beds and ranges in thickness from about 3,000 to over 7,000 feet. The Mesaverde Group has also been referred to as the Mesaverde Formation, which includes informal subdivisions based on gas productivity characteristics. Table 5 lists the surficial geologic formations present within the proposed project area.

The Mesaverde Group is the target zone of the proposed drilling program. Composed of the Williams Fork and Iles Formations, the Mesaverde Group consists of marine sandstones and transitional to non-

marine beds of coal, shale, and sandstone. These sediments were deposited marginal to the great Cretaceous seaway. The oscillating shoreline of this sea, due to the rise and fall of sea level, left behind a complex of transgressive (encroaching toward land) and regressive (receding away from land) sedimentary sequences of nearshore and offshore sediments that define the Mesaverde Group.

Table 5. Geologic Formations within the Study Area

Map Symbol	*Formation Name*	*Age*	*Characteristics*	*Location*
Qal	Quaternary alluvium deposits	Holocene	Chiefly silt, sand, and gravel	Flood plains, fans, and low terraces
Tu	Uinta Formation	Eocene	Light brown to gray tuffaceous sandstone.	Cliffs and terraces
Tgj	Green River Formation: Jack Rabbit Ridge	Eocene	Light brown to gray laminated marlstone	Cliffs and terraces
Tgs	Green River Formation: Stewart Gulch Tongue	Eocene	Marlstone and marly siltstone	Cliffs and terraces
Tgs	Green River Formation: Cough Creek Tongue.	Eocene	Fossiliferous marlstone w/some sandstone and siltstone	Cliffs and terraces

Source: O'Sullivan et al. 1981

The proposed drilling program would target the sandstone sequences of the Upper Williams Fork Formation, which provide most of the natural gas production volumes (Lorenz 1989). Upper portions of the Williams Fork include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork includes delta front, distributary channel, 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 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the gas is both stratigraphic, related to vertical and lateral changes in the types of sediments being deposited, and diagenetic (post-depositional), related to changes in chemical and physical changes in the rocks during prolonged burial at great depth.

Environmental Consequences

Proposed Action

If the proposed wells prove feasible, initial production rates would be expected to be highest during the first few years of production, then decline during the remainder of the economic lives of the wells. Substantial reserves have been known to be trapped within the tight sands of these reservoirs since the late 1950s, but only within the last decade, and particularly within the last few years, has the integrated application of new technologies turned the tight gas sands of the Mesaverde Group into a profitable play (Kuuskraa 1997). Natural fracture detection, advanced log analysis, more rigorous well completions and recompletions, and denser spacing have increased the amount of recoverable gas within these reservoirs.

Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mesaverde Group in this area, an action that would be consistent with BLM objectives for mineral production. Hydraulic fracturing or "fracing" will be utilized to create fractures within the formation to allow gas production from the wells. Tight gas sands refer to low permeability

sandstone reservoirs that produce primarily dry natural gas. Typically, these reservoirs cannot be produced at economic flow rates or volumes unless the well is stimulated by hydraulic fracture treatment (Holditch 2006). The amount of natural gas that may be potentially produced can only be estimated based on production rates from nearby wells and adjacent fields. Reserves have been estimated to approach 2 billion cubic feet (bcf) of natural gas per well (Vargas and Davis 2006).

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. Although it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface, these would not impact Federal mineral resources.

Invasive Non-Native Plants

Affected Environment

Weeds observed within the 40-acre BLM parcel included cheatgrass (*Anisantha tectorum*) scattered in the sagebrush shrubland understory. Cheatgrass is a highly invasive non-native annual grass that has become one of the most pernicious weeds in arid and semi-arid habitats throughout the region. Other weeds observed include non-native annual or biennial forbs (broadleaf herbaceous species) such as houndstongue (*Cynoglossum officinale*), common bindweed (*Convolvulus arvense*), and common mullein (*Verbascum thapsus*), all of which were established across the proposed WF H15 596 pad location and the proposed 24-inch gas pipeline alignment. Houndstongue is on the State of Colorado's "B List" of noxious weeds, while cheatgrass, burdock, and mullein are on the "C List."

Weeds on adjacent and nearby private land within the project area included Canada thistle (*Cirsium arvense*), musk thistle (*Carduus acanthoides*), and bull thistle (*Cirsium vulgare*) along the existing pipeline corridor proposed to be used for installation of the new 24-inch gas line. All of these are on the State of Colorado's "B List" of noxious weeds. Invasives scattered on private land along the proposed pipeline in Lindauer Meadow adjacent to Middle Fork of Parachute Creek included common tansy (*Tanacetum vulgare*), wild chicory (*Cichorium intybus*), and common burdock. Common tansy and chicory are on the State's "B List" of noxious weeds, while burdock, as noted above, is on the "C List."

Invasive non-native species within the project area that are not listed as noxious weeds in Colorado but nonetheless problematic in terms of overall habitat quality and potentially affecting reclaimed areas included kochia (*Bassia scoparia*), Russian-thistle (*Salsola iberica*), tall tumble-mustard (*Sisymbrium altissimum*), and cocklebur (*Xanthium strumarium*). Also present was redroot pigweed (*Amaranthus retroflexus*), a native species that behaves as a weed.

Environmental Consequences

Proposed Action

Surface-disturbing activities provide a niche for the invasion and establishment of invasive, non-native species particularly when these species are already present in the surrounding area. Because invasive, non-native species are present in the project area, the potential for increased establishment of these undesirable plants following construction activities is high. Consequently, the standard weed control COA would be attached to APDs to require periodic monitoring and weed control practices to ensure that these weedy pants are controlled (see Appendix A). Implementation of Encana's Integrated Vegetation Management Guidance to aggressively control and manage weeds on adjacent NPR property would be in addition to weed treatments required by the BLM as a COA (Appendix A).

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to those under the Proposed Action. Because of the lack of Federal involvement on the fee development under this alternative, weed issues could become a greater issue during reclamation.

Migratory Birds

Affected Environment

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

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

The proposed WF H15 596 pad would occur in the canyon bottom of West Fork Parachute Creek. The West Fork is a narrow and steep-sided canyon rising to cliffs of the Roan Plateau. Vegetation in the project area is primarily composed of mixed mountain shrubs and revegetated grasses/forbs along existing disturbances in the project area. The riparian corridor along the West Fork is composed primarily of

boxelder, three-leaf sumac, narrowleaf cottonwood, and willows. The steep canyon sides above the project along the south facing slope is composed of sagebrush shrublands to barren shale slopes. The canyon sides along the north facing slopes are composed of scattered Douglas-fir woodlands and mountain shrublands to barren shale slopes.

Species on the BCC list that are potentially present in the project area, based on habitat preferences and known geographic ranges, include the golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*), flammulated owl (*Otus flammeolus*), Lewis's woodpecker (*Melanerpes lewis*), Brewer's sparrow (*Spizella brewer*i), and Cassin's finch (*Carpodacus cassinii*). The peregrine falcon, flammulated owl, and Brewer's sparrow are also BLM sensitive species and addressed under Special Status Species.

The golden eagle and peregrine falcon nest in cliff bands such as are found in the project area. Golden eagles typically hunt across open upland habitats such as atop the Roan Plateau or on the Colorado River valley floor, lower reaches of the Parachute Creek valley, and nearby hills and mesas. The peregrine falcon hunts primarily for waterfowl along the Colorado River but also for upland fowl and other birds in uplands such as sagebrush expanses on the Roan Plateau. Flammulated owls generally nest in montane conifers and aspen, which do not occur in the immediate project area but occur at higher elevations in the vicinity. Although the Lewis's woodpecker has not been reported in the project area or vicinity, the mature cottonwoods in the riparian habitat along West Fork Parachute Creek appear potentially suitable for breeding. Brewer's sparrow nests in sagebrush stands, primarily extensive stands on level or rolling terrain. The sagebrush -covered slopes of the West Fork Parachute Creek canyon are marginally suitable for this species. Cassin's finch nests at higher elevations, primarily montane and subalpine coniferous forests, but often disperse to lower elevation foothills pinyon-juniper following the breeding season and may remain there over the winter. This species is potentially present as a winter visitor.

A variety of other migratory species use the upland habitats along West Fork Parachute Creek and the canyon sideslope, including Neotropical migrants. Riparian nesters are expected to include the Cordilleran flycatcher (Empidonax difficilis), American robin (*Turdus migratorius*), house wren (*Troglodytes aedon*), black-capped chickadee (*Poecile atricapillus*), warbling vireo (*Vireo gilvus*), plumbeous vireo (*V. plumbeus*), yellow warbler (*Dendroica petechia*), MacGillivray's warbler (*Oporornis tolmie*i), orange-crowned warbler (*Oreothlypis celata*), Bullock's oriole (*Icterus bullockii*), lazuli bunting (*Passerina amoena*), and lesser goldfinch (*Spinus psaltria*). Prevalent species nesting on the shrubby canyon sideslopes may include the dusky flycatcher (*Empidonax oberholseri*), rock wren (*Salpinctes obsoletus*), spotted towhee (*Pipilo maculatus*), black-headed grosbeak (*Pheucticus melanocephalus*), lark sparrow (*Chondestes grammacus*), and vesper sparrow (*Pooecetes gramineus*) in addition to potential use by Brewer's sparrow.

Besides the golden eagle and peregrine falcon, mentioned above as BCC species that may use the area as transients from nesting habitats in the vicinity, several other raptors may use the area for nesting and/or hunting. Nesting habitat for raptors includes the riparian corridor and nearby cliffs. Species most likely to nest near the project area include the American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipiter striata*), Cooper's hawk (*A. cooperi*), red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginiana*), long-eared owl (*Asio otus*), and northern pygmy-owl (*Glaucidium gnoma*).

No occupied raptor nests were found in the project area in the most recent raptor survey (Figure 4). However, five unoccupied golden eagle nests and two unoccupied nests of unknown species were found within 0.5 mile of the proposed project area. Of the five known golden eagle nest sites, none was active during the 2011 breeding season. Federal lease COC70018 has a Timing Limitation (TL) for the protection of raptor nesting and fledgling habitat (Appendix A). The TL prohibits surface use from February 1 through August 15 within 0.25 mile of a nest site. However, exceptions to the TL may be granted for years when a nest is unoccupied.

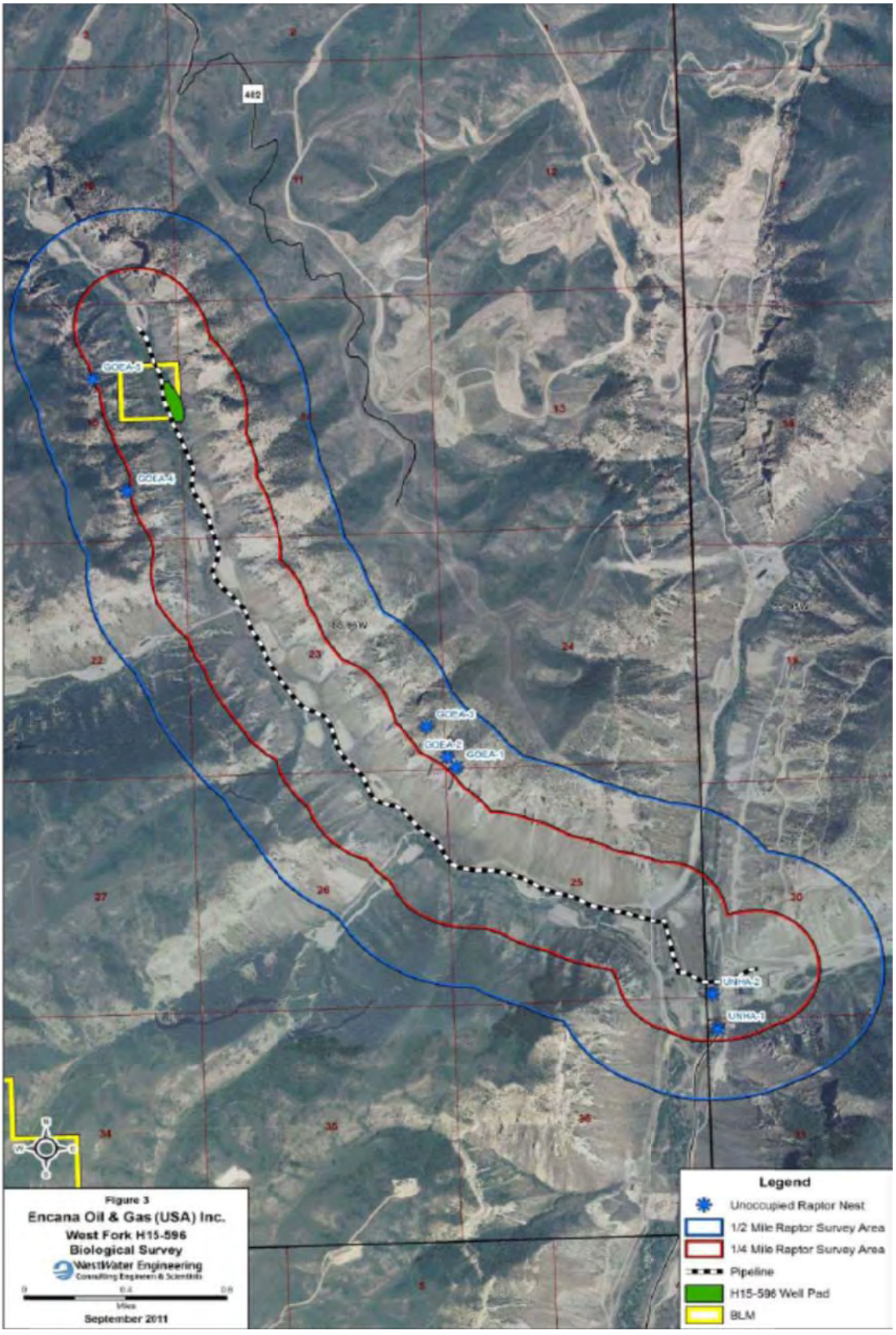

Figure 4. Results of 2011 Raptor surveys for the WF H15 596 Pad (WWE 2011).

Environmental Consequences

Proposed Action

Under the Proposed Action, 71.7 acres of new disturbance would occur on private and BLM land as a result of pad, road, and pipeline construction. Following successful interim reclamation, the disturbance would be reduced to 3.4 acres. Removal of vegetation would result in loss of existing and potential nesting sites for perching birds. While habitat loss and fragmentation 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 nesting season, visual and noise disturbance near active nests could cause nest abandonment and failure, reducing the productivity of affected species. Construction activity during the nesting season could also result in the destruction of clutches and/or mortality of nestlings. The TL stipulation related to raptor nesting (February 1 through August 15 around occupied nests) and a COA that prohibits vegetation removal during the period May 1 through June 30 (Appendix A) would reduce impacts to migratory birds.

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to those under the Proposed Action.

Native American Religious Concerns

Affected Environment

The Proposed Action is located within an area identified by the Ute Tribes as part of their ancestral homeland. A number of Class III cultural resource inventories (see section on Cultural Resources) were conducted in the project vicinity Proposed Action 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 have been identified during the inventories. The Ute Tribe of the Uintah and Ouray Bands, the primary Native American tribe in this area of the CRVFO, have indicated that they do not wish to be consulted for small projects or projects where no Native American areas of concern have been identified either through survey or past consultations. Therefore, formal consultation with Native American Tribes was not undertaken. If new data are disclosed, new terms and conditions may have to be negotiated to accommodate their concerns.

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

The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency BLM notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the agency BLM, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act. Encana Oil & Gas (USA) will notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations. A standard Education/Discovery COA for the 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.

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action.

Noise

Affected Environment

Noise is generally described as unwanted sound, weighted and noise intensity (or loudness) is measured as sound pressure in decibels (dBAs). The decibel scale is logarithmic, not linear, because the range of sound that can be detected by the human ear is so great that it is convenient to compress the scale to encompass all the sounds that need to be measured. Each 20-unit increase in the decibel scale increases the sound loudness by a factor of 10.

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

The Proposed Action would lie within a rural setting approximately 15 miles north of the town of Parachute and highway I-70. No known human residence is located within 1,500 feet of any of the pad or proposed facilities. Noise levels in the project area are presently created by Encana's oil and gas operations including construction of facilities, traffic serving the existing nearby well pads and ongoing drilling and completion activities.

Environmental Consequences
Proposed Action

The project would result in increased levels of noise during the construction, drilling, and completion phases. The noise would be most noticeable along the roads used to haul equipment and at the pad location. Drilling activities are subject to noise abatement procedures as defined in the COGCC Rules and Regulations (Aesthetic & Noise Control Regulations). Operations involving pipeline or gas facility installation or maintenance, compressors, the use of a drilling rig, completion rig, workover rig, or stimulation are subject to the maximum permissible noise levels for industrial zones. The 2006 revised COGCC noise control rules call for noise levels from oil and gas operations at any well site and/or gas facility to comply with the maximum permissible levels (Table 6) at a distance of 350 feet. Periodically the noise level may increase to 10 dbA above levels in Table 6 for no more than 15 minutes in one hour period. Operations involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones.

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

Zone	*7:00 A.M. to 7:00 P.M*	*7:00 P.M. to 7:00 A.M*
Light Industrial	70 dBA	65 dBA
Residential/Agricultural/Rural	55 dBA	50 dBA

Given that the proposed project activities are not within proximity of an occupied structure 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 2006).

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 (EPA 1974). These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas developments in the area. As stated above, no human dwelling is believed to be located within 1,500 feet of the pad.

Table 7. Typical Noise Levels at Construction Sites and along Access Roads

Equipment	*Noise Level (dBA)*		
	50 feet	*500 feet*	*1,000 feet*
Air Compressor, Concrete Pump	82	62	56
Backhoe	85	65	59
Bulldozer	89	69	63
Crane	88	68	62
Front End Loader	83	83	57
Heavy Truck	88	68	62
Motor Grader	85	65	59
Road Scraper	87	67	61
Tractor, Vibrator/Roller	80	60	54
Sources: BLM (1999a), La Plata County (2002)			

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

Traffic noise would also be elevated as a consequence of the Proposed Action. The greatest increase would be along access roads during the drilling and completion phases. Based on the La Plata County data presented in Table 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. These increased noise levels would be in addition to levels of noise that are already above background levels due to current oil and gas developments in the area. Traffic noise levels would affect residences located along County roads that provide primary access into the area. As stated earlier, there is no known residence within 1500 feet of either pad, so noise impacts to nearby residences are negligible.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to those under the Proposed Action.

Realty Authorizations

Affected Environment

Within the project area, there are three existing rights-of-way and one oil and gas lease representing the realty authorizations within proximity of the Proposed Action (Table 8 and Figure 5).

Table 8. Realty Authorizations within the Project Area

Serial #	*Company*	*Section*[1]	*Aliquot Location*	*Case Type*	*Status*
COC68645	Encana	15	SE¼NE¼	Road ROW	Authorized
COC68646	Encana	15	SE¼NE¼	Gas Pipeline ROW	Authorized
COC68647	Encana	15	SE¼NE¼	Water Pipeline ROW	Authorized
COC70018	Encana	15	SE¼NE¼	Oil and Gas Lease	Authorized

[1]Legal Description: Township 5 South, Range 96 West, Sixth P.M., Garfield County, Colorado

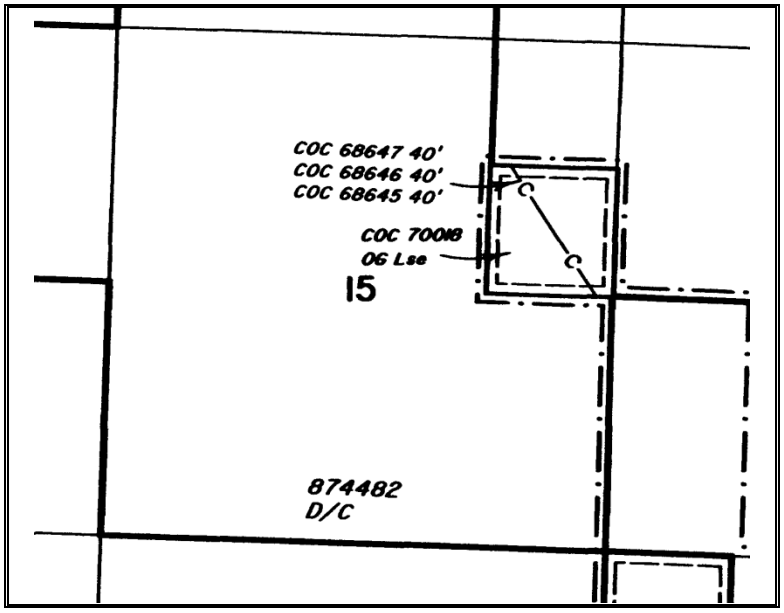

Figure 5. Depiction of BLM Realty Authorizations in Project Area.

Encana's existing West Fork Road is authorized across public land under right-of-way (COC68645) with a 40-foot-wide corridor. The existing 16-inch buried steel gas line (COC68646) and existing 12-inch steel water line (COC68647) serving the existing private well pads in the NPR West Fork Valley would comprise the other two rights-of-way. Encana has obtained the development rights for BLM's oil and gas lease (COC70018) and the plans to develop this lease are outlined in this Proposed Action.

Environmental Consequences

Proposed Action

As stated in the Proposed Action, Encana plans to drill and develop as many as 56 oil and gas wells in the nearby fee mineral estate surrounding the 40-acre BLM parcel. To drill these fee wells, Encana would obtain a BLM right-of-way authorizing the operator to occupy the BLM portion of the well pad. Encana would also install a 24-inch buried steel gas line between the proposed WF H15 596 pad location and Middle Fork Compressor Station to gather the additional gas volumes generated by the wells on the new BLM pad. The 24-inch as line would be buried underneath the proposed WH H15 596 pad within the BLM 40-acre parcel. Three additional water pipelines (6-inch steel remote frac line, 10-inch steel flowback line and 16-inch lined steel produced water line) would be installed from the WF H15 596 pad north to support the remote well completion operations staged on the nearby WF A15 pad.

The proposed man camp to be established on the southern extent of the new pad would also be subject to BLM rights-of-way authorizations. All of the described actions across or within the BLM 40-acre parcel (SE¼NE¼ of Section 15) would be authorized under a BLM right-of-way grant. No drilling of fee wells would be authorized until the BLM right-of-way is granted. The right-of-way term would be a standard 30-year span. Since the man camp would be operational while drilling and completion work is occurring, and the drilling and completion work could occur intermittently for at least three years, the man camp would be included in the pad site right-of-way instead if using a temporary use permit authorization.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would not require realty authorizations from the BLM but would result in resource impacts similar to those under the Proposed Action.

Riparian and Wetland Areas (includes an analysis on Public Land Health Standard 2)

Affected Environment

Low-lying areas adjacent to West Fork Parachute Creek are characterized by shallow groundwater and an occasional flood during snowmelt and major rainfall events. In addition, surface runoff collects and settles in depressions along the bank. Narrow bands of riparian vegetation occur along the creek, which runs south of and parallel to Encana's West Fork Road. Woody riparian species include narrowleaf cottonwood (*Populus angustifolia*), box-elder (*Negundo aceroides*), small quaking aspen (*Populus tremuloides*), tall willow shrubs (*Salix* spp.), thinleaf alder (*Alnus incana*), redtwig dogwood (*Swida sericea*), with lesser three-leaf sumac (*Rhus trilobata*) dominant on the drier slopes. Associated species include common chokecherry (*Padus virginiana* ssp. *melanocarpa*), snowberry (*Symphoricarpos rotundifolia*), golden currant (*Ribes aureum*), gooseberry currant (*R. inerme*), Woods' rose (*Rosa woodsii*), and western virgins-bower (*Clematis ligusticifolia*).

The herbaceous layer associated with the creek is limited by the narrow width of the habitat, the dense cover of deciduous trees and tall shrubs, and the abrupt transition from wet to dry conditions on the steep shale streambanks..

Although the buffer width incorporated into lease stipulation CSU-2 for the protection of wetland and riparian zones includes the proposed pad location, no physical disturbance would occur within the CSU area. Instead, the pad would be located entirely within upland habitat separated from the outer edge of riparian vegetation by the existing road

The pipeline would be installed along Encana's West Fork Road. The existing road and stormwater management structures would prevent sediment from migrating into the creek.

Environmental Consequences

Proposed Action

No direct impacts to wetland or riparian areas are expected occur as a result of the Proposed Action. However, potential indirect impacts could result from surface-disturbing activities associated with pad construction and from increased traffic on West Fork Road. Short-term impacts would be minimized by managing stormwater, stockpiling topsoil, controlling erosion, and promptly rehabilitating disturbed surfaces, as required by the COAs included in Appendix A. Long-term protections would be achieved by a reduction in pad size during interim reclamation, ongoing road and pad maintenance to reduce erosion, and remediation of any media contaminated by accidental spills or releases of chemical pollutants.

Potential adverse impacts from increased transport of sediments by runoff or aerial deposition of airborne dust from the road would be minimized by BLM's requirement for application and maintenance of a minimum 6-inch gravel surface and periodic dust abatement using fresh water.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to the riparian and wetland zone along West Fork Parachute Creek because the alternative surface location(s) used by Encana would be in less suitable areas.

Analysis on Public Land Health Standard 2 for Riparian and Wetland Areas

The Rifle-West Watershed LHA conducted in 2005 determined all lotic areas assessed were meeting standard 2 for healthy riparian areas. The Proposed Action would be unlikely to prevent Standard 2 from being achieved since direct impacts to riparian or wetland areas would not occur with the Proposed Action or the No Action Alternative due to the location of the pad in upland habitat, separated from the creek by the existing road.

Socioeconomics

Affected Environment

The project area is located within Garfield County, Colorado. The total county land area is 2,947 square miles (City Data 2011). The county seat is Glenwood Springs; other towns include Carbondale, New Castle, Silt, Rifle, Parachute, and Battlement Mesa. Interstate 70 transects the county from east to west. A network of county and private roads services the project area.

The population of the county grew by an average of approximately 3% per year from 2000 to 2010, resulting in a total increase of more than 27% from 44,259 to 56,298 residents (USDOC 2011). Population growth in Garfield County is expected to more than double over the ensuing 20 years to 119,979 in 2030 (DOLA 2010). Currently the population density is 10 people per square mile, which is low compared to the U.S. average. The county population in July 2009 was approximately 70% urban and 30% rural (City Data 2011). In 2009, Garfield County had an estimated 32,692 jobs. Industry groups with the highest percentage of total employment were construction (15%), tourism (14%), retail trade (13%), and education and health (8%) (Table 9).

Table 9. Selected Job Sectors for Garfield County

Job Sector	*No. of Jobs*	*Percent of Total*
Agriculture	644	2.0
Mining	1,956	6.0
Oil and Gas Extraction	531	1.6
Construction	5,029	15.4
Retail Trade (retail & wholesale)	4,444	13.6
Tourism	4,692	14.3
Education and Health	2,797	8.5
Government	5,035	15.4

Employment in agriculture, forestry, hunting, and mining accounted for 8% or the total employment. Jobs in the oil and gas extraction industry numbered 531 (Colorado Department of Labor and

Employment 2010). This number, representing 1.6% of total jobs, is considered misleading because some oil and gas employment has been incorporated as part of the construction sector statistics instead (BLM 2006). For example, in the year 2005, an estimated 4,000 persons were directly employed by gas development companies and their subcontractors in Garfield County. The number of natural gas related jobs is projected to peak at 5,278 in 2017(Garfield County 2007).

Personal income in Garfield County has also risen, growing approximately 6% per year from $1.3 billion in 2000 to $2.1 billion in 2009. Annual per capita income has grown in the same period approximately 3% per year, from $29,080 to $37,099 (USDOC 2011). The communities of Parachute, Silt, and Rifle are considered to have the most affordable housing, while the communities of Battlement Mesa, New Castle, and Glenwood Springs are considered to have the least affordable housing, where the cost to rent or own similar housing may be 50% or more higher (BLM 2006).

In 2009, industry groups in Garfield County with the highest percentage of total employment were Construction 15%, Tourism 12%, Retail Trade 13%, and Education and Health 20% (Colorado Department of Labor and Employment 2010). An estimated 13.3% of the population was retired in the year 2000 and did not earn wages (Garfield County 2000). Employment in agriculture, forestry, hunting, and mining accounted for 8% of total employment (Colorado Department of Labor and Employment 2010).

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

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

Property tax revenue from oil and gas development has become the largest source of public revenue in Garfield County (BLM 2006) and is the primary revenue source for the General Fund, Capital Expenditures Fund, Road and Bridge Fund, Retirement fund, and Human Services Fund. Together these funds comprise 77% of the budget. In the year 2009, oil and gas assessed valuation in the County amounted to approximately $3.8 billion, or about 74% of the total assessed value (Garfield County 2011b). In 2010, the oil and gas assessed valuation amounted to $2.0 billion, or about 60% of the total assessed value, reflecting the effects of low natural gas prices and the economic downturn on exploration and production. However, total tax revenues increased from $135 million in 2009 to $153 million in 2010. Tax dollar distributions in 2010 were Schools 34.6%, County 30.4%, Special Districts 12.3%, Fire Districts 12.0%, Colleges 8.2%, and Towns 2.5%.

The Federal government makes Payments in Lieu of Taxes (PILT) to County governments to help offset property tax revenue lost on non-taxable Federal lands located within County boundaries (BLM 2006). The PILT distributions are based on acres for all Federal land management agencies (e.g., approximately 1.9 million acres in Garfield County). 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 in the last 5 years are shown in Table 10 (USDI NBC 2011).

In addition to PILT distributions, BLM shares revenue generated by commercial activities on public lands with State and County governments (BLM 2006). Federal mineral royalties (FMLs) are collected 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 lands. Half of the royalty receipts are distributed to Colorado. In 2008 and 2009, Garfield County received FML and Severance Direct Distribution Payments totaling $2,744,802 and $11,400,046 respectively (AGNC 2011). These funds are then allocated to fund County services, schools, and local communities.

Table 10. Federal Payments in Lieu of Taxes to Garfield County

Year	***PILT Amounts***
2011	$391,032
2010	$391,649
2009	$1,808,984
2008	$654,453
2007	$1,078,087

NEPA 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 Latino community is the only minority population of note in the vicinity of the project area. In 2010, 28.3% of the residents of Garfield County identified themselves as Hispanic or Latino, and this is slightly higher than for Colorado (20.7%). African Americans, American Indians, and Pacific Islanders account for less than 2% of the Garfield County population, which are below state levels (DOLA 2010).

Environmental Consequences: The Proposed Action would have minor positive impacts on the local economy of Garfield County through the creation of additional job opportunities in the oil and gas industry and in supporting trades and services. In addition, Garfield County would receive additional tax and royalty revenues.

The Proposed Action could result in negative social impacts including changing the recreational character of the area, reducing scenic quality, increasing dust levels especially during construction, and increasing traffic.

No Action Alternative:

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in a level of development, and associated positive and negative socioeconomic impacts, similar to those under the Proposed Action.

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

Affected Environment

The WF H15 596 project is covered by the *Soil Survey of Rifle Area, Colorado* (NRCS 2010, USDA 1985) and would include surface-disturbing activities on two soil complexes. The pipeline, the access road and a portion of the pad lies within the Nihill Channery loam which follows along the creek. A portion of the of the pad lies within the Rock outcrop-Torriorthents complex.

The Nihill Channery loam is a well-drained, moderately sloping (6 – 25% slopes) to hilly soil found on alluvial fans and sides of valleys. This soil is formed in alluvium derived from the Green River shale and sandstone. The permeability is moderately rapid, runoff is slow and erosion hazard is severe. This soil is generally used for grazing and wildlife habitat and development is limited by steep slopes.

According to the mapped areas the pad lies within the Rock outcrop-Torriorthents complex. This complex consists of exposed bedrock, stony areas, shallow to moderately deep soils over bedrock and small areas of deep soils. At lower elevations, where the pad lies the surface runoff is rapid and erosion hazard is moderate. This complex has limited value for grazing. Extreme slopes and rockiness limit development.

Environmental Consequences

The Proposed Action would involve surface disturbance for new pipelines, road spurs and a 9.5-acre well pad. The Proposed Action would result in approximately 71.7 acres of short-term vegetation loss and soil compaction and displacement on private and BLM lands. After reclamation the long-term surface disturbance would be reduced to 3.6 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 West Fork Parachute Creek and the Colorado River. The project does include a few areas which are susceptible to erosion due to steep slopes. The pad was positioned in the most optimal location to take advantage of the topography and avoid disturbances on steep slopes. In areas susceptible to erosion or possible slope instability issues, proper erosion control and construction techniques would be required in the site specific COAs (Appendix A).

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, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action.

Analysis on Public Land Health Standard 1 for Upland Soils

The Rifle-West Watershed LHA conducted in 2005 determined that all areas were meeting Standard 1 for upland soils, although some areas were found to be impacted by accelerated erosion. The Proposed Action with associated mitigation is unlikely to prevent Standard 1 from being achieved. Measures attached as COAs (Appendix A) for controlling erosion and revegetating disturbances would minimize long-term impacts to soil volume and productivity. The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for soils because no new development would occur on BLM land.

Special Status Species (includes an analysis on Public Land Health Standard 4)

Federally Listed, Proposed, or Candidate Plant Species

Affected Environment

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

Environmental Consequences

Proposed Action

The results of a plant survey conducted in September 2011 indicate no Federally listed, proposed, or candidate plant species or suitable habitat for these species in the project area (WWE 2011). Therefore, the Proposed Action would have "**No Effect**" on these species.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. Although it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface, impacts to Federally listed, proposed, or candidate threatened or endangered species would not occur, because none is present in the project vicinity.

Federally Listed, Proposed, or Candidate Animal Species

Affected Environment

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

Canada Lynx (*Lynx canadensis*). Federally listed as threatened. Canada lynx occupy high-latitude or high-elevation coniferous forests characterized by cold, snowy winters and an adequate prey base (Ruggiero et al. 1999). The preferred prey of Canada lynx throughout their range is the snowshoe hare (*Lepus americanus*). In the western United States, lynx are associated with mesic forests of lodgepole pine, subalpine fir, Engelmann spruce, and quaking aspen in the upper montane and subalpine zones, generally between 8,000 and 12,000 feet in elevation. Although snowshoe hares are the preferred prey in

Colorado, lynx in also feed on other species such as the mountain cottontail (*Sylvilagus nuttallii*), pine squirrel (*Tamiasciurus hudsonicus*), and dusky grouse (*Dendragapus obscurus*).

The U.S. Forest Service (USFS) has mapped suitable denning, winter, and other habitat for lynx within the White River National Forest (WRNF), portions of which are adjacent to BLM lands within the CRVFO. The mapped suitable habitat in the WRNF comprises several areas known as Lynx Analysis Units (LAUs). Several LAUs border BLM lands along the Interstate 70 corridor from east of Wolcott to west of DeBeque. While BLM lands within the CRVFO area are generally not suitable habitat, they may support movement by animals dispersing to a new area or, potentially, moving to lower elevations during severe winter weather in search of prey. The project area does not border the Battlement Creek LAU, and this species is therefore not considered further in this document.

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

Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*). Candidate for Federal listing. This secretive species occurs in mature riparian forests of cottonwoods and other large deciduous trees with a well-developed understory of tall riparian shrubs. Habitat along West Fork Parachute Creek appears too limited in extent and quality for use by the cuckoo. Although a more extensive riparian community occurs along the Colorado River a few miles south of the project area, historic grazing use, and recent industrial use of the corridor have resulted in conditions seemingly unsuitable for this species. For these reasons, the western yellow-billed cuckoo is species is not considered further.

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

Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*). Federally listed as threatened. The greenback cutthroat trout was not identified on the USFWS list for Garfield County; however, recent surveys have identified a population in a small stream that enters the Colorado River from the south several miles farther east than Parachute Creek. However, this species was not found during electrofishing surveys in West Fork Parachute Creek and is not considered potentially present.

Environmental Consequences

Proposed Action

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

The endangered Colorado River fishes could potentially be affected by the consumptive use of water taken from the Colorado River basin to support activities associated with the Proposed Action.

Depletions in flows in the Colorado River and major tributaries are a major source of impacts to these fishes due to changes in the flow regime that reduce the availability and suitability of spawning sites and habitats needed for survival and growth of the larvae. Principal sources of depletion in the Colorado River basin include withdrawals for agricultural or industrial uses, withdrawals for municipal water supplies, and evaporative losses from reservoirs. On average, approximately 0.7 acre-feet of Colorado River water is consumed during activities related to each oil and gas well.

In 2008, the BLM prepared a Programmatic Biological Assessment (PBA) addressing water-depleting activities associated with BLM's fluid minerals program in the Colorado River Basin in Colorado. In response to this PBA, the USFWS issued a Programmatic Biological Opinion (PBO) (ES/GJ-6-CO-08-F-0006) on December 19, 2008. The PBO concurred with BLM's effects determination of "**May Affect, Likely to Adversely Affect**" the Colorado pikeminnow, humpback chub, bonytail chub, or razorback sucker as a result of depletions associated with oil and gas projects. To offset the impacts, the BLM has set up a Recovery Agreement, which includes a one-time fee per well. The estimated depletions from the Proposed Action will 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 on the well pads, associated with ancillary surface facilities, or resulting from an accident involving a haul truck in proximity to a stream. Stormwater controls required for the protection of surface water quality would also provide protection of aquatic organisms (see COAs in Appendix A). Even if sediment inflow were to occur, including incidental aerial deposition of fugitive dust from roadways and construction areas, these fishes are adapted to the naturally high sediment loads that characterize the Colorado River and its tributaries.

The inflow of chemical pollutants could impact the endangered big-river fishes if concentrations were sufficient to cause acute effects. The potential for adverse impacts would be limited to the Colorado pikeminnow and razorback sucker, the two species known to occur within the CRVFO area. Spills or other releases of chemical pollutants as a result of oil and gas activities are infrequent in the CRVFO area due to the various design requirements imposed by BLM and the State of Colorado. In the event of a spill or accidental release, the operator is required to implement its Spill Prevention, Control, and Countermeasures (SPCC) plan, including such cleanup and mitigation measures as required by BLM or the State. In addition, stormwater controls (Appendix A) would reduce the risk of transport of these substances as well as sediments to surface waters, including the Colorado River. For these reasons, and because any spills making their way into the Colorado River would be rapidly diluted to levels below that are not deleterious, or even detectable, the potential for adverse impacts from chemical releases is not considered significant. Consequently, the Proposed Action would have "**No Effect**" on the endangered big-river fishes from potential impacts to water quality.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to the

aquatic and riparian/wetland habitats along West Fork Parachute Creek because the alternative surface location(s) used by Encana would be in less suitable areas.

BLM Sensitive Plant Species

Affected Environment

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

Environmental Consequences

Proposed Action

A plant survey conducted in September 2011 indicated two BLM sensitive plant species or their habitats in the vicinity of the Proposed Action. These species are the Roan Cliffs blazingstar (*Mentzelia rhizomata*) and Cathedral Bluffs meadow-rue (*Thalictrum heliophilum*). Roan Cliffs blazingstar was observed in abundance along the shale slopes east of the proposed WF H15 596 pad and in one area along the proposed pipeline alignment on private land.

Roan Cliffs blazingstar found on the shale slopes east of the pad would not be directly impacted by the Proposed Action. About 60 Roan Cliffs blazingstar plants were also observed on private land along the existing pipeline disturbance corridor. These plants may potentially be impacted by the proposed 24-inch pipeline installation. In its biological report, WestWater Engineering stated: "If plants are removed during the pipeline construction, it is likely that they would repopulate the area due to the abundance of plants upslope of the pipeline and based on WWE observations of Roan Cliffs blazingstar on areas of disturbance" (WWE 2011). Cathedral Bluffs meadow-rue was also observed (from scattered to abundant) on steep shale slopes during the site surveys, although no Cathedral Bluff meadow-rue plants were found within the proposed project disturbance area for the pad or pipeline (WWE 2011).

Based on the report by WWE (2011), approximately 0.4 acre of occupied habitat for the Roan Cliffs blazingstar and Cathedral Bluffs meadow-rue occurs near the WF H15 pad location on BLM land, and an additional 5.3 acres of occupied habitat is present on private land within 200 meters of the proposed 24-inch gas pipeline. Since proposed WF H15 596 pad would be constructed in a mountain shrub community and not along any of the barren shale slopes, no loss of plants attributed to the pad construction on BLM or private land. However, indirect impacts and inadvertent direct impacts would pose a potential risk to nearby plants, some of which were observed within 50 to 60 feet of the proposed pad. Nonetheless, the report by WWE (2011) concluded that the proposed project would be unlikely to affect the population status of these species due to the abundance of plants observed along suitable in the project area vicinity.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to the

Roan Cliffs blazingstar and Cathedral Bluffs meadow-rue because alternative surface location(s) used by Encana would be in less suitable areas.

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 11. Species indicated in the table as present or possibly present in the project vicinity are described more fully following the table.

Table 11. Special Status Vertebrate Species Present or Potentially Present in the Project Area

Common Name	***Habitat***	***Potential for Occurrence***
Fringed myotis, Townsend's big-eared bat	Breed and roost in caves, trees, mines, and buildings; hunt over pinyon-juniper, montane conifers, and semi-desert shrubs.	Possible
Northern goshawk	Predominantly uses spruce/fir forests but also use Douglas-fir, various pines, and aspens.	Possible
Bald eagle	Nests and roosts in mature cottonwood forests along rivers, large streams, and lakes.	Nests and roosts on Colorado River
Peregrine falcon	Nests on cliffs, usually near a river, large lake, or ocean. Hunts for waterfowl on water or upland fowl across grasslands and steppe.	Nests on Roan Cliffs
Brewer's sparrow	Nests in large stands of sagebrush, primarily Wyoming sagebrush on level or undulating terrain.	Possible
Midget faded rattlesnake	Cold desert dominated by sagebrush and with an abundance of rock outcrops and exposed canyon walls, typically farther west than the project area.	Possible
Great Basin spadefoot	Habitat includes pinyon-juniper woodlands and semi-desert shrublands, typically farther west than the project area.	No suitable habitat found
Northern leopard frog	Wet meadows and the shallows of marshes, ponds, lakes, streams, and irrigation ditches.	Possible
Flannelmouth sucker and roundtail chub	Restricted to rivers and major tributaries.	Present in Colorado River
Bluehead sucker	Found in smaller streams with a rock substrate and mid to fast flowing waters.	Not present
Colorado River cutthroat trout	Headwaters streams and ponds with cool, clear waters and no non-native cutthroat subspecies	Present in West Fork of Parachute Creek

Environmental Consequences

Proposed Action

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

Northern Goshawk (*Accipiter gentilis*) – This species is mostly limited to spruce/fir or aspen forests, such as atop the Roan Plateau, Battlement Mesa, and other areas that reach subalpine elevations. However, goshawks may migrate to lower elevation pinyon/juniper or Douglas-fir habitats during winter and therefore could make occasional, transitory use of the project area for winter foraging. Goshawks feed primarily on small birds but also on diurnal small mammals (rabbits, chipmunks, etc.).

Bald Eagle (*Haliaeetus leucocephalus*) – Formerly listed as endangered, then downlisted to threatened, and eventually removed from the list of threatened or endangered species, the bald eagle remains protected by the Bald and Golden Eagle Protection Act (BGEPA) as well as the MBTA. Bald eagles nest and roost along the Colorado and probably occasionally venture into the Parachute Creek drainage, primarily in the more open lower reaches. Bald eagles hunt primarily for fish and waterfowl but secondarily for rabbits, ground squirrels, or other upland prey, especially in winter. Any use of the West Fork Parachute Creek canyon by this species would be expected to be infrequent and transitory.

Peregrine Falcon – Also formerly listed as endangered, then downlisted to threatened, and eventually removed from the list of threatened or endangered species, the peregrine falcon nests along the Roan Cliffs in the general project vicinity and hunts primarily for waterfowl along the Colorado River or upland fowl and other birds on nearby sagebrush-covered plateaus. No peregrine nests are known in the West Fork Parachute Creek canyon near the project area, and the creek is not suitable hunting habitat due to its small sizes and dense tree cover. Peregrines may hunt for birds on the sagebrush slopes of the canyon sides.

Brewer's Sparrow – This species is a near-obligate on sagebrush and is common in expansive stands, especially those dominated by Wyoming big sagebrush on level to rolling or undulating terrain. Smaller stands or those on steep mountainsides may also be used, and the species occasionally nests in stands of short willows near timberline. The sagebrush habitat on the sideslopes of West Fork Parachute Creek is marginally suitable for nesting by this Neotropical migrant.

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

Northern Leopard Frog (*Rana pipiens*) – The northern leopard frog is limited to perennial waters, including ponds and slow-flowing perennial streams or persistent portions of intermittent streams. It requires good water quality and abundant aquatic or shoreline vegetation. The habitat along West Fork Parachute Creek appears marginally suitable for the species, but no leopard frogs have been reported during fish surveys or other surveys of the stream. Because the project would not involve habitat disturbance near water sources, impacts to this species are not expected.

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

Also similar to the endangered big-river fishes, these BLM sensitive species are adapted to naturally high sediment loads and therefore would not be affected by increased sediment transport to the Colorado

River. However, these species are vulnerable to inflow of sediments into smaller streams by smothering the eggs of these species. The potential for adverse impacts from inflow of chemical pollutants is also greater in small streams due less dilution and the presence of larval or juvenile fishes, which are more susceptible to mortality from acute toxicity. The COAs for the protection of water quality (Appendix A) would minimize the potential for impacts from inflow of sediments or toxicants. Prompt implementation of the SPCC plan following any spill or other release of hydrocarbons, saline waters, or other contaminants would further reduce the risk of significant adverse impacts to these species and other aquatic life in affected waters.

Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*) – Remaining populations of this subspecies of cutthroat trout occur mostly in headwater streams and lakes of the Colorado River drainage. This includes West Fork Parachute Creek, which is located approximately 75 yards from the proposed pad and runs along the proposed pipeline. The most recent sampling by CPW fisheries personnel confirmed the occurrence of Colorado River cutthroat trout in West Fork Parachute Creek. The reach of stream that was sampled also found to support brown trout (*Salmo trutta*), in greater abundance than the Colorado River cutthroat trout.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to the aquatic and riparian/wetland zone along West Fork Parachute Creek because the alternative location(s) used by Encana would be in less suitable areas.

Analysis on Public Land Health Standard 4 for Special Status Species

According to a recent land health assessment, habitat conditions within this area appear suitable for special status animal species known or likely to occur (BLM 2005). However, large portions of the landscape are being fragmented due to extensive natural gas development. Continued habitat fragmentation is of concern as large blocks of contiguous intact habitat are required by many species. Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms and other surface facilities will continue to reduce habitat patch size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. The Proposed Action in conjunction with similar activities throughout this watershed would increase fragmentation and could increase sediment loads. Although the contribution of the Proposed Action is in itself small, it may further trend the area away from meeting Standard 4 for special status wildlife.

The No Action Alternative would not result in a failure of the area to achieve Standard 4 because the proposed developments on BLM land would not occur.

Vegetation (includes an analysis on Public Land Health Standard 3)

Affected Environment

The proposed pad and pipeline would be constructed in the mountain shrub community and among the revegetated grasses and forbs representative of the reclaimed existing pipeline corridor between the proposed pad south to the Middle Fork Compressor. The riparian vegetation, characterized by boxelder, narrowleaf cottonwood, and willows, and other shrubs occurs along West Fork Parachute Creek. The

riparian corridor lies in proximity to the project but generally lies on the west side of the existing access road from the proposed pad and pipeline installation.

The steep canyon walls buttressing the Roan Plateau rise above the project area. The south-facing and west-facing slopes of the canyon support sagebrush shrublands while the north-facing and east-facing steep slopes are composed of mixed mountain shrublands with scattered Douglas-fir trees. The sagebrush-covered slopes are dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) mixed with bitterbrush (*Purshia tridentata*), wax currant (*Ribes cereum*), mountain-mahogany (*Cercocarpus montanus*), serviceberry (*Amelanchier alnifolia*), and snowberry. Dominant perennial grasses include bluebunch wheatgrass (*Pseudoroegneria spicata*) and slender wheatgrass (*Leymus trachycaulus*), with a variety of subdominant native grasses and native forbs.

Environmental Consequences

Proposed Action

Under the Proposed Action, 71.7 acres of new disturbance would occur, with 7.5 acres or approximately 10% of the project disturbance planned on the 40-acre BLM parcel. The proposed pad would remove vegetation from 9.5 acres of sagebrush and mountain shrub communities (6.3 acres on BLM). The planned pipeline upgrades would denude about 62 acres of vegetation although much of that surface disturbance would occur within the existing, but reclaimed pipeline corridor. The new spur road construction would result in 0.2 acre of vegetation disturbance.

Following successful interim reclamation, all but 3.4 acres would be revegetated with the remaining area comprising the working area of the pad supporting the access road, wellheads, production units and storage tanks. With implementation of standard COAs (Appendix A), desirable forbs and grasses on the unused portions of the pads and pipeline could be established within 2 to 3 years. However, because of periodic workovers and the potential for additional well bores in the future, it is likely that vegetation would remain in an early seral stage for the life of the wells.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action.

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

This area was meeting the standard, although problems were noted: decadent stands of sagebrush with poor recruitment, encroaching juniper, and widespread invasion of cheatgrass with a corresponding loss of other functional groups such as native perennial grasses and forbs. Surface disturbance associated with the Proposed Action has the potential to encourage expansion and dominance of the site by cheatgrass and other invasive weeds. Appendix A includes provisions to revegetate the disturbances with native species and to control noxious weeds. If successfully revegetated, the Proposed Action should not contribute to the failure of the area to meet Standard 3. The No Action Alternative would have no bearing on the ability of the area to meet the public land health standard for plant and animal communities because no new development would occur on BLM land.

Visual Resources

Affected Environment

The proposed pad, access road, and pipelines are located on public land administered by the BLM and private land approximately 14.8 miles north of Parachute, Colorado. The lands administered by the BLM is classified as Visual Resource Management (VRM) Class II, as identified by the 1984 Glenwood Springs Resource Management Plan. The proposed WF H15 596 pad and pipelines would occur on both VRM Class II land and private land, while the proposed access road would occur entirely on VRM Class II land (Figure 6). Federal lease terms regarding visual concerns are not applicable to private land.

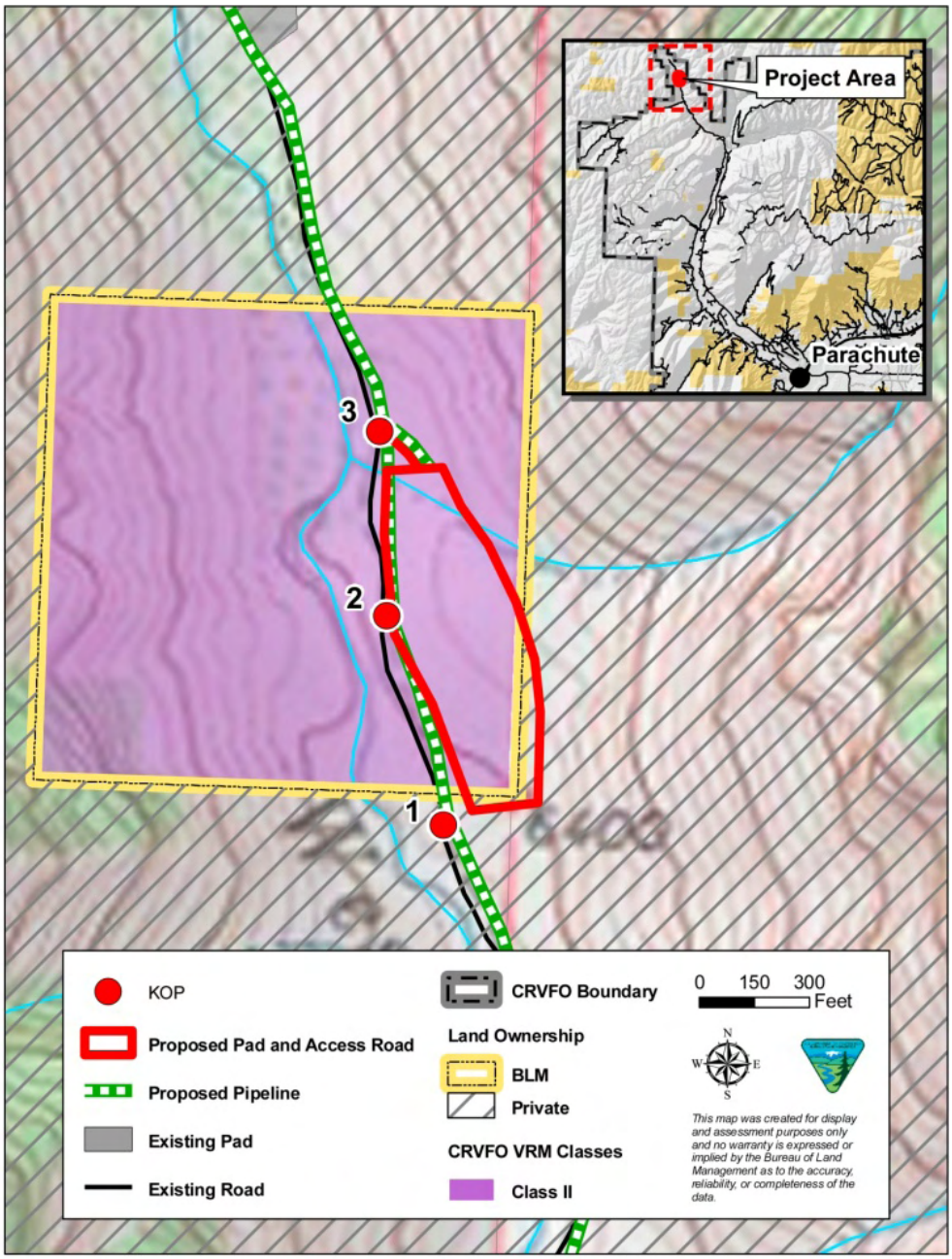

Figure 6. Proposed Action Relationship to Visual Resource Management (VRM) Classes.

The objectives for VRM Classes II, 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 project area consists of steep cliff walls rising out of West Fork Parachute Creek Valley. The cliff walls create an enclosed landscape that intensifies their scale while creating a narrow valley bottom that runs in a southeast to northwest direction. The area is characteristic of scattered oil and gas development intermixed within a more natural appearing landscape. The Proposed Action would occur east of West Fork Parachute Creek and the existing road, but would be located at the base of the eastern cliff wall. Vegetation within the project area lies within the mountain shrub vegetation community dominated by serviceberry, mountain mahogany, and oakbrush.

No public access exists to the project location. The 40-acre BLM parcel is landlocked by private land. Encana maintains a guard station at the end of Garfield County Road 215 as it enters the North Parachute Ranch property. The road then continues north from the property boundary to the base of West Fork Parachute Creek Falls. This segment of the road is owned and maintained by Encana.

The visual resource analysis area is visible from Encana's West Fork Road and, with limited views, from private lands on the top of the nearby Roan Plateau. The project area is within the background (5 to 15 miles) of major travel corridors that are accessible to the public. The topography surrounding the project location also screens views into the project area from outside the project area. The West Fork Road viewshed is only seen by viewers who have permission to access the adjacent private lands. The Proposed Action would occur in the viewer's foreground, less than 5 miles from Encana's West Fork Road and, with limited views, from Davis Point, Rabbit Ridge, and Red Point on top of the Roan Plateau. BLM guidance states that lands with high visual sensitivity are those within 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 be easily noticed by the casual observer. The visual impact analysis for this project is based on views from Encana's West Fork Road. This location represents the viewing angle and direction with the highest frequency of viewers. Because the views and public access on the top of the nearby Roan Plateau are limited, the top of the Roan Plateau was not selected for Key Observation Points (KOPs). Three KOPs were selected along West Fork road and represent typical views that a viewer would see while traveling north and south (Figure 6).

KOP 1 (Figure 7) is located at the southwestern corner of the pad. This represents the typical view a traveling north on West Fork Road. From this location, the viewer would be lower in elevation than the pad. West Fork Road gradually gains elevation as it passes along the valley floor, then rises to the southern end of the pad location. This portion of the pad would be most visible to a viewer traveling north and would be located primarily on private land. The toe of the fill slope would parallel the West fork Road and would vary from approximately 50 feet in the southwestern corner to 10 feet in the northwestern corner. The cut slope would also become apparent, varying from approximately 20 feet in the southeastern corner to 54 feet at mid-pad and 13 feet near the northeastern corner.

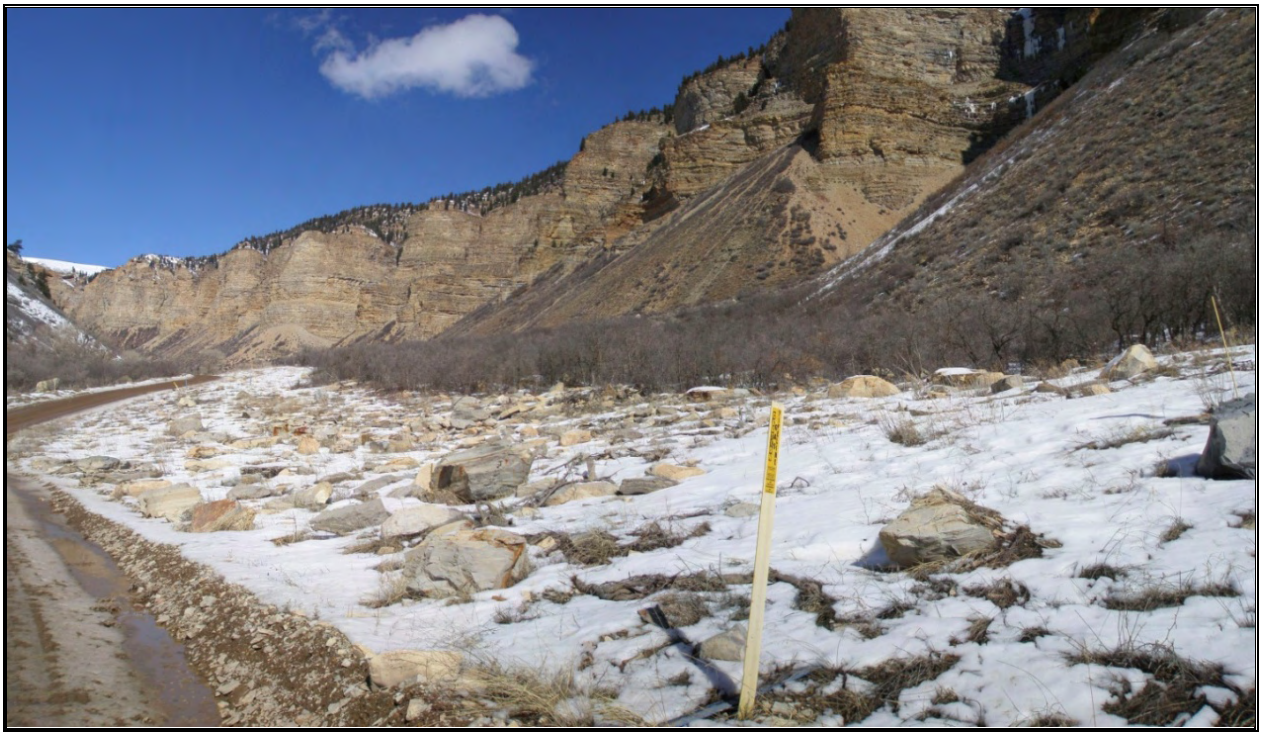

Figure 7. KOP 1. Southwestern Corner of the Proposed Pad.

KOP 2 (Figure 8) is located directly west of the center of the pad, representing the view both northbound and southbound on West Fork Road. The viewer would be at an equal or slightly lower elevation than the pad, which would lie at a 90-degree angle to the side. This is where the second entrance to the pad would be located and where the 54-foot cut slope would be most apparent. Fill along would be 10 to 20 feet

Figure 8. KOP 2. Western side of the Proposed Pad.

KOP 3 (Figure 9) is located at the northwestern corner of the pad, representing the typical view while traveling south along West Fork Road. The viewer would be located at the same elevation as the pad. The proposed access road would extend from this location to the pad entrance. The fill slope along this edge of the pad would vary from 10 feet in the northwestern corner to 2 feet in the northeastern corner.

Figure 9. KOP 3.

Environmental Consequences

Proposed Action

The proposed WF H15 596 pad was sited in this location because of the limitations of adjacent topography and to avoid being too close to West Fork Parachute Creek. This location provides the space needed space to a pad of the size required to accommodate up to 60 wells and associated facilities. The pad was designed to conform to the natural topography as much as possible.

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

Long-term impacts and mitigations measures to meet VRM Class II requirements are described below.

Proposed WF H15 596 Pad. The proposed WF H15 596 pad footprint would include approximately 9.5 acres of total surface disturbance. The pad would be approximately 350 feet wide (at the widest measurement) by 940 feet in length with an additional 175 feet of length at the south end to accommodate

topsoil storage. The 50 foot (approximate) fill along the southwest corner would occur predominantly on private land. Of the 9.5 acres of total surface disturbance, 6.3 acres would occur on BLM land. After drilling and completion operations are finished, the disturbance acres would be reduced to approximately 3.4 acres.

Proposed Access Road. Approximately 175 feet of a new 22-foot-wide access road would be built at the north end of the pad. In addition, another pad entrance, approximately 25 feet in length, would be constructed near the center of the pad. The disturbance area attributable to the road construction would amount to 0.2 acres on BLM land.

Proposed Pipelines. To gather the expected gas volumes from the WF H15 596 pad, approximately 20,930 feet of maximum 24-inch steel pipeline would be buried along an existing pipeline corridor between the WF H15 596 pad and the operating Middle Fork Compressor Station located on Encana property in NE¼NE¼ Section 30, T5S, R96W (Figures 1 and 3). Only 1010 feet of the 24-inch line would be buried on BLM essentially underneath the planned WF H15 596 pad footprint. The planned disturbance width for the 24-inch gas pipeline on private land would not exceed 120 feet although the actual disturbance would be limited, where feasible, to 50 feet in width. The 24-inch line would function as a 3-phase line which would move all fluids associated with the producing gas downstream to a planned tank farm located at the Middle Fork Compressor Station where separation of natural gas, produced water, and condensate would occur. The disturbance footprint associated with the 24-inch gas pipeline (using a length of 20,930 feet) would occur solely on private land and amount to 62.0 acres.

Three additional buried pipelines (6-inch steel remote frac line, 10-inch steel flowback line, and 16-inch lined steel produced water line) would be installed from the WF H15 596 pad north to support the remote well completion operations staged on the WF A15 596 pad. The 1570 feet of pipeline distance for these 3 lines would encompass a maximum disturbance width of 120 feet resulting in 4.3 acres of disturbance. Of this total, a 367-foot length representing approximately 1.0 acre of new disturbance would occur on the BLM 40-acre parcel.

Total surface disturbance for the WF H15 596 pad, road and pipeline construction would amount to 71.7 acres. The total disturbance occurring on BLM would be 7.5 acres, representing approximately 10% of the surface disturbance planned for the project. Approximately 64.2 acres of disturbance would occur on Encana's North Parachute Ranch property. As shown in Table 12, approximately 7.5 acres would be disturbed within the VRM Class II designation. Of those 7.5 acres, 3.6 acres would remain in use for the life of the producing wells (representing the amount of long-term disturbance associated with the Proposed Action). Implementation of the mitigation measures would assist in the project components related to the BLM 40-acre parcel meeting the objectives for the VRM Class II designation (Appendix A).

Table 12. VRM Class II Designations Applicable to the Proposed Action

Project Component	***Total on BLM Land***
Proposed WF H15 596 Pad	6.3 acres
Proposed Access Roads/Pad Entrance	0.2 acre
Proposed Pipelines	1 acre
Total	***7.5 acres***

Mitigation measures to reduce visual impacts in the Class II areas would include the following, to be applied by the BLM as COAs (Appendix A):

Construction

- The pipeline shall be installed during pad construction to reduce the amount of additional surface disturbance that would occur if the pipeline was installed after the pad was constructed.
- All woody vegetation (live and dead) shall remain standing at the toe of the north and south fill slopes to provide some visual screening.
- Rocks and woody debris shall be saved during the construction process; care should be taken to preserve the canopy of the woody material while storing and transporting.
- Facilities shall be located to maximize area for interim reclamation.
- All facilities shall be painted Shadow Gray, a color found in the natural vertical elements.

Interim Reclamation

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in impacts similar to the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to visual resources because the alternative surface location(s) used by Encana would be in less suitable areas.

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 National Environmental Policy Act documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed

project. The Glenwood Springs Resource Area, Oil & Gas Leasing & Development, Draft Supplemental Environmental Impact Statement (June 1998), Appendix L, Hazardous Substance Management Plan, contains a comprehensive list of materials that are commonly used for oil and gas projects. It also includes a description of the common industry practices for use of these materials and disposal of the waste products. These practices are dictated by various Federal and State laws and regulations, and the BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis. The most pertinent of the Federal laws dealing with hazardous materials are as follows:

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

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

- The Resource Conservation and Recovery Act (RCRA) (Public Law 94-580, October 21, 1976) regulates the use of hazardous substances and disposal of hazardous wastes. Note: While oil and gas lessees are exempt from RCRA, right-of-way holders are not. RCRA strictly regulates the management and disposal of hazardous wastes.

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

Environmental Consequences

Proposed Action

Possible pollutants that could be released during the construction phase of this project would include diesel fuel, hydraulic fluid, and lubricants. These materials would be used during construction of the pads, roads, and pipelines, and for refueling and maintaining equipment and vehicles. Potentially harmful substances used in the construction and operation phases would be kept onsite in limited quantities and trucked to and from the site as required. No hazardous substance, as defined by 40 CFR 355 would be used, produced, stored, transported, or disposed of in amounts above threshold quantities.

Waste generated by construction activities would not be exempt from hazardous waste regulations under the oil and gas exploration and production exemption of RCRA. Exempt wastes would include those associated with well production and transmission of natural gas through the gathering lines and the natural gas itself.

With the exception of produced hydrocarbons, ethylene glycol (antifreeze), lubricants, and amine compounds, chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act in quantities of 10,000 pounds or more would not be used, produced, stored, transported, or disposed of during construction or operation of the facilities. None of the chemicals that

would be used in construction meet the criteria for an acutely hazardous material/substance, or meet the quantities criteria per BLM Instruction Memorandum No. 93-344. In addition, no extremely hazardous substance, as defined in 40 CFR 355, in amounts above threshold planning quantities would be produced, used, stored, transported, or disposed of during construction or operation of the facilities.

Solid waste (human waste, garbage, etc.) would be generated during construction activities and, to a larger extent, during drilling and completion operations since a man camp would be created on the southern edge of the pad. While providing food and lodging for the workers, support services such as bear-proof trash storage, potable and sewer water storage, generator and transformer settings, a fuel storage area and a freezer for food storage would be provided to complete the plans for the man camp. Potable water (one 4,200 gallon water supply tank and three 3,300 gallon water supply tanks) and septic service (seven 2,000 gallon above-ground septic tanks with overflow tanks and alarms) would be provided every 2-3 days by certified water and septic providers licensed by the State (Appendix A).

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

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in similar potential for impacts associated with solid or hazardous waste as under the Proposed Action.

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

Surface Water

Affected Environment

The proposed activities for WF H15 596 pad would occur within West Fork of Parachute Creek hydrologic unit which drains to West Fork Parachute Creek and after flowing into Parachute Creek ultimately empties into the Colorado River approximately 14 miles to the south 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 11b, which includes the mainstem and tributaries to West Fork Parachute Creek from West Fork Falls to the confluence with Parachute Creek. Following is a brief description of segment 11b.

- Segment 11b – This segment has been classified aquatic life cold 2, recreation N 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 suitable or intended to become suitable for primary contact recreation. This segment is suitable or intended to become suitable agricultural purposes that include irrigation and livestock use.

No streams within segment number 11b 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). *Colorado's Monitoring and Evaluation List* identifies water bodies where there is reason to suspect water quality problems but uncertainty exists regarding one or more factors. The USGS has collected limited flow and water quality data at sites along West Fork Parachute Creek near the project area (Table 13).

Table 13. Selected Water Quality Data for Two Locations on West Fork Parachute Creek

Parameter	Below Falls USGS Site #393736108091501	Mouth of Creek USGS Site #393454108064401
Instantaneous discharge (cfs)	1.6	2.1
Temperature, water (°C)	0.0	2.5
Field pH (standard units)	8.5	8.5
Specific conductance (µS/cm/cm at 25°C)	730	841
Total Dissolved Solids (mg/L)	443	542
Hardness as CaCO3 (mg/L)	290	290
Chloride (mg/L)	2.9	33
Selenium (µg/L)	<1	1

NA = data not available
Source: USGS 2007 (date of sampling 12/15/1982).

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

Environmental Consequences

Proposed Action

The Proposed Action would result in 71.7 acres of surface disturbance of which approximately 3.4 acres would not be reclaimed during the life of the wells. Potential impacts to surface water associated with the Proposed Action occur from surface-disturbing activities, traffic, waste management, and the use, storage and transportation of fluids (i.e., chemicals, condensate, and produced water). Surface-disturbing activities associated with well and facility pads, roads, and pipelines cause loss of vegetation cover, soil compaction and displacement, increased volume and velocity of runoff, and increased sedimentation and salinity in surface waters. Initially impacts can be minimized by stormwater management, stockpiling topsoil, controlling erosion, rehabilitation of disturbed surfaces quickly. Long term soil protection could be achieved by continued road and pad maintenance to reduce erosion, remediation of contaminated soils and minimizing the size of the long-term pad footprint through interim reclamation measures. As proposed, these measures would include limiting cut slope steepness, step-cutting, crowning road

surfaces, installing culverts and drainage systems, and applying gravel to all upgraded roads in the project area to a compacted thickness of 6 inches (Appendix A).

Oil and gas waste management practices have the potential to contaminate soils and surface water. Contamination of soils could cause long-term reduction in site productivity resulting in increased erosion and potential sediment and contaminant delivery to nearby waterways during runoff. Use, storage, and transportation of fluids such as produced water, hydraulic fracturing fluids, and condensate have the possibility of spills that could migrate to surface or groundwater. Additionally, tanks used to store produced water and condensate would be placed in secondary containment to prevent offsite release. Other elements of the Proposed Action are designed to mitigate risks to surface waters associated with the release of drilling fluids, produced water, and condensate. A closed-loop drilling system would be implemented which recycles drilling fluids; cuttings would be dried through the use of a shaker system and be stacked against the cutslope on the pad. A traditional reserve pit would not be constructed.

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

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

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in similar potential for impacts to surface waters as under the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to West Fork of Parachute Creek because the alternative surface location(s) used by Encana would be in less suitable areas.

Waters of the U.S.

Affected Environment

Waters of the U.S. located in the project vicinity include the main stem and tributaries to the West Fork of the Parachute Creek. Section 404 of the Clean Water Act requires a Department of the Army permit from the U.S. Army Corps of Engineers (USACE) prior to discharging dredged or fill material into waters of the U.S. as defined by 33 CFR Part 328.

The existing access roads parallel the main stem and tributaries of West Fork of Parachute Creek. No new crossings of the creek would be required as part of the project

Environmental Consequences

Proposed Action

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

Improperly designed crossings of small ephemeral drainages, in particular any undersized or poorly aligned culverts, could result in soil degradation, including erosion at culvert outlets. This could potentially supply sediment to the Colorado River approximately 14 miles to the south. However, standard and site-specific surface-use COAs listed in Appendix A would be implemented to protect West Fork of Parachute and Parachute Creeks, the Colorado River, and any other waters of the U.S. potentially impacted by long-distance storm flow transport.

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in similar potential for impacts to surface waters as under the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to Waters of the U.S. because the alternative surface location(s) used by Encana would be in less suitable areas.

Groundwater

Affected Environment

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

The principal bedrock aquifers of the Piceance Basin are the Uinta Formation and the Parachute Creek Member of the Green River Formation, 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 upper most 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 the 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 which consists of the lower two members of the Green River Formation, and the Wasatch Formation. Although considered a confining unit, some fresh water wells are completed in the discontinuous water bearing sands of the Wasatch Formation, but these water bearing intervals are considered to be localized.

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 (bgs), far too deep for economic development. The Mesaverde aquifer is of regional importance, but does not provide recharge into the fresh water system within the shallower groundwater system of the project area.

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

No permitted domestic water wells are located within a 1-mile radius of the proposed project area. The closest permitted well is approximately 1.5 miles east of the project area. It is listed as having a depth of 580 feet. There is no data pertaining to static water depth or discharge rates.

Environmental Consequences

Proposed Action

Potential impacts to groundwater resources from the proposed development would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents. Hydraulic fracturing (fracing) would be incorporated to create additional pathways to facilitate gas production. Agents called "proppants" used to prop open the fractures are mixed with both fresh water and produced water. Typical proppants include sand, aluminum, glass, or plastic beads, with less than 1% of other compounds such as corrosion-, friction-, and scale-inhibitors (EnerMax Inc. 2007). Fracing techniques are used to create secondary porosity fractures, held open by proppants, allowing the otherwise trapped gas to migrate up the borehole for production. Hydrofracturing would be conducted at 5,000 feet or more below ground surface (bgs). Drilling scenarios are developed to prevent fluids and produced hydrocarbons from migrating upward into fresh water zones. Geologic and engineering reviews are conducted to ensure that the cementing and casing programs are adequate to protect all downhole resources. With the use of proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers is anticipated to result from the project (see Downhole COAs in Appendix A).

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in similar potential for impacts to surface waters as under the Proposed Action.

Analysis on Public Land Health Standard 5 for Water Quality

The Rifle-West Watershed LHA conducted in 2005 included Parachute Creek watershed. The assessment indicated that tributaries to Parachute Creek, which includes the West Form of Parachute Creek, were meeting Standard 5 but the Colorado River which the Parachute Creek drains to was not. Accelerated erosion was found to be impacting portions of the watershed as well. As proposed in the LHA, the Proposed Action would conform to best management practices including graveling roads and reclaiming disturbed areas to meet BLM's Reclamation Policy. Proposed Action would unlikely prevent Standard 5

from being achieved because direct impact to West Fork Parachute Creek and riparian areas are being avoided. Water bodies, riparian areas and erosive soils are protected by lease stipulations, COAs, and requirements set for permitting by the COGCC and USACE. Therefore, the Proposed Action is not expected to contribute to a failure of the area to meet standards.

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

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

Affected Environment

West Fork Parachute Creek, a perennial stream and tributary of Parachute Creek, is located approximately 75 yards from the proposed pad and on the opposite side of West Fork Road. The proposed pipeline corridor parallels the creek for approximately 4 miles. Fish surveys of West Fork Parachute Creek conducted by CPW and BLM have documented the presence of Colorado River cutthroat trout, a native trout listed as sensitive by the BLM and discussed in the section on Special Status Species. The brown trout, a non-native sportfish widely stocked throughout the region, also occupies the creek. This trout of eastern North America has been widely introduced in mountainous areas of Colorado because of its tolerance for slightly warmer waters than the cutthroat trout and its ability to reproduce successfully in streams with small flows.

Aquatic macroinvertebrates living in perennial streams such as West Fork Parachute Creek during a portion of their lifecycles include larvae of stoneflies, mayflies, and some caddisflies in fast-flowing reaches with rocky or detrital substrates. Both the aquatic larvae and winged adults of these insects are the primary prey for trout in West Fork Parachute Creek. Terrestrial invertebrates that land or fall onto the water surface or are carried into the stream in runoff from adjacent uplands provide a secondary prey base. Slow-flowing portions of West Fork Parachute Creek with fine substrates, aquatic macroinvertebrates are likely to support the larvae of midges, mosquitoes, and some caddisflies. These species are able to tolerate relatively warm, turbid, and poorly oxygenated waters, and their more abbreviated larval stages allow them to reproduce in intermittent streams and in seasonally inundated overbank areas.

Environmental Consequences

Proposed Action

Habitat for the present fish population of West Fork Parachute Creek, including the stream and adjacent riparian corridor, is not expected to be affected by the Proposed Action due to the various measures applied as COAs for the protection of water quality (Appendix A).

No Action Alternative

Under the No Action Alternative, no surface disturbance would occur on the 40-acre BLM parcel, and the four proposed Federal wells would not be drilled, completed, and produced. However, it is likely that Encana would drill, complete, and produce the 56 proposed fee wells using a modified pad location and design that avoids the BLM surface. This would result in similar potential for impacts to surface waters as under the Proposed Action. Moreover, relocation of the pad to an area outside the BLM land could result in greater impacts to West Fork of Parachute Creek because the alternative surface location(s) used by Encana would be in less suitable areas.

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

According to a recent land health assessment, habitat conditions within this area appear suitable for aquatic species known or likely to occur (BLM 2005). Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms, and other surface facilities would continue to reduce habitat size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. Although the contribution of the Proposed Action is in itself small, it may further trend the area away from meeting Standard 3 for aqautic wildlife.

The No Action Alternative would not result in a failure of the area to achieve Standard 4 because the proposed developments would not occur.

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

Affected Environment

Mammals

The site is located within winter range and the winter concentration area for mule deer (*Odocoileus hemionus*) and American elk *(Cervus elaphus)* area as mapped by CPW (2010). Winter range is that part of the overall range of a species where 90% of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each data analysis unit (DAU) (CPW 2011). Winter Concentration areas are that part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten (CPW 2011). 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*). 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 (*Spermophilus variegatus*), golden-mantled ground squirrels *(Spermophilus lateralis)*, least chipmunk (*Tamias 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

The wild turkey (*Meleagris gallopavo*) is native to North America and is the largest upland gamebird. Wild turkeys are omnivorous, foraging on the ground or climbing shrubs and small trees to feed. They prefer eating hard mast such as acorns, nuts, and various trees, including pinyon pine as well as various seeds, berries such as juniper and bearberry, roots and insects. Wild turkeys often feed in cow pastures and are also known to eat a wide variety of grasses. This site is located within an area mapped by the

CPW as wild turkey overall range and a production (nesting) area. The production area is used during the period March 15 to August 15.

A non-native upland gamebird, the chukar partridge (*Alectoris chukar*), is common on the sagebrush-covered slopes of the West Fork Parachute Creek canyon. Originally introduced to the western U.S. to provide hunting in arid habitats, the chukar has become naturalized throughout much of the region, in part because of its ability to utilize cheatgrass, a non-native annual grass that has become abundant and widespread.

See the sections on Migratory Birds and Special Status Species for discussions of other birds in the area.

Reptiles and Amphibians

Species most likely to occur include the western fence lizard (*Sceloporus undulatus*) and gopher snake (bullsnake) (*Pituophis catenifer*) in xeric shrublands or grassy clearings and the western terrestrial garter snake (*Thamnophis elegans*) along creeks. Other reptiles potentially present along creeks, although more commonly found at lower elevations than the site, are the milk snake (*Lampropeltis triangulum*) and smooth green snake (*Opheodrys vernalis*).

Although the project area does not contain any suitable habitat for the northern leopard frog (see the section on Special Status Species) two additional amphibians, the Woodhouse's toad (*Bufo woodhousii*), and western chorus frog (*Pseudacris triseriata*) could potentially be found in the vicinity. Within the CRVFO and vicinity, the spadefoot toad and Woodhouse's toad occur primarily along ephemeral washes that do not support fish and contain pools of water for a period of at least a few weeks every spring. The chorus frog occurs primarily in cattail and bulrush wetlands and along the vegetated margins of seasonal or perennial ponds and slow-flowing streams.

Environmental Consequences

Proposed Action

The surface disturbance for the WF H15 596 pad construction would amount to 9.5 acres, with 6.3 acres occurring on BLM. The total surface disturbance related to the new pad, road spurs and pipelines would be 71.7 acres which would be reduced to 3.4 acres following successful interim reclamation. Of the 71.7 acres of disturbance, approximately 7.5 acres would occur on BLM. The long-term project disturbance would amount to 3.6 acres which would occur on the BLM parcel. Reclamation activities would benefit some wildlife species by increasing herbaceous forage. In areas where shrubs and trees would be disturbed, impacts to wildlife from loss of thermal and/or hiding cover would be long-term, lasting the 20 to 30+ years following reclamation that it would take for these woody species to reestablish. Surface disturbing activities within these habitats during the winter and during migratory seasons have the potential to displace mule deer and elk from these important habitats.

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

Indirect impacts on wildlife, especially big game and raptors, would be 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).

No Action Alternative

The No Action Alternative constitutes denial of the Federal APD(s) and denial of the BLM Right-of-Way Grant described in the Proposed Action. In so doing, none of the planned developments outlined in the Proposed Action would occur since the authorizations would be denied for drilling on the BLM parcel. The need to construct new roads or new pipelines would not arise. The No Action Alternative would yield no new surface disturbance therefore there would be no additional impacts to these species.

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

According to a recent land health assessment, habitat conditions within this area appear suitable for aquatic species known or likely to occur (BLM 2005). Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms and other surface facilities would continue to reduce habitat size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. Although the contribution of the Proposed Action is in itself small, it may further trend the area away from meeting Standard 3 for terrestrial wildlife.

The No Action Alternative would not result in a failure of the area to achieve Standard 4 because the proposed developments would not occur.

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 FSEIS (BLM 1999a) as significant, and while new technologies and regulatory requirements have reduced the impacts of some land uses, it is clear that past, present, and reasonably foreseeable future actions have had and would continue to have adverse effects on various elements of the human 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, the rate of development, particularly oil and gas development, has generally been increasing in the area, resulting in an accelerated accumulation of individually nominal effects. Second, residential and commercial expansion, as well as 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. Recent COGCC regulations have closed considerably the gap between the potential environmental impacts associated with development of private versus Federal fluid mineral resources.

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

PERSONS AND AGENCIES CONSULTED

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Uintah Engineering & Land Surveying: Greg Olson

INTERDISCIPLINARY REVIEW

BLM staff from the CRVFO who participated in the preparation of this EA, including review of survey results submitted by the operator's consultants, evaluation of impacts likely to occur from implementation of the Proposed Action, and identification of appropriate COAs to be attached and enforced by BLM, are listed in Table 14.

Table 14. BLM Interdisciplinary Team Authors and Reviewers

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

REFERENCES CITED

Associated Governments of Northwest Colorado (AGNC). 2011. Report on Direct Distribution Payments: 2008-2009 Comparison. Available online (http://agnc.org/reports.html)

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

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

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

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

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

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

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

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

City Data. 2011. Available online (http://www.city-data.com/county/Garfield_County-CO.html)

Cole, R.D., G.J. Daub, and L.K. Weston. 1995. Review of geology, mineral resources, and ground-water hydrology of Green River Formation, north-central Piceance Creek Basin, Colorado. *In* W.R. Averett (Ed.), The Green River Formation in Piceance Creek and Eastern Uinta Basins: Grand Junction, Colorado, Grand Junction Geological Society, p. 63-81.

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

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

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

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

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

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

Colorado Oil and Gas Commission (COGCC). 2008. Amended Rules. 800 Series Aesthetic and Noise Control Regulations Regulation 801. http://cogcc.state.co.us/

_____. 2010. Colorado Oil and Gas Information System (COGIS) Production. http://cogcc.state.co.us/.

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

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

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

_____. 2007. Socioeconomic Impact Study. Available online.

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

_____. 2011a. Finance Reports. Available online.

_____. 2011b. 2009 Abstract of Assessment and Tax Levies. Available online.

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

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

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

Hemborg, T.H. 2000. Gas production characteristics of the Rulison, Grand Valley, Mamm Creek, and Parachute Fields, Garfield County, Colorado: Turning marginally economic basin-centered tight-gas sands into profitable reservoirs in the Southern Piceance Basin. Colorado Geological Survey, Resource Series 39. Denver.

Holditch, S.A. 2006. Tight gas sands. Society of Petroleum Engineers Paper 103356, Journal of Petroleum Technology.

Johnson, R.C. 1989. Geologic history and hydrocarbon potential of late Cretaceous-age, low-permeability reservoirs, Piceance Basin, western Colorado: U.S. Geological Survey Bulletin 1787, Evolution of sedimentary basins-Uinta and Piceance Basins, chapter E, 51 p.

Kuuskraa, V.A. 1997. Producing massively stacked lenticular sands of Colorado's Piceance Basin: Gas Tips – A Publication of Gas Research Institute GRI-97/0206:4-11.

La Plata County, Colorado. 2002. Final La Plata County Impact Report. October.

Lorenz, J.C. 1989. Reservoir sedimentology of rocks of the Mesaverde Group, multiwall experiment site and east-central Piceance Basin, northwest Colorado. *In* B.E. Law and C.W. Spencer, C.W. (*Eds*.), Geology of tight gas reservoirs in the Pinedale Anticline area, Wyoming, and at the multiwall experiment site, Colorado: U.S. Geological Survey Bulletin 1886:K1-K24.

National Academy of Sciences. 2007. Weather and climate extremes in a changing climate. National Academies Press. http://dels.nas.edu/globalchange/reportDetail.php?id=4288&c=clim&t=pubs.

Natural Resources Conservation Services (NRCS) 2010. Soil Data Mart. http://soildatamart.nrcs.usda.gov.

O'Sullivan, R.B, F. Wahl-Pierce, and S.J. Arbelbide. 1981. Geologic Map of the McCarthy Gulch Quadrangle. Rio Blanco and Garfield Counties, Colorado. USGS MF-860. 1:24,000 scale.

Robson, S.G., and G.J. Saulnier, Jr. 1981. Hydrogeochemistry and simulated solute transport, Piceance Basin, northwestern Colorado. U.S. Geological Survey Professional Paper 1196, 65 p.

Ruggiero, L.F., K.B. Aubrey, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.M. Squires (*Eds*). 1999. The scientific basic for lynx conservation in the contiguous United States. Gen. Tech. Rpt. RMRS-GTR-30. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT.

Spencer, C.W., and Wilson, R.J., 1988. Petroleum geology and principal exploration plays in the Uinta-Piceance-Eagle Basins Province, Utah and Colorado: U.S. Geological Survey Open-File Report 88-450-G, 35 p.

U.S. Department of Agriculture (USDA). 1985. Soil survey of Rifle area, Colorado: parts of Garfield and Mesa Counties. Soil Conservation Service [Natural Resources Conservation Service].

U.S. Department of Commerce (USDOC). 2011. State and county selection of 2010 Census data. Available online (http://2010.census.gov/2010census/data/index.php)

U.S Department of the Interior, National Business Center (USDI NBC). 2011. Payments in Lieu of Taxes to Garfield County (2007-2011) Available online (http://www.nbc.gov/pilt/search.cfm#search with Search for Colorado Counties).

U.S. Department of the Interior and U.S. Department of Agriculture (USDI and USDA). 2007. Surface operating standards and guidelines for oil and gas exploration and development. The Gold Book. Fourth edition.

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

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

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

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

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

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

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

WestWater Engineering (WWE) 2009. North Parachute Ranch Integrated Vegetation Management Guidance: Reclamation and Noxious Weed Control

WestWater Engineering (WWE) 2011. Biological Survey Report – West Fork H15-596 Well Pad and Pipeline.

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APPENDIX A

Surface Use and Downhole Conditions of Approval
WF H15 596 Pad

Terms and Conditions for BLM Right-of-Way Grant COC75120

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SURFACE USE CONDITIONS OF APPROVAL
FOR APPLICATION FOR PERMIT TO DRILL
AND
TERMS AND CONDITIONS
FOR BLM RIGHT-OF-WAY #COC75120

WF H15 596 PAD, DOI-BLM-CO-N040-2011-0110-EA

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. No construction activities shall commence without staking of pad construction limits, pad corners, and road/pipeline centerlines and disturbance corridors.

2. Road Construction and Maintenance. The two road spurs, 125 feet in length for the north pad entrance and 25 feet in length for the west-side center pad entrance, shall be constructed with a 22-foot running surface as staked on the ground. Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards *(Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, The Gold Book, Fourth Edition—Revised 2007, BLM/WO/ST-06/021+3071/REV 07).*

   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. Drill Cuttings Management. Cuttings generated from the numerous planned well bores shall be worked through a shaker system on the drill rig, mixed with sawdust in a steel cuttings bin, and piled on location against the cutslope for later burial during the interim reclamation earthwork. The cuttings shall be remediated per COGCC regulations (Table 910-1 standards) prior to earthwork reshaping related to well pad interim reclamation.

4. 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.

5. 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 Western Colorado Regulatory Branch at 970-243-1199.

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.

6. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the U.S. Army Corps of Engineers (USACE) prior to discharging fill material into waters of the U.S. in accordance with Section 404 of the Clean Water Act. Waters of the U.S. are defined in 33 CFR Section 328.3 and may include wetlands as well as perennial, intermittent, and ephemeral streams. Permanent impacts to waters of the U.S. may require mitigation. Contact the USACE Western Colorado Regulatory Branch at 970-243-1199. Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.

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 and temporary (pre-interim) reclamation are described below.

   a. Reclamation Plans. In areas that have low reclamation potential or are especially challenging to restore, reclamation plans will be required prior to APD approval. The plan shall contain the following components: detailed reclamation plats, which include contours and indicate irregular rather than smooth contours as appropriate for visual and ecological benefit; timeline for drilling completion, interim reclamation earthwork, and seeding; soil test results and/or a soil profile description; amendments to be used; soil treatment techniques such as roughening, pocking, and terracing; erosion control techniques such as hydromulch, blankets/matting, and wattles; and visual mitigations if in a sensitive VRM area.

   b. Deadline for Interim Reclamation Earthwork and Seeding. Interim reclamation to reduce a well pad to the maximum size needed for production, including earthwork and seeding of the interim reclaimed areas, shall be completed within 6 months following completion of the last well planned for the pad. Reclamation, including seeding, of temporarily disturbed areas along roads, pipelines, and topsoil piles and berms, shall be completed within 30 days following completion of construction.

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

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

   c. Topsoil Stripping, Storage, and Replacement. *All* topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas

of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation.

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.

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

e. Seed Mixes. A seed mix consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project (see Attachments 1 and 2 of the letter provided to operators dated May 1, 2008). Note that temporary seeding no longer allows the use of sterile hybrid non-native species.

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

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

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

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

g. Mulch. Mulch shall be applied within 24 hours following completion of seeding. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil.

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

h. Erosion Control. Cut-and-fill slopes shall be protected against erosion with the use of water bars, lateral furrows, or other measures approved by the BLM. Cut-and-fill slopes along drainages or in areas with high erosion potential shall also be protected from erosion using hydromulch designed specifically for erosion control or biodegradable blankets/matting, bales, or wattles of weed-free straw or weed-free native grass hay. Well-anchored straw wattles shall also be placed at the toe of cut-and-fill slopes along drainages or to protect other sensitive areas from deposition of soils eroded off the slopes. Additional BMPs shall be employed as necessary to reduce soil erosion and offsite transport of sediments.

i. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as "operator reclamation in progress" and shall submit an annual monitoring report of these sites to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by 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 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 in the BLM Field Office (970-876-9051).

11. Raptor Nesting. To protect nesting raptors, a survey shall be conducted prior to construction, drilling, or completion activities that are to begin during the raptor nesting season (**February 1 to August 15**). The survey shall include all potential nesting habitat within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. Results of the survey shall be submitted to the BLM. If a raptor nest is located within the buffer widths specified above, a 60-day raptor nesting TL will be applied by the BLM to preclude initiation of construction, drilling, and completion activities during the period **April 1 to May 31**. The operator is responsible for complying with the MBTA, which prohibits the "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. Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all surface-disturbing activities are prohibited from **May 1 to June 30** to reduce impacts to Birds of Conservation Concern (BCC). An exception to this COA will be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC species are nesting or otherwise present within 10 meters of the area to be disturbed. Nesting surveys shall include an audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 15 and continue into the 60-day period at the same location.

13. Migratory Birds. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to "take" of migratory bird species. Under the MBTA, "take" means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The operator shall prevent use by migratory birds of any pit containing fluids associated with oil or gas operations, including but not limited to reserve pits, produced water pits, frac-water pits, cuttings trenches (if covered by water/fluid), and evaporation pits. Fluids in these pits may pose a risk to migratory birds (e.g., waterfowl, shorebirds, wading birds, songbirds, and raptors) as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation. Regardless of the method used, it shall be in place within 24 hours following the placement of fluids into a pit. Because of high toxicity to birds, oil slicks and oil sheens should immediately be skimmed off the surface of any pit that is not netted. The most effective way to eliminate risk to migratory birds is prompt drainage, closure, and reclamation of pits, which is strongly encouraged. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative in the BLM Field Office at 970-876-9051 and visit http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm.

14. Fossil Resources. All persons associated with operations under this authorization shall 8be 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.

15. 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).

16. Visual Resources. To mitigate impacts to the visual landscape the following requirements shall be incorporated into the construction activities:

- The pipeline shall be installed during pad construction to reduce the amount of additional surface disturbance that would occur if the pipeline was installed after the pad was constructed.
- All woody vegetation (live and dead) shall remain standing at the toe of the north and south fill slopes to provide some visual screening.
- Rocks and woody debris shall be saved during the construction process; care should be taken to preserve the canopy of the woody material while storing and transporting.
- Facilities shall be located to maximize area for interim reclamation.
- All facilities shall be painted **Shadow Gray**, a color found in the natural vertical elements.

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

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

During the pad construction, pipeline construction, and interim reclamation phases of the project, BLM and Encana representatives shall jointly review construction measures on BLM land to determine effectiveness in meeting BLM’s Visual Resource Management Class II objectives. If it is

determined that changes in construction techniques are warranted in order to satisfy VRM Class II objectives, steps shall be implemented as soon as feasible to achieve the Class II objectives.

17. Soils. Cuts and fills shall be minimized when working on erosive soils and slopes in excess of 30 percent. Cut-and-fill slopes shall be stabilized through revegetation practices with an approved seed mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with well-anchored silt fences, straw wattles, or other acceptable BMPs designed to minimize the potential for sediment transport. On slopes greater than 50%, BLM personnel may request a professional geotechnical analysis prior to construction.

18. Interim Reclamation Related to Drilling Phases. Within 1 year of completion of all exploratory wells proposed on a pad or within one year of completion of all development wells on a pad (whichever the situation may be), the operator would stabilize the disturbed area by recontouring, mulching, providing run-off and erosion control, replacing topsoil as directed, and seeding with BLM-prescribed native seed mixes (or landowner requested seed mix on Fee surface), and conducting weed control, as necessary. In cases where the exploratory drilling and development drilling on a single pad occur more than 1 year apart, slopes shall be recontoured to the extent necessary to accommodate seeding, and seed mixes required by BLM or requested by the private landowner shall be applied to stabilize the soil between visits per direction of the BLM.

19. Pad Construction Details. To accomplish the vegetative clearing for pad construction, the operator shall employ a trackhoe-mounted hydroaxe unit to mow the brushy vegetation and occasional tree leaving only the root material to be excavated with a dozer during the topsoil stripping.

    Topsoil shall be stripped to a minimum depth of 12 inches, unless operator-provided soil samples indicate otherwise, and stockpiled at either end of the pad. Topsoil shall be shaped into detention ponds at the north and south ends of the pad catching directed storm water sediments from diversion ditches installed above the pad perimeter. Topsoil to be stripped along the cutslope side of pad can be windrowed and utilized as storm water berms to direct water around the top of cutslope, if necessary.

    Seeding the pad cut slopes and storm water channels around the pad perimeter with interim reclamation seed mix immediately after the pad is constructed shall be accomplished where feasible since the pad will undergo numerous drilling visits.

20. Pipeline Installation Details. The operator shall install on BLM land approximately 1,010 feet of 24-inch steel gas pipeline (as shown on Uintah's Sheet 7 of 11 in the APD) within the planned disturbance footprint for the proposed WF H15 596 pad prior to or during the H15 pad construction in a manner that does not require re-excavation of the proposed pad fillslope to bury and install the 24-inch line. Furthermore, the pipeline installation shall be conducted in a manner that does not require or inhibit pad reshaping of the fillslope during the earthwork related to interim pad reclamation - the pipe shall be buried a minimum of 4 feet below the surface of the native ground unless otherwise approved by the Authorized Officer. If this requirement of burying the 24-inch gas pipeline underneath the WF H15 596 pad during pad construction work is not feasible, BLM and Encana representatives shall meet at the site during the pad prework meeting to determine the optimal time and method to install the 24-inch gas line in proximity or underneath the proposed pad. An alternate plan to install the 24-inch gas pipeline in proximity to the WF H15 596 pad would be documented with sundry notice submission to the BLM.

The operator shall also concurrently install on BLM land approximately 370 feet of 16-inch lined steel produced water line, 10-inch steel flowback line and 6-inch steel frac line along the staked alignment (as shown on Uintah's Sheet 7 of 11 in the APD) using a maximum 120-foot wide disturbance corridor for the entire length. The pipes would be buried to a minimum depth of 4 feet and placed concurrently in the same trench.

To accomplish the pipeline clearing, the operator shall employ a trackhoe-mounted hydroaxe unit to mow the brushy vegetation and occasional tree leaving only the root material to be excavated with a dozer during the topsoil stripping. Topsoil shall be windrowed alongside the uphill edge of the disturbance corridor. The topsoil windrow shall be placed on top of the mowed brush allowing the brush to quickly sprout back after the topsoil is spread back over the reclaimed corridor. Trench spoils shall be windrowed along the lower side of the cleared right-of-way or spread across the existing access road, depending on the circumstance.

After installation, the lines shall be tested using air compressed from the atmosphere or water using conventional testing methods.. Pipelines shall be maintained according to industry standards. A cathodic protection system shall be used to protect against external corrosion and sustain the working life of the pipelines.

21. Reporting on Fresh Water Use. Since a well scheduled for the WF H15 596 pad will be drilled horizontally, and since this type of well drilling is relatively new, the amount of fresh water used in the drilling of the horizontal well (N. Parachute DHS3B-23 H15 596) shall be reported to this office within 15 days after the wells are placed into production (first day of gas sales).

    While it is understood that Encana uses treated/recycled waters for their well completions, the focus of the reporting for these horizontal wells shall be the amount of FRESH WATER (in barrels) used in well drilling, cementing, and hydraulic fracturing.

    The fresh-water volume report shall be submitted to the BLM Interagency Energy Team hydrologist via email (skocman@blm.gov) within 15 days after the wells are placed into production (first day of gas sales).

22. Man Camp Permitting and Support Services. No installation of man camp is authorized on BLM land until BLM right-of-way (#COC75120) is executed. The man camp facility shall not exceed 22 occupants unless otherwise approved by the Authorized Officer. The layout of the man camp shall be accomplished as shown on Sheet 7 of 11 in the APD. The camp shall have a kitchen, permitted through the State, providing meals to the workers. During the drilling and completion process, the man camp shall be occupied 24 hours per day, 7 days per week with two crews working 12-hour shifts.

    Food and lodging shall be provided for the workers by employees and State-licensed vendors. Support services such as bear-proof trash storage, potable and sewer water storage, generator and transformer settings, a fuel storage area and a freezer for food storage shall be provided by State and County-permitted and licensed vendors. Such services shall be regularly provided, as needed, without breach in schedule; vendors shall be allowed 24-hour access to support the man camp. Potable water (one 4,200 gallon water supply tank and three 3,300 gallon water supply tanks) and septic service (seven 2,000 gallon above-ground septic tanks with overflow tanks and alarms) would be provided and serviced every 2-3 days by certified domestic water and septic providers licensed by the State.

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DOWNHOLE CONDITIONS OF APPROVAL

Applications for Permit to Drill

Operator: Encana Oil & Gas (USA) Inc.

Surface Location: SENE, Section 15, Township 5 South, Range 96 West

Field	Well.	Pad	Bottomhole Location	Lease
Grand Valley	N. Parachute WF08A-15 H15 596	WF H15 596	SE NE, Sec 15, T5S, R96 W	COC70018

1. Twenty-four hours prior to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within twenty-four 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 i: 970-876-9064. The BLM CRVFO inspectors are Julie King, Lead PET; David Giboo, PET; Greg Rios, PET; Alan White, PET; and Tim Barrett, PET.

2. A CRVFO petroleum engineer shall be contacted for a verbal approval prior to commencing remedial work, plugging operations on newly drilled boreholes, changes within the drilling plan, sidetracks, changes or variances to the BOPE, deviating from conditions of approval, and conducting other operations not specified within the APD. Please contact, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) for verbal approvals.

3. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) will be forwarded to CRVFO, Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 24 hours of a well control event.

4. The BOPE shall be tested and conform to Onshore Order No. 2 for a **5M** system and recorded in the IADC/Driller's log. A casing head rated to 5,000 psi or greater shall be utilized.

5. An electrical/mechanical mud monitoring equipment shall be function tested prior to drilling out the surface casing shoe. As a minimum, this equipment shall include a trip tank, pit volume totalizer, stroke counter, and flow sensor.

6. Prior to drilling out the surface casing shoe, gas-detecting equipment shall be installed in the mud return system. The mud system shall be monitored for hydrocarbon gas/pore pressure changes, rate of penetration, and fluid loss.

7. A gas buster shall be functional and all flare lines effectively anchored in place, prior to drilling out the surface casing shoe. The discharge of the flare lines shall be a minimum of 100 feet from the wellhead and targeted at bends. The panic line shall be a separate line (not open inside the buffer tank) and effectively anchored. All lines shall be downwind of the prevailing wind direction and directed into a flare pit, which cannot be the reserve pit. The flare system shall use an automatic ignition. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and maintain a continuous flare.

8. After the surface/intermediate casing is cemented, a Pressure Integrity Test/Mud Equivalency Test/FIT will be performed on the first well drilled in accordance with OOGO No. 2; Sec. III, B.1. i. in order to make sure the surface/intermediate casing is set in a competent formation. This is not a Leak-off Test, but a formation competency test, insuring the formation at the shoe is tested to the highest anticipated mud weight equivalent necessary to control the formation pressure to the next casing shoe depth or TD. Submit the results from the test via email (bhartman@blm.gov) on the first well drilled on the pad or any horizontal well and record results in the IADC log. Report failed test to Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell). A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.

9. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format will 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, then within 48 hours from running the CBL and prior to commencing fracturing operations, a CRVFO petroleum engineer shall be notified for remedial operations.

   A greater volume of cement may be required to meet the 200 -foot cement coverage requirement for the Williams Fork Formation/Mesaverde Group. Evaluate the top of cement on the first cement job on the pad (Temperature Log). If cement is below 200-foot cement coverage requirement, adjust cement volume to compensate for low TOC/cement coverage.

10. On the first well drilled on this pad, a triple combo open-hole log shall be run from the base of the surface borehole to surface, and from TD to bottom of surface casing shoe. This log shall be in submitted within 48 hours in .las and .pdf format to CRVFO, Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Please contact Todd Sieber at 970-876-9000 or asieber@blm.gov for clarification.

11. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CRF 3160-9 (a).

12. Prior to commencing fracturing operations, the production casing shall be tested to the maximum anticipated surface treating/fracture pressure and held for 15 minutes without a 2% leak-off. If leak-off is found, Bob Hartman shall be notified within 24 hours of the failed test, but prior to proceeding with fracturing operations. The test shall be charted and set to a time increment as to take up no less than a quarter of the chart per test. The chart shall be submitted with the well completion report.

13. During hydraulic frac operations, monitor the bradenhead/casing head pressures throughout the frac job. Any sharp rise in annular pressure (+/- 40 psi or greater) will terminate the frac operations in order to determine well/wellbore integrity. Notify BLM Bob Hartman at 970-244 3041 (office) or 970-210-2374 (cell) immediately.

14. Per 43 CFR 3162.4-1(c), not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in a case of a well which has been off production for more than 90 days, the operator shall notify the authorized officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed.

FONSI

DOI-BLM-CO-N040-2011-0110-EA

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

DECISION RECORD

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

RATIONALE: The bases for this decision are as follows:

1. Approval of the Proposed Action is validating the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.

2. The environmental impacts would be avoided, minimized, or offset with the mitigation measures incorporated into the Proposed Action or attached and enforced by BLM as Conditions of Approval (COAs).

3. This Decision does not authorize the initiation of surface-disturbing activities on BLM lands or of drilling activities associated with any Federal oil and gas well. Initiation of activities related to the new Federal oil and gas well to be drilled from the proposed WF H15 596 well pad may commence only upon approval by BLM of an Application for Permit to Drill (APD) submitted by Encana Oil & Gas (USA) Inc. Furthermore, no activities related to the drilling of the seventeen fee wells from the proposed WF H15 596 well pad may commence until BLM approves the BLM Right-of-Way Grant COC75120.

MITIGATION MEASURES: Mitigation measures presented in Appendix A of the EA will be incorporated as COAs for both surface and drilling operations and attached to APD for the Federal wells drilled on the proposed WF H15 596 well pad. Appendix A also lists Terms and Conditions to be applied to the BLM Right-of-Way Grant #COC75120 to cover the surface activities related to the drilling, completion and production of the 17 fee wells planned on the WF H15 596 well pad.

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:

Allen B Crockett

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

DATE: Oct 24, 2011

During the October 28, 2011 meeting scheduled to review the WF H15 596 pad construction and the installation of a the portion of 24-inch natural gas pipeline underneath the pad, Encana indicated its desire to install additional gas and water pipeline segments that would be feasibly needed in the future. Since a Condition of Approval (#20) required the installation of the natural gas pipeline segment prior to or during the pad construction, this Decision Record is amended to recognize the change in the original gas pipeline diameter and the installation of the four additional lines in the same trench. It is important to note that the line segments to be installed under the WF H15 596 pad during its construction shall remain unconnected and out of service until the BLM right-of-way #COC75120 authorizing these pipelines is approved and the remaining pipelines are installed on private land between the Middle Fork Compressor and the WF H15 596 pad during the 2012 field season.

To meet Encana's future needs for gas gathering, water gathering and delivery, and completion support, the following lines would be installed in the same trench underlying the WF H15 596 pad and be connected to associated lines to be installed in the same trench during the 2012 field season. The original 24-inch natural gas pipeline analyzed in the Environmental Assessment shall be deleted, and the following pipelines shall be installed in the same trench with no change in the overall surface disturbance estimates described in the EA:

- 16-inch steel natural gas pipeline gathering low pressure gas generated from the future directional wells
- 16-inch steel natural gas pipeline gathering high pressure gas generated from the future horizontal wells
- 12-inch steel lined water pipeline capable of gathering fluids generated from the planned H15 wells
- 10-inch steel flowback pipeline to retrieve water supporting future well completion work on nearby well pads
- 5½-inch steel high pressure frac pipeline to deliver water supporting of remote completion work on nearby well pads

The mitigation measures identified in the Environmental Assessment remain in full force and effect.

FONSI

DOI-BLM-CO-N040-2011-0110-EA

The Environmental Assessment (EA) analyzing the environmental effects of the Proposed Action, including the pipeline changes noted above, 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.

Amended DECISION RECORD

AMENDED DECISION: It is my decision to approve the installation of the additional pipelines described above (1) initially as unconnected segments to be buried in the same trench underlying the WF H15 596 pad during the pad construction work and (2) during the 2012 field season, these buried line segments underneath the WF H15 596 pad would be connected to the associated pipelines to be buried in the same trench on private land between the WF H15 pad and the Middle Fork Compressor. This decision will

provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on a valid Federal oil and gas lease.

RATIONALE: The bases for this decision are as follows:

1. Approval of the Proposed Action is validating the rights granted with the Federal oil and gas leases to develop the leasehold to provide commercial commodities of oil and gas.

2. The environmental impacts would be avoided, minimized, or offset with the mitigation measures incorporated into the Proposed Action or attached and enforced by BLM as Conditions of Approval (COAs).

3. This Decision does not authorize the initiation of surface-disturbing activities on BLM lands or of drilling activities associated with any Federal oil and gas well. Initiation of activities related to the new Federal oil and gas well to be drilled from the proposed WF H15 596 well pad may commence only upon approval by BLM of an Application for Permit to Drill (APD) submitted by Encana Oil & Gas (USA) Inc. Furthermore, no activities related to the drilling of the seventeen fee wells from the proposed WF H15 596 well pad may commence until BLM approves the BLM Right-of-Way Grant COC75120.

MITIGATION MEASURES: Mitigation measures presented in Appendix A of the EA will be incorporated as COAs for both surface and drilling operations and attached to APD for the Federal wells drilled on the proposed WF H15 596 well pad. Appendix A also lists Terms and Conditions to be applied to the BLM Right-of-Way Grant #COC75120 to cover the surface activities related to the drilling, completion and production of the 17 fee wells planned on the WF H15 596 well pad.

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:

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

DATE: Nov. 1, 2011