**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-N040-2014-0011-EA

## CASEFILE NUMBER

Federal Lease COC50944 (bottomholes).

## PROJECT NAME

Proposal to Drill 8 Federal Wells and 1 Fee Well from the Proposed RU 42-7 Pad Located on Private Land and Issue Associated BLM Road and Pipeline Rights-of-Way on Flatiron Mesa South of Rifle, Garfield County, Colorado.

## PROJECT LOCATION

Township 7South (T7S), Range 93 West (R93W), Section 6, SW¼SE¼, Section 7, Lot 5, SE¼NE¼, NE¼SE¼, Sixth Principal Meridian. The project is located approximately 5 air-miles south of Rifle, Garfield County, Colorado on Flatiron Mesa and is accessed by an existing field development road east of Beaver Creek (Figure 1). Elevation across the project ranges from 7,200 to 7,800 feet above mean sea level (MSL).

## APPLICANT

WPX Energy Rocky Mountain LLC. Contact: Greg Davis, 1001 Seventeenth Street, Suite 1200, Denver, CO 80202.

## BACKGROUND

The proposed RU 42-7 well pad was originally analyzed and approved in the Environmental Assessment (EA) for the Flatiron Mesa Master Development Plan (FMMDP), #DOI-BLM-CO-NO40-2010-0002, signed on December 14, 2009 (BLM 2009). In the 2009 EA, the new RU 42-7 pad was planned and analyzed with 11 new Federal wells and 4 fee wells (Figure 1). The original 5.5-acre pad footprint in the 2009 EA would be expanded to 7.63 acres supporting only 8 Federal wells and 1 fee well with much of the extra space dedicated for on-pad cuttings storage and storage tank capacity for future nearby pads.

Since the 2009 EA was approved, Laramie Energy II LLC ("Laramie"), now operating as Piceance Energy LLC ("Piceance"), constructed a new pad development road serving a Piceance fee pad in NW¼NW¼ of Section 8, T7S, R93W, under BLM Right-of-Way (COC74214). This road (crossing 284 feet of BLM in Lot 5 of Section 7) matched the RU 42-7 pad road alignment initially analyzed in the FMMDP. On November 10, 2010, BLM, CRVFO documented a new buried gas pipeline alignment to serve the RU 42-7 pad with the approval of Statutory Categorical Exclusion (SCX #DOI-BLM-CO-

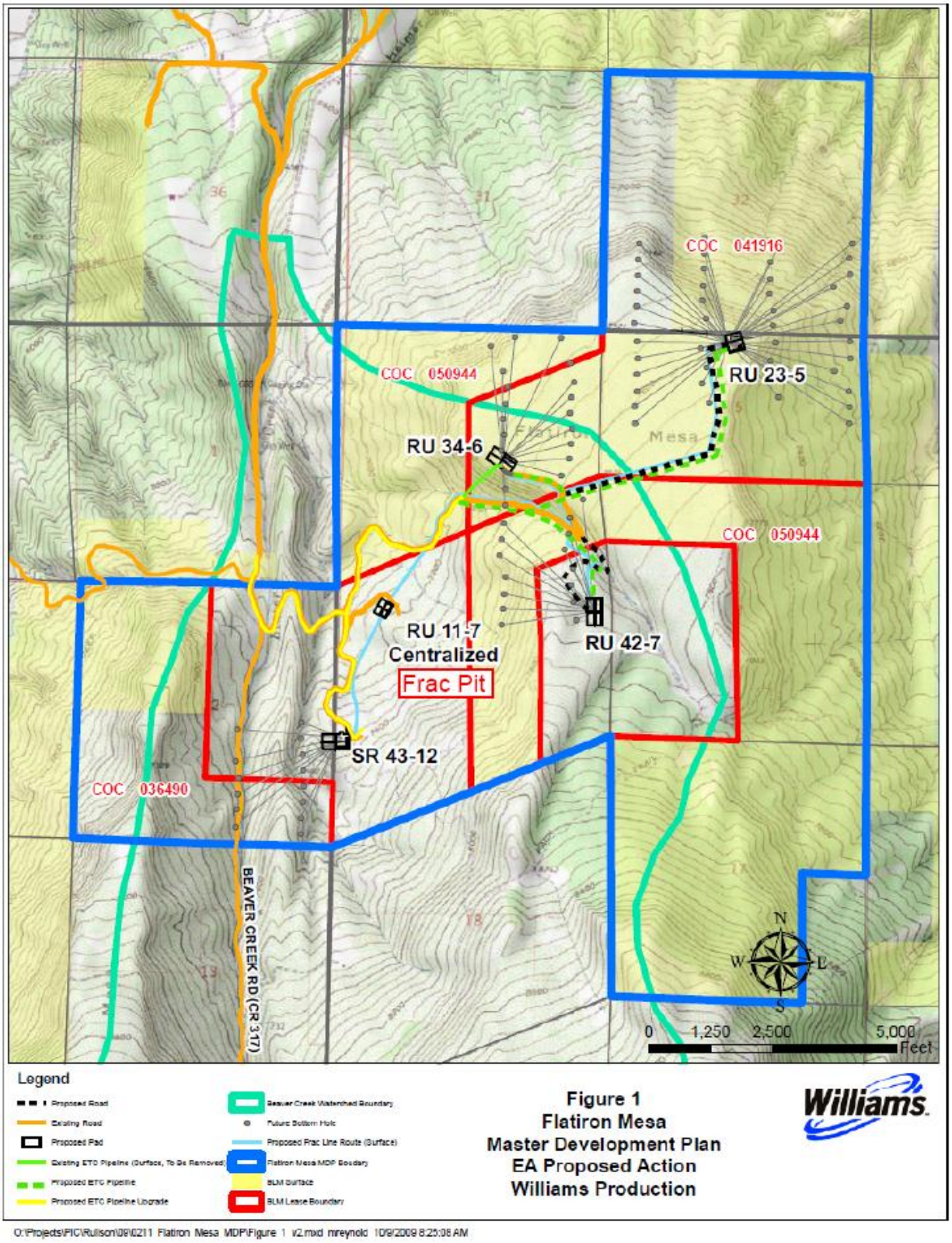


**Figure 1. Components of the Original Flatiron Mesa Master Development Plan**

NO40-2011-0003). The change in the gas pipeline route on BLM was analyzed to avoid potential impacts of burying the line near the Flatiron Springs water development. Figures 2 and 3 identify the proposed and updated project components including the RU 42-7 pad location, the Piceance access road which would serve the RU 42-7 pad as originally planned in the FMMDP, and the new buried and surface pipeline alignments serving the RU 42-7 pad.

The BLM has concluded that preparation of a new EA tiered to the original 2009 EA was appropriate for the following reasons:

(1) The 2009 EA relied on the air quality model prepared for the *Roan Plateau Resource Management Plan Amendment and Environmental Impact Statement* (BLM 2006). Results of a recently completed (expanded and updated) air quality model (BLM 2011) are now available.

(2) New BLM direction and analysis of well completion impacts under the Geologic Resource and Water Quality – Ground resource sections.

(3) The new tiered EA analyzes an increase in new surface disturbance for the RU 42-7 pad from 5.5 acres in the 2009 EA to 7.63 acres for the 2013 update with 1.70 acres of new surface disturbance for the gas and water pipelines crossing BLM land.

(4) The nine proposed wells to be drilled from the RU 42-7 pad are six wells less than originally analyzed in the 2009 EA.

Consequently, the BLM has prepared this EA, tiered to the 2009 EA in conformance with the National Environmental Policy Act (NEPA) using the tiering process outlined in 40 CFR 1502.20. This provision encourages Federal agencies to tier new NEPA documents to previously completed documents, when appropriate, for the purposes of eliminating repetitive discussions and focusing on natural and human environment elements present in the project vicinity and potentially affected by the project. This provision applies, because most aspects and potential impacts of the project would remain the same as or not significantly different from those analyzed and disclosed in the 2009 EA and thus do not warrant additional, repetitive analysis and documentation.

## ALTERNATIVES

### Proposed Action

WPX Energy Rocky Mountain LLC ("WPX") proposes to directionally drill and develop eight new Federal oil and gas wells and 1 private well from the proposed RU 42-7 fee pad (Figures 2, 3, and 4). The proposed 7.63-acre pad would be constructed on private surface with underlying private minerals and the new Federal wells would be drilled directionally into nearby Federal minerals. The nine new wells are planned for drilling in fall 2014 with pad construction occurring in spring-summer 2014.

Although 15 directional wells were initially planned for the RU 42-7 pad in the 2009 EA, the RU 42-7 project being analyzed would only include 9 new wells. The remaining six wells planned in the 2009 EA have been switched to the future RU 44-7 pad to be analyzed in the forthcoming Flatiron Mesa II Master Development Plan (FM2MDP) which is scheduled for a summer 2014 completion. Planning for the FM2MDP prescribes additional space on the RU 42-7 pad for a tank farm to store fluids from future pads. That tank farm area would be created in the initial RU 42-7 pad construction.

The RU 42-7 pad would be constructed with a working area of 550 feet by 300 feet with maximum cut of 30.3 feet at the southwest pad corner and a maximum fill of 28.1 feet at the northeast pad corner. The

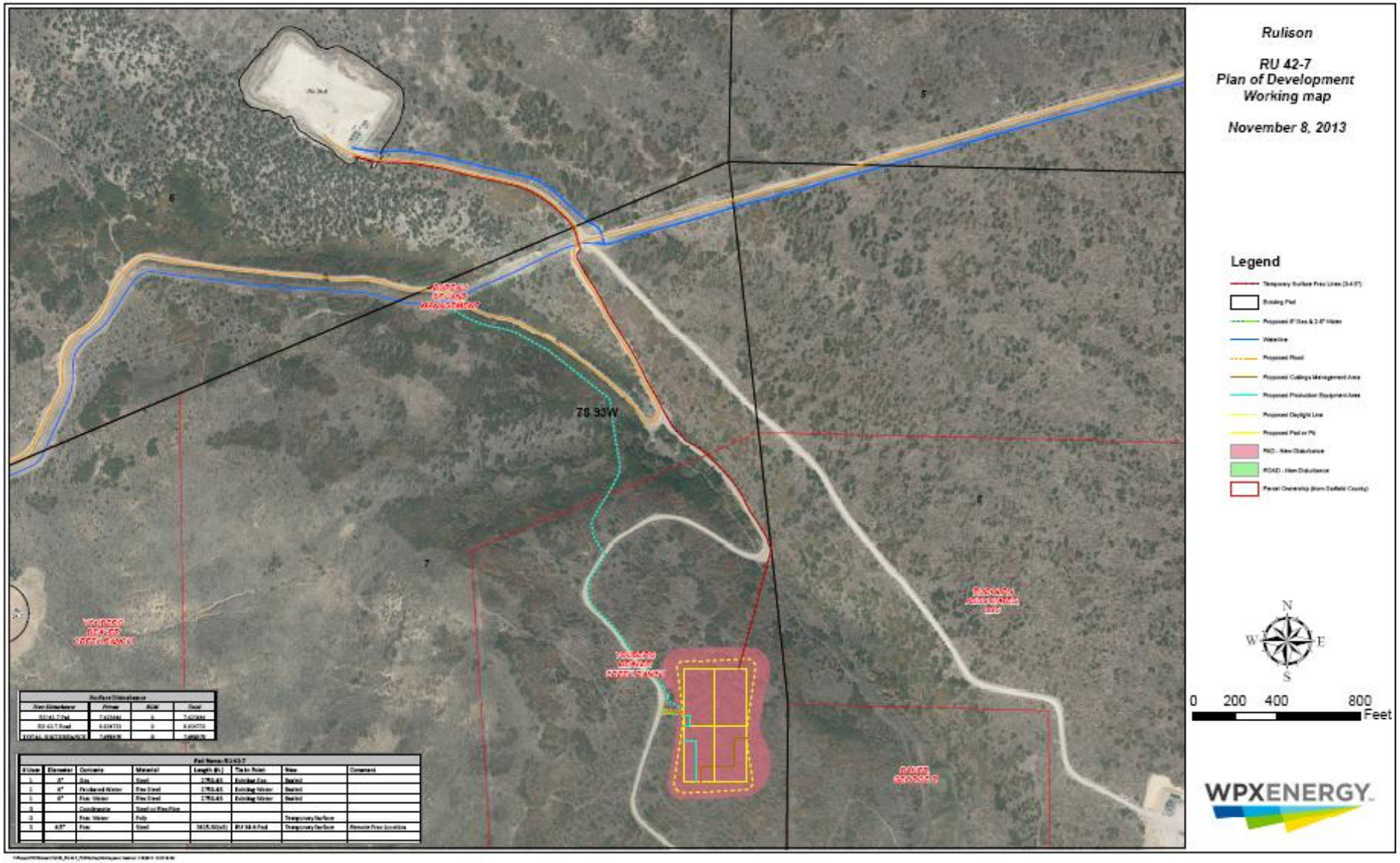


**Figure 2. Plan of Development focusing on roads and pipelines**

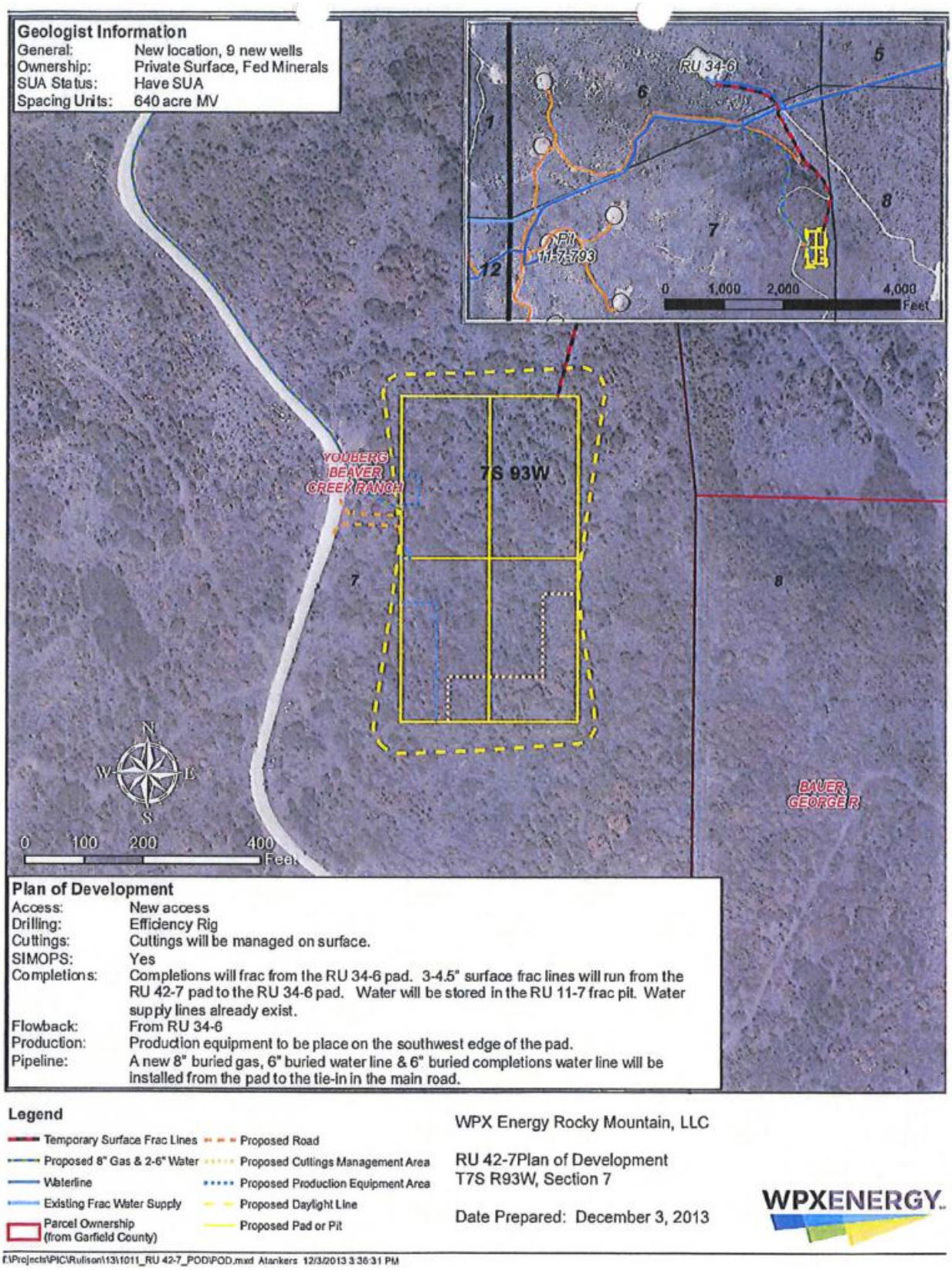


**Figure 3. Plan of Development highlighting pad components.**

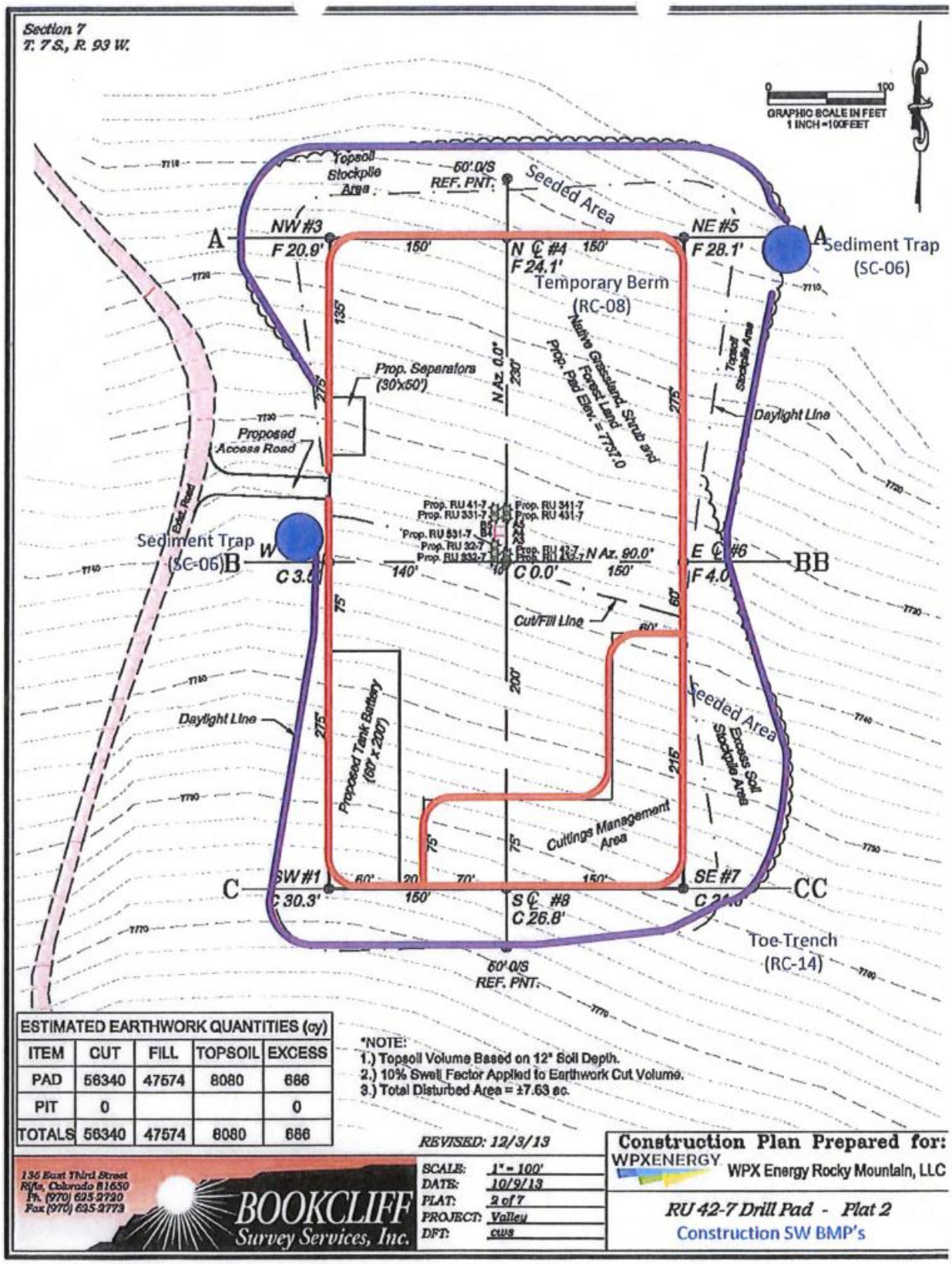


**Figure 4. RU 42-7 Pad Construction Layout.**

earthwork quantities of the pad work are nearly balanced with only 686 cubic yards of excess material. The larger pad footprint would create space for extra cuttings storage and storage tank placements.

A closed-loop drilling system would be used on the pad, eliminating the need for a fluids-containing reserve pit. Recovered drilling fluid would be stored on location in steel tanks for reuse. Drill cuttings would be collected from the rig's shaker system and placed within a bermed "management" area during drilling operations. Cuttings would be mixed with drying agents and stored in the cuttings management area along the pad cut slope to eventually be incorporated and buried during the earthwork stage of interim reclamation. Drilling plan includes the use of a self-contained flare unit to restrict venting.

To complete the new wells to be drilled on the RU 42-7 pad, frac operations would be staged on the existing, partially reclaimed RU 34-6 pad. Fracing would occur simultaneously during the drilling work. No new surface disturbance would be associated with the remote frac operations planned on the RU 34-6 pad. Currently being used for cuttings storage from the wells drilled on the RU 23-5 pad, the RU 34-6 pad has a second drilling visit scheduled for 2015.

To deliver high-pressure water from the remote frac operations staged on the RU 34-6 pad, three 4½-inch diameter welded steel water lines would be laid on the ground surface along existing roads, where possible, between the two pads. The surface frac lines would be approximately 3,615 feet in length (2,453 feet across BLM land). Existing buried water delivery and collection lines between the RU 11-7 frac pit and the RU 34-6 pad would provide the water storage and delivery needed to support the remote well completion operations staged on the RU 34-6 pad (Figures 2 and 3).

The existing access road serving the new pad was constructed in 2010 by Piceance for a nearby well pad on fee lease. The road is sufficient to handle the traffic related to the RU 42-7 well development.

Summit Midstream Partners LLC doing business as Red Rock Gathering Company, LLC ("Red Rock Gathering") holds the gas gathering contract with WPX for the Flatiron Mesa area and would bury 2,762 feet of new 8-inch diameter welded steel natural gas pipeline along the access road and deviating cross-country on BLM land to an existing connection point along the Flatiron Mesa Access Road (Figure 2). Two 6-inch diameter Flexsteel water lines operated by WPX would be buried concurrently with the Red Rock Gathering gas line in the same trench for a length of 2,758 feet. Approximately 1,480 feet of the collocated gas and water pipelines would be buried across BLM. The Flexsteel lines, spooled in 1,080-foot lengths, would be joined with crimped and bolted flanges; above-ground valves would be installed with manufactured fittings. All pipelines would be tested with air prior to being placed into service.

One of the new 6-inch buried water lines would connect into the buried Flatiron Mesa water delivery system providing the remaining link to the RU 42-7 pad for frac water supply and flowback. The other 6-inch water line would collect produced water generated from the new wells and stored in the tanks at the RU 42-7 pad and deliver that water into the existing Flatiron Mesa water collection system which has capability to transport the waters to the Rulison Water Treatment Facility near Anvil Points entirely via pipeline.

The operability of the Flatiron Mesa water line system allows WPX to drastically reduce and limit its use of water truck transports to the delivery of fresh water for drilling the proposed 9 wells. Oil truck transports, however, would periodically be needed to haul condensate developed from the wells and stored in the tanks at the RU 42-7 tank farm to off-site processing facilities.

The RU 42-7 project would include the following components:

(1) Constructing the RU 42-7 pad to a 7.63-acre disturbance footprint to provide working space for drilling, completion and well production operations, storage space for drill cuttings and providing room for a storage tank farm serving future planned wells;

(2) Drilling eight Federal wells directionally into the nearby Federal lease;

(3) Conducting remote well completion operations on the RU 34-6 pad simultaneously during the drilling process. Water storage for the completion work would be provided from the existing COGCC-approved RU 11-7 water storage pit and would deliver water to the frac jobs via the Flatiron Mesa water pipeline system between the RU 11-7 and RU 34-6 pads. Three 4½-inch diameter steel surface lines laid between the RU 34-6 and RU 42-7 pads would deliver and flowback water in support of the RU 42-7 well completion work;

(4) Burying a new 8-inch welded steel gas pipeline for 1,480 feet across BLM in a 50-foot-wide corridor from the RU 42-7 pad to a connection point with the Red Rock Gathering trunk line (under BLM ROW 76417);

(5) Burying two new 6-inch diameter Flexsteel water lines (one serving to collect production water and the other to supply water for well completions) for 1,480 feet across BLM (under BLM ROW 76418) concurrently in the same trench with the gas line's 50-foot-wide disturbance corridor from the RU 42-7 pad to a connection point with the Red Rock Gathering trunk line; and

(6) Reclaiming (interim) the RU 42-7 pad to a working area pad footprint of 1.65 acres for the operating period of the producing wells including the implementation of interim reclamation practices and excavation work to recontour the pad.

(7) Issuing BLM ROW 76419 to authorize WPX's use and maintenance on segments of the existing BLM Flatiron Mesa Road across Section 6 and 7, T7S R93W.

Table 1 lists the location and amount of surface disturbance related to the project. With 7.67 acres attributed to the RU 42-7 pad and short spur road and 3.17 acres allotted for the buried pipelines, the project amounts to 10.84 acres of initial disturbance. Of the total 10.84 acres of disturbance, only 1.70 acres would occur on BLM entirely attributable to the buried gas and water pipelines. After interim reclamation, the long-term disturbance would be reduced to 1.65 acres covering the working area of the pad and the short spur road.

**Table 1. Initial and Long-term Surface Disturbance (acres)**

| ***New Disturbance*** | ***Private*** | | ***BLM*** | | ***Total*** | |
|---|---|---|---|---|---|---|
| | ***Initial*** | ***Long-Term*** | ***Initial*** | ***Long-Term*** | ***Initial*** | ***Long-Term*** |
| RU 42-7 Pad | 7.63 | 1.61 | 0.00 | 0.00 | 7.63 | 1.61 |
| RU 42-7 Road | 0.04 | 0.04 | 0.00 | 0.00 | 0.04 | 0.04 |
| New Gas & Water Lines | 1.47 | 0.00 | 1.70 | 0.00 | 3.17 | 0.00 |
| **Total** | **9.14** | **1.65** | **1.70** | **0.00** | **10.84** | **1.65** |

Although no new road construction would be needed for this project, the use of the existing Flatiron Mesa Access Road would require a BLM road right-of-way (ROW) authorization (COC76419) to WPX across the SW¼SE¼ of Section 6, T7S R93W (for a length of 1,186 feet and width of 30 feet) and across Lot 5 of Section 7 (for a length of 284 feet and width of 30 feet). These BLM road segments represent ROW permitting gaps related to the planned road use for the RU 42-7 project (Figure 5).

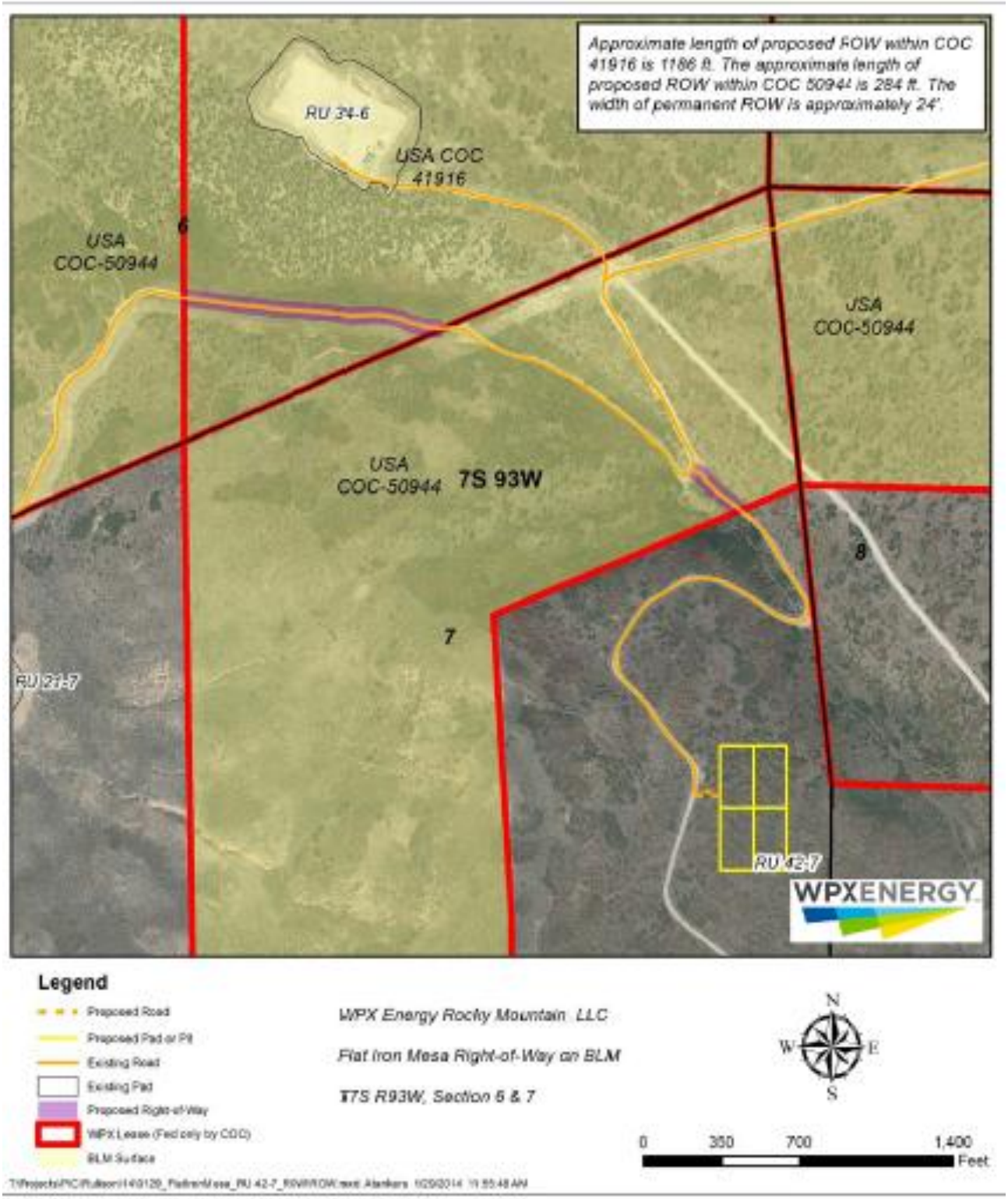


**Figure 5. ROW Permitting Gaps Along Access Road to RU 42-7 Pad (Proposed ROW COC76419).**

A Mineral Leasing Act (MLA) pipeline project ROW grant (COC76417) would be issued to Red Rock Gathering (RRG) for the buried installation of the 8-inch welded steel natural gas pipeline across 1,480 feet of BLM with a permanent ROW width of 25 feet and a temporary use area during construction of 25 feet. A meter run box to gauge the gas product flowing into the Red Rock Gathering pipeline would be installed in the separator footprint on the RU 42-7 pad (Figure 4); this flow meter equipment would be authorized in the ROW permit.

A Federal Land Policy and Management Act (FLPMA) water line ROW grant (COC76418) would be issued to WPX for the 1,480 feet of dual 6-inch Flexsteel water lines to be buried concurrently in same trench with the Red Rock Gathering gas line. The ROW widths for the water lines would mimic the gas line ROW corridor. The co-located pipeline alignments are shown on Figures 2 and 3.

The Proposed Action would include well drilling and well 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 the Federal oil and gas lease, Federal regulations (43 CFR 3100), and the operational measures included in the Applications for Permit to Drill (APDs). The appendix lists the specific Surface Use Conditions of Approval (COAs) to 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 No Action Alternative would constitute denial of the Federal APDs and BLM ROWs related to the development plans for the RU 42-7 pad. Although 1 fee well is planned on this pad which could be authorized solely under a state-issued APD, the denial of the BLM ROW authorizations needed to use the existing BLM road to access the pad and construct and use gas and water lines across BLM would effectively result in WPX's inability to drill and operate the planned fee well. Steep topography west and south of the project area does not offer any feasible alternate routes around BLM land for the proposed single fee well. Under this alternative there would be no new development or surface disturbance.

## PURPOSE AND NEED FOR THE ACTION

The purpose of the Proposed Action is to develop oil and gas resources on Federal lease COC50944 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 drilled from the planned pad located on private surface with underlying fee mineral estate. Because the Federal wells are accessing the nearby Federal leases from a private surface/private mineral location, the Federal lease terms are not applicable to the construction, drilling, completion, gas gathering or well production operations on the pad.

## 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, and Federal oil and gas lease COC50944 was duly leased pursuant thereto. The RU 42-7 project was identified and analyzed in WPX's Flatiron Mesa Master Development Plan (FMMDP) approved on December 14, 2009 (BLM 2009). Therefore, the Proposed Action is in conformance with the current land use plan.

## 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 be implemented in an area included in the Rifle West Watershed LHA (BLM 2005).

## AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

During its internal scoping process for the current Proposed Action, CRVFO resource specialists evaluated the Proposed Action in relation to current resource conditions and information. This evaluation indicated that 8 resources and resource uses could be impacted differently, or to a different extent, than analyzed and disclosed in the EA #DOI-BLM-CO-NO40-2010-0002. The resources and resource uses identified as requiring additional analysis are as follows:

| | |
|---|---|
| Air Quality | Vegetation |
| Geologic Resources | Water Quality – Groundwater |
| Invasive Non-Native Plants | Wildlife - Migratory |
| Special Status Species | Wildlife - Terrestrial |

For the remaining resources and resource uses, evaluation of the Proposed Action by the BLM indicated that the analysis in the initial 2009 EA remained appropriate and sufficient notwithstanding the increased 2.13 acres of additional initial disturbance. These resources include Access and Transportation, Cultural Resources, Native American Religious Concerns, Noise, Realty Authorizations, Socioeconomics, Soils, Visual Resources, Wastes - Hazardous or Solid, and Water Quality – Surface. For these resources and

resource uses, the impact analyses in analogous sections of EA #DOI-BLM-CO-NO40-2009-0002 are incorporated by reference. Note that the additional discussion regarding potential impacts of fracing technologies on groundwater resources are described in the section of this EA titled "Geologic Resources."

The land health analyses identified for certain resources in the 2009 EA remain unchanged with the slight modifications of the Proposed Action as it compares to the original RU 42-7pad proposal in the 2009 EA.

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

Federal air quality regulations adopted and enforced by CDPHE through the Clean Air Act (CAA) Prevention of Significant Deterioration (PSD) Program limit incremental emissions increases of air pollutants from certain sources to specific levels defined by the classification of air quality in an area. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict.

The project area and surrounding areas are classified as PSD Class II, as is Dinosaur National Monument, located approximately 180 miles to the northwest. PSD Class I areas located within 100 miles of the project area are Flat Tops Wilderness (approximately 25 miles north), Maroon Bells – Snowmass Wilderness (approximately 35 miles south), West Elk Wilderness (approximately 60 miles southeast), Black Canyon of the Gunnison National Park (approximately 65 miles south), and Eagles Nest Wilderness (approximately 60 miles east).

### Environmental Consequences

*Proposed Action*

The CDPHE, under CAA delegated authority from the U.S. Environmental Protection Agency (EPA) and in conformance with Colorado's State Implementation Plan (SIP), is the agency with primary responsibility for air quality regulation and enforcement in connection with industrial developments and other air pollution sources in Colorado. Unlike the conceptual "reasonable but conservative" engineering

designs used in NEPA analyses, CDPHE air quality preconstruction permitting is based on site-specific, detailed engineering values, which are assessed in CDPHE's review of the permit application.

The Proposed Action would involve constructing the new RU 42-7 pad to drill, complete and operate 8 new Federal wells and 1 fee well. An existing access road would serve the pad adequately in its present condition. A new buried 8-inch gas pipeline and two 6-inch water lines would be installed concurrently in the same trench to provide gas gathering and water delivery and produced water collection for the planned wells. The existing RU 34-6 pad would be used to stage well completion operations for the RU 42-7 wells. The initial disturbance for the project would be 10.84 acres and the long term disturbance after reclamation would be 1.65 acres (Table 1). Only 1.70 acres of the total disturbance would occur on BLM land.

The wells would require approximately 7 to 10 days to drill and 5 to 15 days to complete. Air quality in the project area would decrease during construction of access roads, pads, and pipelines and drilling and completing the wells and would be spread across the 2 year timeframe for the project. Long term air quality benefits of this project include road improvements which would decrease long term dust generation and centralized fluids collection facilities which reduce truck traffic and fugitive emissions.

Pollutants generated during construction activities would include combustion emissions and fugitive dust associated ($PM_{10}$ and $PM_{2.5}$) with earthwork and construction equipment. Once construction activities are complete, air quality impacts associated with construction would cease and impacts would transition to emissions associated with transportation of drilling and completion equipment. Fugitive dust and vehicle emissions from mobilization of equipment necessary for the drilling and completions phase and rigging up the drill rig would occur during the transitions between construction, drilling and completions phases. During drilling and completions work air quality impacts would be caused by emissions from generators and engines to run equipment, onsite and offsite vehicle traffic, and escaped and flared gasses during drilling and flowback phases. Following the completion of these phases, emissions would be greatly reduced to emissions associated with long-term natural gas and condensate production.

The CRVFO analyzes air quality impacts of oil and gas development projects using results of a regional air model prepared by Tetra Tech, Inc. and its subcontractor, URS Corporation, in October 2011. The modeling addressed the cumulative impacts of incremental oil and gas development in the CRVFO by assuming a range of future Federal (BLM and USFS) and private wells and associated facilities such as compressors, storage tanks, and roads. The modeled scenarios also incorporated different levels of mitigation. The "no action" scenario assumed a total of 5,106 future Federal (BLM plus USFS) wells with mitigation sufficient to meet CDPHE and EPA regulations and emissions standards. Other scenarios included as many as 6,640 Federal wells and associated facilities in a "maximum development" scenario in combination with more stringent mitigation to meet or exceed State and Federal regulations and standards. In all scenarios analyzed, impacts to air quality are estimated to be below applicable NAAQS, CAAQS, PSD increments, and visibility and deposition thresholds.

The modeling also estimated cumulative impacts from future Federal plus private wells in the CRVFO, ranging from a total of 12,072 wells in the "no action" scenario to 15,664 wells in the "maximum development" scenario. During the modeling, estimated future emissions from wells in the CRVFO were added to background air quality levels, major stationary sources, and an additional 28,843 future Federal plus private wells outside the CRVFO but within the modeling domain. These additional wells were based on estimated numbers for three other BLM field offices in the modeling domain—White River Field Office (Meeker, Colorado), Little Snake Field Office (Craig, Colorado), and Vernal Field Office (Vernal, Utah). Methods and results of the modeling are presented in an Air Resources Technical Support

Document (ARTSD) (BLM 2011), available for viewing at the CRVFO in Silt, Colorado, and on its website.

The air quality model addressed impacts associated with emissions of greenhouse gases (GHGs), "criteria pollutants" (CO, $NO_2$, $SO_2$, ozone, $PM_{10}$, and $PM_{2.5}$) and 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 (1 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 either integrated into WPX's project design or to be applied by the BLM as COAs (see the appendix). These include use of directional drilling to reduce the number of well pads, flaring instead of venting of natural gas during well completions, self-contained flare units to minimize emissions to the atmosphere, and use of closed-loop drilling. Closed-loop drilling minimizes emissions by recycling drilling muds and separating fluids and drill cuttings, thus eliminating open pits containing petroleum fluids. In addition to minimizing emissions associated with drilling and completion activities, these mitigation measures would also significantly reduce fugitive dust and vehicle tailpipe emissions by greatly reducing the volume of truck traffic required to support the operations.

Generation of fugitive dust as a result of construction activities and travel on unpaved access roads would also be reduced by BLM's requirement that the operator apply gravel to a compacted depth of 6 inches on the access road, apply water to the access road during the development phase, and apply a dust suppressant surfactant approved by the BLM throughout the long-term production phase (see the appendix). In addition, 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, a generally more favorable period for atmospheric dispersion due to warmer temperatures and less stable air. Fugitive dust emissions from vehicular traffic during drilling and completion would be further reduced if, as planned under the Proposed Action, these activities are allowed to occur during the winter season, when roads are frozen, snow-covered, or wet.

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

Ongoing scientific research has identified the potential impacts of "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 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.

An inventory and assessment of GHG emissions from oil and gas projects in the CRVFO was included in the air quality modeling completed in October 2011. In all of the modeled development scenarios, annual GHG emissions from Federal wells in the CRVFO would be less than 0.5% of Colorado emissions from natural gas projects in 2008 and 0.0009% of U.S. emissions from natural gas projects in 2005 (USEPA 2013). The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of climate change on the specific area of the Proposed Action. While any oil and gas development project may contribute GHGs to the atmosphere, these contributions would not have a significant effect on a phenomenon occurring at the global scale believed by some to be due to more than a century of human activities.

Based on the information presented in this section, including results of the air quality model prepared for the BLM in October 2011, the Proposed Action is not expected to have significant adverse impacts on air quality.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the project, no wells would be drilled, completed, or produced, and no new impacts on air quality would result.

## Geologic Resources

In general, impacts to geologic resources were adequately analyzed in the #DOI-BLM-CO-NO40-2009-0002. The analogous section of that EA is incorporated here by reference and relevant COAs retained (see the appendix). However, the CRVFO has recently begun incorporating information on potential impacts of hydraulic fracture stimulation ("fracing") as a result of microseismic events and the lateral and vertical extent of induced fractures. This new information is presented below. For other aspects of geologic resources, the analysis presented in the previous EA remains adequate regarding the Proposed Action and No Action Alternative and is incorporated here by reference.

### Environmental Consequences

*Proposed Action*

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

For decades, oil and gas companies and independent geophysicists have used state of the art equipment to monitor microseismic activity—defined as a "faint" or "very slight" tremor—during hydraulic fracturing to optimize well completions and to gather information about fracture dimensions and propagation

(Warpinski 2011). These data give an indication about the magnitude of seismic activity associated with hydraulic fracturing, dimensions of resultant fractures in geologic formations, and probability for induced fractures to extend into nearby aquifers, if present. Research indicates that microseismic activity created by hydraulic fracturing occurs at Richter magnitude 1 or less (Warpinski and Zimmer 2012). In comparison, a magnitude 3 earthquake is the threshold that can be felt at the ground surface. The Richter magnitude scale is base-10 logarithmic, meaning that a magnitude 1 tremor is 1/100th the amplitude of a magnitude 3 tremor. The National Academy of Sciences reviewed more than 100,000 oil and gas wells and waste water disposal wells around the world and concluded that "incidences of felt induced seismicity appear to be very rare," with only one such documented occurrence (NAS 2012).

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

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

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

Based on a review of available information on microseismic monitoring and fracture dimensions, Fisher and Warpinski (2012) concluded that fractures from deep horizontal wells are not a threat to propagate across the long distances (thousands of feet) needed to reach fresh-water aquifers much closer to the surface. This conclusion applies to the CRVFO area, and is also applicable to much shallower potable

groundwater sources consisting of unconsolidated alluvium (streambed deposits) associated with the Colorado River and major tributaries. In general, alluvial water wells in the CRVFO extend to depths of less than 200 feet, with few in the range of 400 feet. Typical water levels in these wells range from 50 to 100 feet deep. Impacts to water quality of these shallow fresh-water wells is highly improbable as a result of hydraulic fracturing, which occurs at depths of 5,000 to 11,000 feet below ground surface.

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

No single list of chemicals currently used in hydraulic fracturing exists for western Colorado, and the exact combinations and ratios used by operators are considered proprietary. However, the general types of compounds and relative amounts used are well known and relatively consistent (Table 2). Since fracture jobs are tailored to the downhole environment and companies are aware of the concerns involving hydraulic fracturing, the chemicals listed in Table 2 may or may not be used, and the information is provided solely as general information. Although a variety of chemicals additives are used in hydraulic fracturing—the examples in Table 2 being drawn from a total of 59 listed on the FracFocus website—the vast bulk of fluid injected into the formation during the process is water mixed with sand, representing 99.51% of the total by volume in the typical mixture shown in Table 2. The sand is as a proppant, or propping agent, to help keep the newly formed fractures from closing.

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

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

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

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

| **Table 2. Constituents of Typical Hydraulic Fracturing Operation in Tight Gas Formations** | | | | |
|---|---|---|---|---|
| ***Additive Type**** | ***Typical Example**** | ***Percent by Volume***** | ***Function**** | ***Common Use of Example Compound*** |
| Acid | Hydrochloric acid | 0.123 | Dissolves mineral cement in rocks and initiates cracks | Swimming pool chemical and cleaner |
| Biocide | Glutaraldehyde | 0.001 | Eliminates bacteria in the water that produce corrosive or poisonous by-products | Disinfectant; sterilizer for medical and dental equipment |
| Breaker | Ammonium persulfate | 0.010 | Allows delayed breakdown of the gel | Used in hair coloring, as a disinfectant, and in manufacture of household plastics |
| Clay stabilizer | Potassium chloride | 0.060 | Creates a brine carrier fluid that prohibits fluid interaction with formation clays | Used in low-sodium table salt substitutes, medicines, and IV fluids |
| Corrosion inhibitor | Formic acid | 0.002 | Prevents corrosion of the well casing | Used as preservative in livestock feed; used as lime remover in toilet bowl cleaners |
| Crosslinker | Borate salts | 0.007 | Maintains fluid viscosity as temperature increases | Used in laundry detergents, hand soaps, and cosmetics |
| Friction reducer | Polyacrylamide | 0.088 | "Slicks" the water to minimize friction | Used as a flocculant in water treatment and manufacture of paper |
| Gelling agent | Guar gum | 0.056 | Thickens the water to help suspend the sand propping agent | Used as a thickener, binder, or stabilizer in foods |
| Iron control | Citric acid | 0.004 | Prevents precipitation of metal oxides | Used as flavoring agent or preservative in foods |
| Surfactant | Lauryl sulfate | 0.085 | Increases the viscosity of the fluid | Used in soaps, shampoos, detergents, and as foaming agents |
| pH adjusting agent | Sodium hydroxide, acetic acid | 0.011 | Adjusts pH of fluid to maintain the effectiveness of other components | Sodium hydroxide used in soaps, drain cleaners; acetic acid used as chemical reagent, main ingredient of vinegar |
| Scale inhibitor | Sodium polycarboxylate | 0.043 | Prevents scale deposits in the pipe | Used in dishwashing liquids and other cleaners |
| Winterizing agent | Ethanol, isopropyl alcohol, methanol | -- | Added as necessary as stabilizer, drier, and anti-freezing agent | Various cosmetic, medicinal, and industrial uses |
| **Total Additives** | | **0.49** | | |
| **Total Water and Sand** | | **99.51** | | |

*FracFocus Chemical Disclosure Registry, fracfocus.org/chemical-use/what-chemicals-are-used
**USDOE 2009

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the

project, no new wells would be drilled, completed, or produced, and no new impacts to groundwater or geologic resources would result.

**Invasive Non-Native Plants**

Affected Environment

Colorado's listed noxious weeds are designated by the Colorado Department of Agriculture, and management of these weeds is regulated under the Colorado Noxious Weed Act, Title 35, Article 5.5. The Colorado noxious weed list is broken down into tiered levels based on existing infestation levels and a tiered approach to weed management. List A weeds are targeted for eradication, List B species are targeted for containment to limit spread, and List C species are targeted for integrated weed management including biocontrols, additional education resources, and research.

Botany surveys conducted during June and August 2013 identified state-listed noxious weeds within the RU 42-7 well pad and pipeline areas, as well as other non-native plant species which can also have detrimental impacts on native plant communities (WWE 2013). The proposed project would include construction of a new well pad and access road, installation of a new buried pipeline, and use of a temporary surface frac pipeline. The new well pad and portions of the new buried pipeline and surface frac line would occur on privately owned lands. The remainder of the pipelines would occur on BLM land. The project area lies within sagebrush shrubland and mountain shrubland habitat types.

Surveys documented six State List B species within the project area. Bull thistle (*Cirsium vulgare*) is present at one location near an existing road and developed spring where livestock congregate. Canada thistle (*Cirsium arvense*) is scattered along the proposed pipeline alignment, houndstongue (*Cynoglossum officinale*) is common throughout the oakbrush understory and near existing disturbed areas, musk thistle (*Carduus nutans*) and plumeless thistle (*Carduus acanthoides*) are scattered along existing disturbances, and spotted knapweed (*Centaurea stoebe* ssp. *micranthos*) occurs in a single infestation along the proposed pipeline. There are also three State List C species present within the project area. Cheatgrass (*Bromus tectorum*) is thinly scattered throughout the project area, common burdock (*Arctium minus*) is scattered along the proposed pipeline corridor, and common mullein (*Verbascum thapsus*) is common near existing disturbance areas.

Undesirable nonnative plant species other than noxious weeds are uncommon. However, there are three non-native species present which were once used extensively in reclamation and are still used in dryland pastures, crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and yellow sweetclover (*Melilotus officinalis*). These species have been widely used in dryland pastures and in reclamation of non-BLM lands but can expand beyond seeded areas, persist indefinitely and resist control efforts, and impede or prevent establishment of native species (Jordan et. al. 2008, Grant-Hoffman et. al. 2012).

Environmental Consequences

*Proposed Action*

Under the Proposed Action, 10.84 acres would be initially disturbed of which 1.70 acres would be on BLM land and 9.14 acres would be on privately owned land. Following pipeline corridor reclamation and interim reclamation around the well pad, a total of 1.65 acres on privately owned land would remain in use until final reclamation. Following construction, drilling and well completion, interim reclamation would occur on all areas not needed for ongoing operations. Reclamation work would consist of seeding

in accordance with the reclamation COAs presented in the appendix. A native seed mix would be used on the BLM portion of the project. For the portion of the project occurring on privately owned lands, the composition of plant species used for reclamation would be at the discretion of the landowner.

Surface-disturbing activities, such as those proposed for this project, provide a niche for invasion and establishment of non-native plant species particularly when these species are already present in the surrounding area. The mechanisms for this invasion and establishment are multi-fold. Soil disturbance and removal of native vegetation creates niches for invasive species (Parendes and Jones 2000). Linear disturbances, such as roads, provide corridors of connected habitat along which invasive plants can easily spread (Gelbard and Belnap 2003). Construction equipment and heavy vehicles often transport invasive plant seeds alone or in dirt clods on tires or the vehicle undercarriage (Schmidt 1989, Zwaenepoel et. al. 2006). Noxious weeds and other invasive species are well adapted to colonize and dominate in disturbed ground. They generally do not require well-developed soils, can out-compete native species for resources, produce prodigious quantities of seeds, and have seeds which can survive for many years or even decades within the soil. When weeds establish on a site, they can also significantly alter the composition of the soil microbial community of bacteria and fungi, making it increasingly more difficult over time for native species to reestablish on the site (Hierro et. al. 2006, Reinhart and Callaway 2006, Vinton and Goergen 2006, Jordan et. al. 2008, Vogelsgang and Bever 2009). Some weed species produce defensive chemicals which can impede germination of native plant seeds, as well as germination of spores for mycorrhizal fungi species upon which most perennial native plants are dependent (Bainard et. al. 2009). Due to the quantity and longevity of weed seeds and the effects of weeds on the soil, once these invasive species have established on a site they can be extremely difficult to eliminate.

The proposed project area has a history of disturbance associated with an existing road and livestock grazing. As a result, noxious weeds and other problematic nonnative species are widespread throughout the project area. Some species are most common along existing roads and disturbed areas. Others, such as houndstongue and cheatgrass, whose seeds readily attach to fur on livestock and wildlife are scattered throughout the area where proposed project activities would occur. With new project disturbances, the potential for increased establishment of these undesirable plants following construction activities is very high. Movement of soil by construction equipment could be expected to spread weed seeds within the project area, and the total area of disturbed habitat would increase. Vehicles and equipment could also transport new noxious weed species to the site where they would have disturbed habitats in which to establish.

To mitigate the risk from invasive species, the standard weed control COA would be attached to APDs to require periodic monitoring and weed control practices to ensure that noxious weeds are controlled (see the appendix). Establishment of native plant species is also crucial in preventing invasive non-native plant species establishment and spread. Therefore, the standard reclamation COAs would also be attached to APDs to require seeding and monitoring of reclamation seeding results (see the appendix).

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the project, no wells would be drilled, completed, or produced, and no new impacts that could lead to the development of new infestations of invasive non-native plants would result.

## Special Status Species

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

Affected Environment

According to the latest species list from the USFWS, four Federally listed plant species may occur within or be impacted by actions occurring in Garfield County. Table 3 lists these species and summarizes information on their habitat associations, potential for occurrence in the project vicinity based on known geographic range and habitats present, and potential for adverse impacts from the Proposed Action.

**Table 3. Potential for Occurrence of Threatened or Endangered Plant Species**

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

The proposed project area is located at elevations ranging from approximately 7,600 feet to 7,800 feet, and is outside of the elevation and habitat ranges of all four of these Federally listed plant species. Therefore, no suitable habitat is present for any Federally listed plant species.

Environmental Consequences

*Proposed Action*

Because no suitable habitat is present for Colorado hookless cactus, DeBeque phacelia, Parachute penstemon, or Ute lady's-tresses orchids within 100 meters of any proposed ground-disturbing activities, the proposed project would have "**No Effect**" on these species.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, there would be no surface disturbance occurring on BLM or private lands, no new wells being drilled, completed or produced, and no new impacts to threatened or endangered plants.

***BLM Sensitive Plant Species***

Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County are listed in Table 4, along with summaries of their habitat requirements, potential for occurrence within the project area, and potential to be impacted by the Proposed Action.

**Table 4. Potential for Occurrence of BLM Sensitive Plant Species**

| ***Species and Status*** | ***Occurrence*** | ***Habitat Association*** | ***Range or Habitat in Vicinity?*** | ***Potentially Affected?*** |
|---|---|---|---|---|
| DeBeque milkvetch (*Astragalus debequaeus*) | Varicolored, fine-textured, seleniferous or saline soils of Wasatch Formation; 5,100 to 6,400 feet | Pinyon-juniper woodlands and desert shrub. | No | No |
| Naturita milkvetch (*Astragalus naturitensis*) | Sandstone mesas, ledges, crevices and slopes in pinyon/juniper woodlands; 5,000 to 7,000 feet | Pinyon-juniper woodlands | No | No |
| Piceance bladderpod (*Lesquerella parviflora*) | Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas; 6,200 to 8,600 feet | Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species | No | No |
| Roan Cliffs blazing-star (*Mentzelia rhizomata*) | Steep, eroding talus slopes of shale, Green River Formation; 5,800-9,000 feet | Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species | No | No |

| **Table 4. Potential for Occurrence of BLM Sensitive Plant Species** | | | | |
|---|---|---|---|---|
| ***Species and Status*** | ***Occurrence*** | ***Habitat Association*** | ***Range or Habitat in Vicinity?*** | ***Potentially Affected?*** |
| Harrington's beardtongue (*Penstemon harringtonii*) | Flats to hillsides with rocky loam and rocky clay loam soils derived from coarse calcareous parent materials or basalt; 6,200-9,200 feet | Sagebrush shrublands, typically with scattered pinyon-juniper | Yes | Yes |
| Cathedral Bluffs meadow-rue (*Thalictrum heliophilum*) | Endemic on sparsely vegetated, steep shale talus slopes of the Green River Formation; 6,300-8,800 feet | Pinyon-juniper woodlands and shrublands; often with other oil shale endemics, sometimes with rabbitbrush or snowberry | No | No |

Not in Table 4 that only one species, Harrington's penstemon, has the potential to occur within the proposed project area. This is a perennial forb found primarily in sagebrush-dominated plant communities within six northwest Colorado counties, and roughly grouped into three population centers: 1) the Rifle-Rulison area in Garfield County, 2) the Eagle/Grand/Routt/Summit Counties area (Eagle), and 3) the Roaring Fork area in Pitkin County. It forms rosettes, which then develop flowering stalks, and single plants can form multiple rosettes (DeYoung, personal communication). Harrington's penstemon commonly grows in flat to gently sloping terrain. Preferred soils include Morval-Tridell and Villa Grove-Zoltay types. The Morval-Tridell complex is the dominant soil type found on Flatiron Mesa, which supports a large and extensive subpopulation of Harrington's beardtongue (BLM 2009). Highest densities are found in open sagebrush shrublands and pinyon-juniper woodlands, typically with scattered areas of bare ground and an understory where competition with grasses and forbs is moderate to low. NatureServe and the Colorado Natural Heritage Program both rank this species as vulnerable (G3 and S3) (Panjabi and Anderson 2006). The proposed project location on Flatiron Mesa is within an area of occupied habitat in the Rifle-Rulison population center.

Rare plant surveys were conducted within the proposed project area in June and August 2013. An estimated 926 Harrington's penstemon plants were observed within 300 meters of the project disturbance area. Harrington's penstemon plants were found growing within 19 meters of the northern end of the proposed well pad, but no plants were found within the well pad disturbance area. Harrington's penstemon plants were also found growing within one meter of the proposed buried pipeline disturbance area where this corridor parallels the access road northwest of the well pad, and within 2 meters of the pipeline disturbance area near its northern terminus. Three plants were found within the pipeline disturbance area (WWE 2013).

Environmental Consequences

*Proposed Action*

The proposed project would result in the construction of a new well pad, a buried pipeline, and a temporary surface frac pipeline. Three Harrington's penstemon plants growing within the pipeline corridor would experience direct mortality from pipeline installation. No other plants would be directly impacted. An estimated 926 Harrington's penstemon plants could experience indirect impacts from project implementation.

Potential indirect impacts include negative effects from increased dust levels from construction and increased vehicle traffic along access roads associated with construction and well drilling. Increased dust levels can negatively impact plants by clogging stomatal openings in the leaves, impeding gas exchange and reducing the ability of plants to take in carbon dioxide. Dust on the leaf surface can also effectively reduce light availability at the leaf surface. Light and carbon dioxide are both critical for plants to conduct photosynthesis, and reductions in either can reduce the quantity of carbohydrates plants can produce through photosynthesis, and thereby reduce plant growth and seed production. Dust on leaf surfaces can also facilitate plant tissue uptake of toxic pollutants (Farmer 1993, Sharifi et al. 1997, Thompson et al. 1984). Dust can also affect snowmelt patterns and resulting hydrology and soil moisture availability, alter soil pH and nutrient availability, and result in plant community composition changes (Angold 1997, Auerbach et al. 1997, Field et al. 2010, Gieselman 2010, Johnston and Johnston 2004). Implementation of attached Conditions of Approval for dust control, requiring use of water only, would reduce the risk of dust impacts as well as potential negative impacts from dust control chemicals.

Ground disturbance combined with vehicle traffic and construction equipment provides both excellent habitat and vectors for invasive species, particularly when these species are already present within the soil seed bank (Gelbard and Belnap 2003, Larson 2003, Parendes and Jones 2000, Schmidt 1989, Zwaenepoel et al. 2006). Nonnative species can negatively impact native plant communities, both directly through competition for resources, and indirectly through alteration of soil microbial communities (Hierro et al. 2006, Klironomos 2002, Reinhart and Callaway 2006, Vogelsgang and Bever 2009). Herbicide treatments of noxious weeds can also result in negative effects or mortality to native plants if they are co-occurring or located nearby, particularly in areas subject to strong winds and blowing dust (BLM 2007). Implementation of standard BLM Conditions of Approval for noxious weeds and temporary reclamation would reduce the risk of noxious weed and invasive species establishment and spread through the combination of treating noxious weeds while also reintroducing native vegetation through seeding of native plant species. To reduce the risk of adverse effects on Harrington's penstemon from chemical treatment of noxious weeds, herbicide use would be restricted to spot treatment or wicking only within the project area. No broadcast application of herbicide would be allowed.

Indirect impacts to Harrington's penstemon could also include negative effects on its pollinators. This species appears to be pollinated primarily by bees in the Megachilidae family and wasps in the Masaridae family (Panjabi and Anderson 2006). Pollinators depend on both appropriate floral communities and on appropriate nesting habitat. Many pollinators show fidelity to specific habitat areas, and if these sites become isolated from contiguous habitat by disturbances such as roads, pollinators may be reluctant to cross these barriers to utilize other habitats (Bhattacharya et. al. 2002, Osborne and Williams 2001). Roads and pipeline construction can negatively impact pollinators by creating barriers, by removing habitat as a result of new construction, and by direct mortality through collisions with vehicles.

Potential negative impacts to Harrington's penstemon and pollinator habitat would be mitigated by site specific reclamation requirements for use of native plants conducive to re-establishment of the sagebrush-bunchgrass-forb plant community present prior to disturbance. Mulch would be limited to weed-free and seed-free options to reduce the risk of introducing non-native plant species and noxious weeds.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the

project, no wells would be drilled, completed, or produced, and no new impacts to BLM sensitive plants would result.

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

Affected Environment

Federally listed, proposed, or candidate species potentially occurring within or affected by actions in Garfield County include eight species of vertebrate wildlife. Table 5 lists these species and summarizes information on their habitat associations, potential for occurrence in the project vicinity based on known geographic range and habitats present, and potential for adverse impacts from the Proposed Action. Species indicated as potentially affected are described in more detail following the table.

**Table 5. Potential for Occurrence of Threatened or Endangered Animal Species**

| ***Species and Status*** | ***Distribution in Region*** | ***Preferred Habitats*** | ***Potentially Present in Vicinity?*** | ***Potentially Adversely Affected?*** |
|---|---|---|---|---|
| Canada lynx *(Lynx canadensis)* – Threatened | Dispersed use in in upper montane and subalpine zones of Colorado mountains. | Subalpine spruce-fir forests; also lodgepole pine and aspen to as low as the upper montane. | No | No |
| Yellow-billed cuckoo (*Coccyzus americanus*) – Candidate | Major rivers and tributaries of western, northwestern, and south-central Colorado. | Large cottonwood stands with tall shrub understory along rivers. | No | No |
| Mexican spotted owl (*Strix occidentalis lucida*) – Threatened | No historic occurrence in area; present in southwestern Colorado and southern Front Range. | Rocky cliffs in canyons with closed-canopy coniferous forests. | No | No |
| Razorback sucker (*Xyrauchen texanus*) – Endangered | Colorado River and major tributary rivers, including mainstem Colorado River upstream to town of Rifle in CRVFO. | General: Deep, slow runs, pools, and eddies. Spawning: silt to gravel substrates in shallow water and seasonally flooded overbank areas. | **Yes** | **Yes** |
| Colorado pikeminnow *(Ptychocheilus lucius*) – Endangered | | | **Yes** | **Yes** |
| Humpback chub (*Gila cypha*) -- Endangered | Mainstem Colorado River and major tributaries – upstream to Black Rocks near Utah state line. | Rocky runs, riffles, and rapids in swift, deep rivers. | No | **Yes** |
| Bonytail chub (*Gila elegans*) – Endangered | | | No | **Yes** |
| *Lineage GB cutthroat trout (*Oncorhynchus clarki* ssp.) – Threatened | Identified in 60 streams in Colorado River basin including CRVFO area. | Clean, cool headwaters streams and ponds isolated from other strains of cutthroat trout. | No | No |

*Lineage GB = Relict populations of cutthroat trout indigenous to the Colorado/Gunnison/Dolores River drainages. Currently protected under the ESA pursuant to prior listing of the greenback cutthroat trout (*O. c. stomias*) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.

Environmental Consequences

*Proposed Action*

Razorback Sucker, Colorado Pikeminnow, Humpback Chub, and Bonytail Chub. These four species of Federally listed big-river fishes occur within the Colorado River drainage basin near or downstream from the project area. Designated Critical Habitat for the razorback sucker and Colorado pikeminnow includes the Colorado River and its 100-year floodplain west (downstream) from the town of Rifle. This portion of the Colorado River lies a few miles northeast of the project area. The nearest known habitat for the humpback chub and bonytail is within the Colorado River approximately 70 miles downstream from the project area. Occasionally, the bonytail is in Colorado west of Grand Junction, but its range does not extend east from that point. Only one population of humpback chub, at Black Rocks west of Grand Junction, is known to exist in Colorado.

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

The endangered Colorado River fishes could potentially be affected by the consumptive use of water taken from the Colorado River basin to support activities associated with the Proposed Action. Depletions in flows in the Colorado River and major tributaries are a major source of impacts to these fishes due to changes in the flow regime that reduce the availability and suitability of spawning sites and habitats needed for survival and growth of the larvae. Principal sources of depletion in the Colorado River basin include withdrawals for agricultural or industrial uses, withdrawals for municipal water supplies, and evaporative losses from reservoirs. On average, approximately 0.77 acre-feet of Colorado River water is consumed during activities related to each oil and gas well. This is equivalent to 0.04 to approximately 0.04 cubic feet per second (cfs) of water throughout the typical 10-day drilling period for an oil and gas well in the CRVFO area.

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

Other potential impacts to these species include inflow of sediments from areas of surface disturbance and inflow of chemical pollutants related to oil and gas activities. Construction activities would increase the potential for soil erosion and sedimentation. Although a minor temporary increase in sediment transport to the Colorado River may occur, it is unlikely that the increase would be detectable above current background levels. In any case, the Federally listed, proposed, or candidate fish species associated with the Colorado River are adapted to naturally high sediment loads and would not be affected.

In contrast to inflow of sediments, the inflow of chemical pollutants could impact the endangered big-river fishes if concentrations are sufficient to cause acute effects. The potential for adverse impacts would be limited to the Colorado pikeminnow and razorback sucker, the two species known to occur within the CRVFO area. Spills or other releases of chemical pollutants as a result of oil and gas activities are infrequent in the CRVFO area due to the various design requirements imposed by BLM and the State of Colorado. In the event of a spill or accidental release into an ephemeral drainage that could flow to the Colorado River, the operator would be required to implement its Spill Prevention, Control, and Countermeasures (SPCC) plan, including such cleanup and mitigation measures as required by BLM or the State. For these reasons, and because any spills into the Colorado River would be rapidly diluted to levels below that are not deleterious, or even detectable, the potential for adverse impacts from chemical releases is not considered significant.

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

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, there would be no surface disturbance occurring on BLM or private lands, no new wells being drilled, completed or produced, and no new impacts to special status animal species.

***BLM Sensitive Animal Species***

Affected Environment

Table 6 lists BLM sensitive vertebrate wildlife species that are known to occur in the region and, if present, could potentially be adversely affected by the Proposed Action. Potential impacts to species indicated as present or possible in the area of direct or indirect effects are discussed following the table.

**Table 6. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area**

| ***Common Name*** | ***Habitat*** | ***Potential for Occurrence*** |
|---|---|---|
| Fringed myotis (*Myotis thysanodes*) | Roosting: Caves, trees, mines, and buildings.<br>Foraging: Pinyon-juniper, montane conifers, and semi-desert shrubs. | Possible |
| Townsend's big-eared bat (*Corynorhinus townsendii*) | | |
| *Northern goshawk* (*Accipiter gentilis*) | Montane and subalpine coniferous forests and aspen forests; may move to lower elevation pinyon/juniper woodland in search of prey during winter. | Possible foraging |
| *Bald eagle* (*Haliaeetus leucocephalus*) | Nesting/Roosting: Mature cottonwood forests along rivers.<br>Foraging: Fish and waterfowl along rivers and lakes; may feed on carrion, rabbits, and other foods in winter. | Nests and roosts along Colorado River |
| Peregrine falcon (*Falco peregrinus*) | Nesting: Cliffs, usually near a river, large lake, or ocean.<br>Foraging: Waterfowl on rivers and lakes; upland fowl in open grassland or steppe. | Not Present |

| **Table 6. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area** | | |
|---|---|---|
| ***Common Name*** | ***Habitat*** | ***Potential for Occurrence*** |
| Brewer's sparrow (*Spizella breweri*) | Extensive stands of sagebrush, primarily Wyoming sagebrush on level or undulating terrain. | Possible – habitat marginal |
| Midget faded rattlesnake (*Crotalus oreganus concolor*) | Cold desert of NW Colorado, SW Wyoming, and NE Utah, primarily in sagebrush with rock outcrops and exposed canyon walls. | Possible – habitat marginal |
| Great Basin spadefoot (*Spea intermontana*) | Permanent or seasonal ponds and slow-flowing streams in pinyon-juniper woodlands and semi-desert shrublands. | No suitable habitat |
| Northern leopard frog (*Lithobates pipiens*) | Clean perennial waters in slow-flowing streams, wet meadows, marshes, and shallows of clean ponds and lakes. | Possible along Colorado River |
| Bluehead sucker (*Catostomus latipinnis*) | Primarily smaller streams with a rock substrate and mid- to fast- moving waters; also shallows of larger rivers. | Possible in Beaver Creek |
| Flannelmouth sucker (*Catostomus discobolus* ) | Runs, riffles, eddies, and backwaters in large rivers. | Present in Colorado River |
| Roundtail chub (*Gila robusta*) | Slow-moving waters adjacent to fast waters in large rivers. | |
| "Lineage CR" cutthroat trout (*Oncorhynchus clarki* ssp.) | Headwaters streams and ponds with cool, clear waters isolated from populations of non-native cutthroats and rainbow trout. | Not present |
| *Lineage CR = Relict populations of cutthroat trout indigenous to the Yampa/Green River drainages but widely transplanted throughout the state. Managed as a BLM sensitive species pursuant to prior designation of the Colorado River cutthroat trout (*O. c. pleuriticus*) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado. | | |

Environmental Consequences

*Proposed Action*

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

Northern Goshawk. This species is mostly limited to spruce/fir or aspen forests, 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. Although bald eagles nest and roost along the Colorado River just southeast of the project area, the potential for use of the actual project area is moderate. Any such use would most likely be by an individual hunting across large expanses of open upland habitats during winter. The project area would represent a small portion of such potential winter hunting habitat, and the reclaimed grass-forb community would provide better habitat for prey than the current shrubland types.

Brewer's Sparrow. Because the habitat is marginal for nesting by this species, and because project initiation is expected to occur outside the nesting season for this species, the project is not expected to have significant direct or indirect impacts at the population level. However, a small number of individual

Brewer's sparrows could potentially be precluded from nesting in the project vicinity in future years due to avoidance of the noise and light pollution associated with ongoing production and maintenance.

Midget Faded Rattlesnake. This small viper is considered a small, pale-colored subspecies of the common and widespread western rattlesnake, although some authorities consider it and another western subspecies, the Great Basin rattlesnake (*C. o. nuntius*) to be genetically distinct species. Although movement patterns of midget faded rattlesnakes are not well known, they are believed to be limited to a few hundred meters from den sites. The limited distribution and small home range make this snake susceptible to impacts from human disturbance (USGS 2007). Threats include direct mortality from vehicles traveling on roads and pads, off-highway vehicle use throughout the landscape, capture by collectors, and livestock grazing. As access increases into previously undeveloped areas, the risk of encounters with humans would increase, resulting in some cases of mortality or collection.

Northern Leopard Frog. The northern leopard frog is limited to perennial waters, including ponds and slow-flowing perennial streams or persistent portions of intermittent streams. It requires good water quality and abundant aquatic or shoreline vegetation. The habitat in the project area 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 and Roundtail Chub. As with the ecologically similar Colorado River endangered fishes described above, 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. Furthermore, protective COAs for water quality would minimize this potential (see the appendix). However, these species are vulnerable to alterations in flow regimes in the Colorado River (including evaporative loses from dams and depletions from withdrawal of water for irrigation or municipal water supplies) that affect the presence of sandbars and seasonally flooded overbank areas needed for reproduction. The amount of depletion in flows associated with this project is not expected to have a significant adverse impact on the survival or reproductive success of these species.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the project, no wells would be drilled, completed, or produced, and no new impacts to special status animal species would result.

## Vegetation

### Affected Environment

The project would be located on Flatiron Mesa in gently sloping terrain draining northward towards the Colorado River. The site is vegetated with a patchwork of sagebrush shrublands and mountain shrublands. A shallow intermittent drainage runs northwest below the pad site, and the temporary surface frac line would cross this drainage near the existing road and a small spring. The buried pipeline would pass above this spring, passing primarily through upland Gambel oak and sagebrush shrubland patches. An existing two-track jeep trail parallels the drainage. Due to the seasonal nature of water flow in this

drainage, its vegetation is dominated by upland species similar to the surrounding landscape, and no true riparian vegetation is present. The project elevation ranges from approximately 7,200 to 7,800 feet.

The sagebrush shrubland areas are dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *pauciflora*), with some basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) in the moister areas such as the intermittent drainage, and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) in rocky windswept sites with shallow soils. Other common species in this habitat type include bluebunch wheatgrass (*Pseudoroegneria spicata*), bottlebrush squirreltail (*Elymus elymoides*), cinquefoil (*Potentilla* sp.), dusty penstemon (*Penstemon comarrhenus*), galletagrass (*Pleuraphis jamesii*), Harrington's penstemon, Indian ricegrass (*Achnatherum hymenoides*), locoweed (*Oxytropis sericea*), longleaf buckwheat (*Eriogonum lonchophyllum*), lupine, (*Lupinus caudatus*), prickly-pear cactus (*Opuntia* sp.), Rocky Mountain penstemon (*Penstemon strictus*), sulphur-flower buckwheat (*Eriogonum umbellatum*), snakeweed (*Gutierrezia sarothrae*), tansy aster (*Machaeranthera pinnatifida*), and yarrow (*Achillea millefolium*). Rabbitbrush (*Chrysothamnus nauseosus*) is also present in moister areas, and Utah juniper (*Juniperus osteosperma*) occurs sparsely. The annual grass noxious weed, cheatgrass, is common and sparsely scattered throughout the sagebrush habitat areas.

Patches of mountain shrubland habitat are dominated by Gambel oak (*Quercus gambelii*), which forms dense stands. Other common species in these areas include mountain mahogany (*Cercocarpus montanus*), Oregon grape (*Mahonia repens*), serviceberry (*Amelanchier alnifolia*), skunkbush sumac (*Rhus trilobata*), snowberry (*Symphoricarpos rotundifolius*), and Woods' rose (*Rosa woodsii*). Houndstongue, a noxious weed whose seeds readily attach to animal fur, occurs scattered throughout the project area and is particularly common within and adjacent to the mountain shrubland patches.

Vegetation in disturbed areas along roads and near the small spring where livestock concentrate includes several non-native species and noxious weeds. These are described in greater detail in the Invasive Non-Native Plants section above. Non-native species include crested wheatgrass, smooth brome, and yellow sweetclover.

Environmental Consequences

*Proposed Action*

Under the Proposed Action, 10.84 acres would be initially disturbed, of which 9.14 acres would be on private land and 1.70 acres would be on BLM land. Of this total disturbance area, 9.19 acres would undergo interim reclamation and 1.65 acres on private land would remain in use until final reclamation is implemented. Vegetation lost in these areas would be a mix of native sagebrush shrublands and mountain shrub vegetation, in addition to some small previously disturbed areas of non-native vegetation. After construction, drilling and completion operations have been conducted, the initial disturbance would be reclaimed per interim reclamation practices outlined in the appendix. Final reclamation COAs related to the long-term disturbance are also presented in the appendix. Because the project is located within occupied habitat for the BLM Sensitive plant species, Harrington's penstemon, the reclamation seed mix would be restricted to native bunchgrass, forb, and shrub species in order to reduce negative impacts on Harrington's penstemon.

Adjacent native vegetation, although not directly impacted, could experience indirect impacts from project implementation. These indirect effects would be similar to those described in the BLM Sensitive Plants section above. These include increased dust levels and deposition on plants, which could interfere with plant gas exchange resulting in reduced photosynthesis rates, reduced growth rates, reduced seed production, and increased uptake of toxic pollutants. Dust could also affect snowmelt patterns and

resulting hydrology and soil moisture availability, alter soil pH and nutrient availability, and result in plant community composition changes.

Additional indirect impacts to adjacent vegetation could occur from noxious weeds and other non-native plants associated with project area disturbances. Removal of native vegetation would increase the site vulnerability to invasion and establishment of noxious weeds and other non-native invasive plant species, particularly with the existing widespread establishment of noxious weeds. Increased establishment of noxious weeds and other non-native plant would increase seed availability and the likelihood of seed dispersal into adjacent native vegetation by livestock, wildlife, wind, and human activities. Construction equipment and increased vehicle traffic associated with construction, operation, and maintenance would create ground disturbance and increase vectors capable of transporting new weed species to the site. Noxious weeds and other non-native species can negatively impact native plant communities, both directly through competition for resources, and indirectly through alteration of soil microbial communities. Herbicide treatments of noxious weeds can also result in negative effects or mortality to native plants if they are co-occurring or located nearby. Implementation of standard COAs for noxious weeds and interim reclamation (see the appendix) would reduce the risk of noxious weed establishment and spread through the combination of chemically treating noxious weeds while also seeding with desired plant species.

Cumulative impacts from the proposed project development on native vegetation would be additive to previous and planned oil and gas development on Flatiron Mesa, along with an existing powerline corridor and access roads. Loss and fragmentation of native vegetation could negatively impact pollinators by reducing and fragmenting pollinator habitat. Roads and well pad construction can also negatively impact pollinators by creating barriers and through direct mortality resulting from collisions with vehicles. Loss of pollinators can, in turn, negatively impact native plant diversity.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the project, no wells would be drilled, completed, or produced, and no new impacts to native vegetation would result.

## Water Quality, Ground

### *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 (USEPA 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, and are defined as the upper and lower Piceance Basin aquifer systems. The Uinta Formation consists of discontinuous layers of sandstone, siltstone, and marlstone and is less permeable than the hydrologically connected upper Parachute Creek Member (Robson and Saulnier 1981). The uppermost Uinta Formation also contains a shallow, perched aquifer that is separate from the upper aquifer unit (Cole et al. 1995). The upper Piceance Basin aquifer is underlain by the Mahogany confining unit, and correlates with the Mahogany Zone, the principal oil shale unit of the Piceance Basin. The Mahogany Zone separates the upper aquifer from the lower. The lower aquifer consists of the fractured marlstone of the lower part of the Parachute Creek Member. The thickness of the upper and lower aquifer units average 700 and 900 feet, respectively (CGS 2003).

Both upper and lower aquifer systems are found within the surrounding cliffs of the project area, but no water wells are completed within either the upper or lower bedrock aquifers units as described above. Beneath these two aquifer systems is a confining unit consisting of the Wasatch Formation and the lower two members of the overlying Green River Formation. Some fresh-water wells are completed in localized water-bearing intervals within this unit. Below the Wasatch Formation is the Cretaceous-aged Mesaverde aquifer. The depth to the top of this aquifer beneath the project area is more than 5,000 feet below ground surface (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 area.

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

The CDWR database lists one domestic water well within 0.5 mile of the proposed new oil and gas wells. The water well is listed as a monitoring well and has a depth of 127 feet.

Environmental Consequences

*Proposed Action*

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

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

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the project, no wells would be drilled, completed, or produced, and no new impacts to groundwater resources would result.

## Wildlife, Migratory Birds

### Affected Environment

The Migratory Bird Treaty Act (MBTA) provides protection to 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 long-distance and short-distance migrants, essentially encompassing virtually all native bird species. For most bird species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of nesting and foraging sites. 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.

Emphasizing the need to conserve declining migratory bird species, the U.S. Fish and Wildlife Service (USFWS 2008) has published a list of Birds of Conservation Concern (BCC). This section focuses on BCC species, non-BCC species that are Neotropical (long-distance) migrants, and raptors—three groups especially vulnerable to habitat loss or modification on their breeding grounds. Species protected under the Endangered Species Act or classified by the BLM as sensitive species are addressed in the section on Special Status Species.

The current BCC list includes 11 species potentially present in or near the project area: the bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*), prairie falcon (*Falco mexicanus*), flammulated owl (*Otus flammeolus*), yellow-billed cuckoo (*Coccyzus americanus*), Lewis's woodpecker (*Melanerpes lewis*), gray vireo (*Vireo vicinior*), pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), and Brewer's sparrow (*Spizella breweri*). The yellow-billed cuckoo (candidate for Federal listing as threatened or endangered) and the bald eagle, peregrine falcon, flammulated owl, and Brewer's sparrow (BLM sensitive species) are addressed in the earlier section on Special Status Species.

The minimal amount of pinyon-juniper habitat provides potential nesting sites for the pinyon jay, juniper titmouse, and gray vireo, with the last species much less likely based on geographic range. Non-BCC species potentially nesting in pinyon-juniper in the project area include migrants such as the black-

chinned hummingbird (*Archilochus alexandri*), western kingbird (*Tyrannus verticalis*), Say's phoebe (*Sayornis saya*), dusky flycatcher (*Empidonax oberholseri*), mountain bluebird (*Sialis currucoides*), western bluebird (*S. mexicana*), blue-gray gnatcatcher (*Polioptila caerulea*), plumbeous vireo (*Vireo plumbeus*), black-throated gray warbler (*Dendroica nigrescens*), and chipping sparrow (*Spizella passerina*).

Sagebrush shrublands in the project area provide marginal habitat for the Brewer's sparrow, a near-obligate in sagebrush shrublands. Non-BCC species associated with sagebrush shrublands include the western meadowlark (*Sturnella neglecta*) and three species of Neotropical migrants: western kingbird, vesper sparrow (*Pooecetes gramineus*), and lark sparrow (*Chondestes grammacus*).

Two BCC raptors, the golden eagle and prairie falcon, may include the project vicinity within large foraging areas associated with nest sites along cliffs to the north. This use would be occasional and transitory. Other non-BCC raptors potentially nesting and foraging in the project vicinity include the American kestrel (*Falco sparverius*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*A. striatus*), northern harrier (*Circus cyaneus*), great horned owl (*Bubo virginiana*), and long-eared owl (*Asio otus*). No occupied raptor nests were documented during surveys. Raptor nesting habitat in the project area consists primarily of mature Gambel oak and a few box elder trees. Due to low tree height, the majority of the Gambel oak in the area would be considered poor to marginal for raptor nesting (WestWater 2013).

Environmental Consequences

*Proposed Action*

Under the Proposed Action, removal of 7.63 acres of sparse juniper woodlands with openings of sagebrush, saltbush, and greasewood would result in loss of existing and potential nesting sites. 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.

Raptor nest surveys in the project vicinity did not result in location of raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility associated with this project, therefore a TL is not required. However, a separate COA would prohibit removal of vegetation during the period May 15 to July 15 to reduce adverse impacts to migratory birds such as BCC species.

In addition to these restrictions, 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. Adherence to the 60-day TL period does not ensure compliance with the MBTA.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee

well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, no surface disturbance would occur on BLM or private lands in conjunction with the project, no wells would be drilled, completed, or produced, and no new impacts to migratory birds would result.

**Wildlife, Other Terrestrial**

Affected Environment

The site is vegetated with a patchwork of sagebrush shrublands and mountain shrublands. Understory vegetation consists of mostly native grasses and forbs with some cheatgrass. Given these vegetation types, the area provides cover, forage, breeding, and nesting habitat for a variety of big game and small game species as well as nongame mammals, birds, and reptiles.

MAMMALS

The project area is within overall ranges of mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsonii*). Because of its low elevation, the project area consists primarily of winter range, meaning that it receives most use by animals that have migrated downslope to where temperatures are milder, snowcover thinner and less persistent, and forage more readily available. In addition to these migrant animals, a small number of mule deer reside in the general vicinity year-round. Winter densities of big game animals in a given area are dependent on the type of habitat present and the severity of the winter.

In addition to overall deer and elk winter range, the project area is mapped by Colorado Parks and Wildlife (CPW 2011) as a mule winter concentration area, and the lower portion immediately north of I-70 is mapped as mule deer severe winter range. Severe winter range is the portion of overall winter range used primarily during the most severe winters in terms of temperatures and, especially, snow cover. Consequently, severe winter range is typically at the lower margins of overall winter range and often comprised of plant species that are not necessarily ideal as forage but remain available when higher quality winter range is covered with deep snow.

Large carnivores potentially present in the project vicinity include the mountain lion (*Puma concolor*), which moves seasonally with its preferred prey, the mule deer, and the black bear (*Ursus americanus*). Two smaller 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 raccoon (*Procyon lotor*), ringtail (*Bassariscus astutus*), striped skunk (*Mephitis mephitis*), spotted skunk (*Spilogale gracilis*), and long-tailed weasel (*Mustela frenata*).

Small mammals present within the planning area include rodents such as the rock squirrel (*Otospermophilus variegatus*), golden-mantled ground squirrels *(Callospermophilus lateralis)*, least chipmunk (*Neotamias minimus*), packrat (bushy-tailed woodrat) (*Neotoma cinerea*), black-tailed and/or white-tailed jackrabbit (*Lepus californica*, *L. townsendii*), and desert or mountain cottontail (*Sylvilagus audubonii*, *S. nuttallii*). Rodents and, to a lesser extent rabbits and hares, are the primary prey for a variety of predators.

BIRDS

The wild turkey (*Meleagris gallopavo*) is native to North America and the largest member of the upland fowl. Wild turkeys are omnivorous, foraging on the ground or climbing shrubs and small trees to feed. They prefer hard mast such as acorns and pine nuts but also relish berries, seeds, and large insects. Wild turkeys may move from cover into open areas such as woodland clearings and the margins of grasslands and pastures dusk and dawn. See the sections on Migratory Birds and Special Status Species for discussions of other birds in the area.

REPTILES AND AMPHIBIANS

The project area is within elevational range of most reptile species known to occur in Garfield County. Two snake species—the gopher snake (bullsnake)(*Pituophis catenifer*) and striped whipsnake (*Coluber taeniatus*)—were observed during project-specific wildlife surveys. Other reptile species potentially present include the collared lizard *(Crotaphytus collaris)*, short- horned lizard, (*Phrynosoma hernandesi)*, plateau lizard (*Sceloporus tristichus*), tree lizard (*Urosaurus ornatus*), and plateau whiptail (*Aspidocelis velox*), all commonly associated with pinyon-juniper woodlands, sagebrush shrublands, and rocky areas such as occur in the project vicinity. A BLM sensitive species, the midget faded rattlesnake, is also potentially present (see the section on Special Status Species).

Amphibians potentially present in seasonal waterbodies and wetlands in this portion of the CRVFO include Woodhouse's toad (*Anaxyrus woodhousii*) and the western chorus frog (*Pseudacris triseriata*) in addition to a BLM sensitive species, the Great Basin spadefoot toad (see the section on Special Status Species). No seasonal aquatic habitats suitable for breeding by these species occur in the project area.

<u>Environmental Consequence</u>

*Proposed Action*

Direct impacts to terrestrial wildlife from the Proposed Action may include mortality, disturbance, nest abandonment/nesting attempt failure, or site avoidance/displacement from otherwise suitable habitats. These effects could result from the 10.84 acres of habitat loss or modification, increased noise from vehicles and operation of equipment, increased human presence, and collisions between wildlife and vehicles. Impacts would be more substantial during critical seasons such as winter (deer and elk) or the spring/summer breeding season (raptors, songbirds, amphibians).

Deer and elk are often restricted to smaller areas during the winter months and may expend high amounts of energy to move through snow, locate food, and maintain body temperature. Disturbance during the winter can displace wildlife, depleting much-needed energy reserves and may lead to decreased over winter survival. Additional, indirect habitat loss may occur if increased human activity (e.g., traffic, noise) associated with infrastructure causes intolerant species to be displaced or alter their habitat use patterns. The extent of indirect habitat loss varies by species, the type and duration of the disturbance, and the amount of screening provided by vegetation and topography. In general, disturbance-related impacts are temporary, with patterns of distribution and habitat use returning to predisturbance conditions rather quickly when disturbance stops.

*No Action Alternative*

Under the No Action Alternative, none of the eight Federal wells would be approved or drilled since Federal APDs would be denied. Furthermore, with the denial of BLM ROW authorizations, the lone fee

well planned on the RU 42-7 pad would also be rendered infeasible since there would be no realistic road access or gas and water pipeline route that could circumvent the BLM parcels surrounding the pad. Consequently, there would be no surface disturbance occurring on BLM or private lands, no new wells being drilled, completed or produced, and no new impacts to terrestrial wildlife.

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

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. The 2011 air quality modeling that provided the basis for the assessment of impacts from oil and gas projects within the CRVFO specifically addressed cumulative effects by including present and reasonably foreseeable future emission sources and air quality receptors within the field office area and a much larger modeling domain. This cumulative analysis included not only Federal wells but also the much more numerous private wells (see the section on Air Quality).

## PERSONS AND AGENCIES CONSULTED

WPX Energy: April Mestas, Adam Tankersley, Kris Meil, John Doose, Heather Hancock, Joe Weaver Jr.
Red Rock Gathering: Cameron Bingham, Tracie Jensen, Mike Mathes

## 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 7.

**Table 7. 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, Socioeconomics, Wastes-Hazardous or Solid |
| Allen Crockett, Ph.D., J.D. | Supervisory Natural Resource Specialist | Technical Review, NEPA Review |
| Shauna Kocman, Ph.D., P.E. | Petroleum Engineer | Downhole COAs Air Quality, Noise, Soils, Surface Water, Waters of the U.S. |
| Julie McGrew | Natural Resource Specialist | Visual Resources |
| Judy Perkins, Ph.D. | Botanist | Invasive Non-native Species, Special Status Plants, Vegetation |
| Sylvia Ringer | Wildlife Biologist | Migratory Birds, Special Status Species Animals, Aquatic and Terrestrial Wildlife |
| Todd Sieber | Geologist | Geology and Minerals, Groundwater, Paleontology |

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# APPENDIX

## Surface-Use and Downhole Conditions of Approval for the RU 42-7 Pad

## and

## Project-Specific COAs Applicable to the following ROW Grants:

**RRG Buried Natural Gas Pipeline (COC76417)**
**WPX Dual Water Lines (COC76418)**
**WPX Access Road (COC76419)**

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# SURFACE-USE CONDITIONS OF APPROVAL
**DOI-BLM-CO-N040-2014-0011-EA**

## General COAs Applicable to All Surface Disturbance Associated with the Project

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 Road Maintenance. Roads shall be crowned, ditched, surfaced, drained with culverts and/or water dips, and constructed to BLM Gold Book standards. Initial gravel application shall be a minimum of 6 inches. The operator shall provide timely year-round road maintenance and cleanup on the access roads. A regular schedule for maintenance shall include, but not be limited to, blading, ditch and culvert cleaning, road surface replacement, and dust abatement. When rutting within the traveled way becomes greater than 6 inches, blading and/or gravelling shall be conducted as approved by the BLM.

3. Drill Cuttings Management. Cuttings generated from the numerous planned well bores shall be worked through a shaker system on the drill rig, mixed with a drying agent, if necessary, and deposited in the planned cuttings trench or piled on location against the cut slope 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 Colorado West Regulatory Branch at 970-243-1199 ext. 17.

   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 Colorado West Regulatory Branch at 970-243-1199 ext. 17. 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 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 to be drilled on that pad as part of a continuous operation. If a period of greater than one year is expected to occur between drilling episodes, BLM may require implementation of all or part of the interim reclamation program.

      Reclamation, including seeding, of temporarily disturbed areas along roads and pipelines, and of topsoil piles and berms, shall be completed within 30 days following completion of construction. Any such area on which construction is completed prior to December 1 shall be seeded during the remainder of the early winter season instead of during the following spring, unless BLM approves otherwise based on weather. If road or pipeline construction occurs discontinuously (e.g., new segments installed as new pads are built) or continuously but with a total duration greater than 30 days, reclamation, including seeding, shall be phased such that no portion of the temporarily disturbed area remains in an unreclaimed condition for longer than 30 days. BLM may authorize deviation from this requirement based on the season and the amount of work remaining on the entirety of the road or pipeline when the 30-day period has expired.

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

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

c. Topsoil Stripping, Storage, and Replacement. *All* topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil shall be implemented for well pad construction whenever topography allows.

d. Seedbed Preparation. For cut-and-fill slopes, initial seedbed preparation shall consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. For compacted areas, initial seedbed preparation shall include ripping to a minimum depth of 18 inches, with a maximum furrow spacing of 2 feet. Where practicable, ripping shall be conducted in two passes at perpendicular directions. Following final contouring, the backfilled or ripped surfaces shall be covered evenly with topsoil.

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

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

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

e. Seed Mixes. A seed mix consistent with BLM standards in terms of species and seeding rate for the specific habitat type shall be used on all BLM lands affected by the project (see Attachments 1 and 2 of the letter provided to operators dated October 23, 2012).

For private surfaces, the menu-based seed mixes are recommended, but the surface landowner has ultimate authority over the seed mix to be used in reclamation. The seed shall contain no prohibited or restricted noxious weed seeds and shall contain no more than 0.5 percent by weight of other weed seeds. Seed may contain up to 2.0 percent 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 BMPs approved by the BLM. Additional BMPs such as biodegradable wattles, weed-free straw bales, or silt fences shall have be employed as necessary to reduce transport of sediments into the drainages. The BLM may, in areas with high erosion potential, require use of hydromulch or biodegradable blankets/matting to ensure adequate protection from slope erosion and offsite transport of sediments and to improve reclamation success.

i. Site Protection. The pad shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species will be considered firmly established when at least 50 percent of the new plants are producing seed. The BLM will approve the type of fencing.

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

8. Weed Control. The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports and Pesticide Application Records (PARs) shall be submitted to BLM by **December 1**.

9. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to "take" of either eagle species. Under the Eagle Act, "take" includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest

and disturb. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, shall be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051).

10. Raptor Nesting. Raptor nest surveys in the project vicinity in June of 2013 did not result in location of raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility associated with this project. Therefore, a 60-day raptor nesting TL is not required. However, to help ensure compliance with the Migratory Bird Treaty Act (MBTA), the operator should schedule construction or drilling activities to begin outside the raptor nesting season (February 1 to August 15) if practicable. If initiation of construction, drilling, or completion activities during these dates cannot be avoided, 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).

11. Migratory Birds – Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all vegetation removal or surface disturbances in previously undisturbed lands providing potential nesting habitat for Birds of Conservation Concern (BCC) is prohibited from **May 15 to July15**. An exception to this TL may be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC species are nesting within 30 meters (100 feet) of the area to be disturbed. Nesting shall be deemed to be occurring if a territorial (singing) male is present within the distance specified above. Nesting surveys shall include an audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 1 and continue into the 60-day period at the same location.

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

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

periods of active manipulation for cuttings management, remediation of contaminated materials, or other purposes.

13. Fossil Resources. All persons associated with operations under this authorization shall be informed that any objects or sites of paleontological or scientific value, such as vertebrate or scientifically important invertebrate fossils, shall not be damaged, destroyed, removed, moved, or disturbed. If in connection with operations under this authorization any of the above resources are encountered the operator shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM of the findings. The discovery shall 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 would, 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.

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

    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 would 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 would inform the operator as to:

    - whether the materials appear eligible for the National Register of Historic Places
    - what mitigation measures the holder would 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 would provide technical and procedural guidelines for relocation and/or to conduct mitigation. Construction may proceed upon verification by BLM that required mitigation has been completed.

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).

15. 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.

16. Windrowing of Topsoil. Topsoil shall be windrowed around the pad perimeter to create a berm that limits and redirects stormwater runoff and extends the viability of the topsoil per BLM Topsoil Best Management Practices (BLM 2009 PowerPoint presentation available upon request from Glenwood Springs Field Office). Topsoil shall also be windrowed, segregated, and stored along pipelines and roads for later spreading across the disturbed corridor during final reclamation. Topsoil berms shall be promptly seeded to maintain soil microbial activity, reduce erosion, and minimize weed establishment.

17. Range Management. Range improvements (fences, gates, reservoirs, pipelines, etc.) shall be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements. If a new or improved access road bisects an existing livestock fence, steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.

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

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

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

19. Special Status Plant Protections

Harrington's Penstemon. The Operator shall incorporate the following steps to avoid and minimize impacts to Harrington's penstemon:

Weed Control.

- A Pesticide Use Permit (PUP) specific to Harrington's penstemon sites shall be submitted to the BLM. Herbicide treatment of noxious weeds shall not occur within Harrington's penstemon habitat until approval of the PUP by the BLM.
- Chemical treatment of noxious weeds and other undesirable non-native plants shall be limited to spot spraying or wicking. No broadcast spraying shall be allowed in order to promote the reestablishment of Harrington's penstemon and other forbs and shrubs with which it co-occurs.

Reclamation. To promote re-establishment of Harrington's penstemon plants, and to prevent negative impacts from aggressive reclamation grasses, the following shall be implemented:

- A minimum of five grass, three forb, and one shrub species shall be included in the seed mix initially installed by drill-seeding or hydroseeding (**Table A-1**). Seeding shall be at the rate of 60 pure live seeds (PLS) per square foot if drill-seeded and 120 PLS per square foot if broadcast-seeded or hydroseeded where drill-seeding is impracticable. If hydroseeding is used, application of seeds shall be performed as a separate step from application of hydromulch.

- In addition, seeds of mountain big sagebrush (*Artemisia tridentata* ssp. *pauciflora*) and/or Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) shall be collected from plants in the vicinity of the well pad and pipeline corridor and seeded within 6 months of collection. Sagebrush seeding shall occur prior to winter snowfall, or on top of snow. Sagebrush may be sown either by broadcast seeding, or, if not on snowpack, by placing the seed in the fluffy seed box of a seed drill, with the drop tube left open to allow seed to fall out on the ground surface.

- Mulch shall not be required, but may be used if it is both weed-free and seed-free. Mulch options shall include one of the following:
  a) Woody material obtained onsite from trees and shrubs removed during well pad and pipeline construction. If used, this material **shall be chipped**, and not hydro-axed.
  b) Wood straw.
  c) Native grass straw from nursery-grown native grasses. Species shall be native to northwestern or central Colorado. If this mulch source is used, the requirement for seed-free mulch shall be waived. The species and source shall be provided to the BLM, and application of this mulch shall not occur until after it has been approved by the BLM botanist.
  d) Hydromulch.

| **Table A-1. Seed Mix for Initial Seeding of Harrington's Penstemon Sites.[1]** | | | | |
|---|---|---|---|---|
| ***Common Name*** | ***Scientific Name*** | ***Variety*** | ***Season*** | ***Form*** |
| **Choose Five Grasses (50% of Total PLS)** | | | | |
| Bottlebrush Squirreltail | *Elymus elymoides, Sitanion hystrix* | VNS | Cool | Bunchgrass |
| Bluebunch Wheatgrass | *Pseudoroegneria spicata, Agropyron spicatum* | Secar, P-7, Anatone, Goldar | Cool | Bunchgrass |
| Indian Ricegrass | *Achnatherum [Oryzopsis] hymenoides* | Paloma, Rimrock | Cool | Bunchgrass |
| Needle and Thread Grass | *Hesperostipa [Stipa] comata* | VNS | Cool | Bunchgrass |
| Junegrass | *Koeleria macrantha* | VNS | Cool | Bunchgrass |
| Columbia Needlegrass | *Achnatherum nelsonii, Stipa columbiana* | VNS | Cool | Bunchgrass |
| Muttongrass | *Poa fendleriana* | VNS | Cool | Weakly Rhizomatous |
| **Choose Three Forbs (30% of Total PLS)** | | | | |
| Arrowleaf Balsamroot | *Balsamorhiza sagittata* | Rocky Mountain Beeplant | *Cleome serrulata* | |
| Silverleaf Lupine | *Lupinus argenteus* | Scarlet Globemallow | *Sphaeralcea coccinea* | |
| Fernleaf Biscuitroot | *Lomatium dissectum* | Sulphur Flower Buckwheat | *Eriogonum umbellatum* | |
| **Use One Shrub (20% of Total PLS)** | | | | |
| Fourwing Saltbush | *Atriplex canescens* | | | |

[1] Mountain big sagebrush (*Artemisia tridentata* spp. *pauciflora*) and/or Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) shall be broadcast seeded into the reclaimed areas prior to snowfall using seeds collected adjacent to the well pad and along the pipeline corridor.

## Project-Specific COAs Applicable to RRG's Natural Gas Pipeline (COC76417)

The following specific measures are in addition to the general stipulations for pipeline construction and operation attached to the ROW Grant.

1. Pipeline Installation Details. A new 8-inch diameter welded steel natural gas pipeline operated by Red Rock Gathering shall be buried concurrently with the WPX dual 6-inch Flexsteel water lines (authorized under separate right-of-way) in the same trench. Approximately 1,480 feet of the co-located gas and water pipelines shall be buried across BLM. The new pipelines shall be buried to a minimum depth of 4 feet. The ROW corridor width shall be 50 feet with 25 feet attributed to temporary use area.

   The new gas line shall gather the gas produced from the new wells at the RU 42-7 pad and deliver the gas to Red Rock Gathering's Flatiron Mesa 12-inch collection pipeline.

   The disturbance limits of the pipelines shall be staked and /or flagged prior to any commencement of operations. All trees and brush within the disturbance corridor shall be hydro-axed or chipped prior to beginning excavation work unless specific trees along the edge of the corridor have been identified

as "save" trees for visual mitigation by the BLM. Topsoil stripping shall not be allowed where topsoil windrowing or stockpiling is to occur along the pipeline corridor to retain the root mass of the brush species and enhance the recovery of the hydro-axed vegetation. No equipment or vehicle use shall be allowed outside the staked disturbance corridor of the pipeline ROW unless authorized by BLM personnel for visual mitigation work.

After installation, the lines shall be tested using air compressed from the atmosphere. Pipelines shall be constructed and maintained according to industry standards.

2. Saturated Soil Conditions. When saturated soil conditions exist on or along the proposed right-of-way, construction shall be halted until soil material dries out or is frozen sufficiently for construction to proceed without undue damage and erosion to soils.

3. Warning Signs. Pipeline warning signs shall be installed within 10 days of completion of construction and prior to use of the pipeline for transportation of product. Pipeline warning shall be installed at all road crossings and shall be visible from sign to sign along the ROW. For safety purposes, each sign shall be permanently marked with the operator's name and shall clearly identify the owner (emergency contact) and purpose (product) of the pipeline.

## Project-Specific COAs Applicable to WPX's Dual Water Lines (COC76418)

The following specific measures are in addition to general stipulations for pipeline construction and operation attached to the ROW Grant.

1. Pipeline Installation Details. Two 6-inch diameter Flexsteel water lines operated by WPX shall be buried concurrently with the Red Rock Gathering 8-inch gas line (authorized under separate right-of-way) in the same trench. Approximately 1,480 feet of the co-located gas and water pipelines shall be buried across BLM. The new pipelines shall be buried to a minimum depth of 4 feet. The ROW corridor width shall be 50 feet with 25 feet attributed to temporary use area.

   The new water lines shall deliver the produced water collected in the planned storage tanks at the RU 42-7 pad into the existing Flatiron Mesa water system which has capability to transport those waters to the Rulison Water Treatment Facility near Anvil Points.

   The disturbance limits of the pipelines shall be staked and /or flagged prior to any commencement of operations. All trees and brush within the disturbance corridor shall be hydro-axed or chipped prior to beginning excavation work unless specific trees along the edge of the corridor have been identified as "save" trees for visual mitigation by the BLM. Topsoil stripping shall not be allowed where topsoil windrowing or stockpiling is to occur along the pipeline corridor to retain the root mass of the brush species and enhance the recovery of the hydro-axed vegetation. No equipment or vehicle use shall be allowed outside the staked disturbance corridor of the pipeline ROW unless authorized by BLM personnel for visual mitigation work.

   After installation, the lines shall be tested using air compressed from the atmosphere. Pipelines shall be constructed and maintained according to industry standards.

2. Saturated Soil Conditions. When saturated soil conditions exist on or along the proposed right-of-way, construction shall be halted until soil material dries out or is frozen sufficiently for construction to proceed without undue damage and erosion to soils.

3. Warning Signs. Pipeline warning signs shall be installed within 10 days of completion of construction and prior to use of the pipeline for transportation of product. Pipeline warning shall be installed at all road crossings and shall be visible from sign to sign along the ROW. For safety purposes, each sign shall be permanently marked with the operator's name and shall clearly identify the owner (emergency contact) and purpose (product) of the pipeline.

## Project-Specific COAs Applicable to the RU 42-7 Pad and Access Road Spur (COC76419)

The following specific measures are in addition to the general surface-use COAs listed above and stipulations attached to the ROW grant..

1. Vegetation Removal Prior to Pad Construction. As initially required in the Flatiron Mesa Master Development Plan, all trees and brush within the disturbance corridor of proposed roads, pipelines and pads shall be hydro-axed or chipped prior to beginning excavation work.

2. Pad Construction Details. Care shall be taken to provide suitable distance between the edge of the pad slopes and the production units and storage tanks so that the cut and fill slopes can be reasonably reshaped during the interim reclamation earthwork and seeded.

3. Surface Pipeline Installation Details. Three 4½-inch diameter welded steel surface lines shall be temporarily laid in a cross-country alignment north from the RU 42-7 pad to the existing road, and then laid further north alongside the Flatiron Mesa Road and RU 34-6 Road to the RU 43-6 pad where well completion operations are to be remotely conducted. The length of the steel high-pressure lines across BLM is estimated at 2,450 feet.

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# BUREAU OF LAND MANAGEMENT

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

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

| | |
|---|---|
| Operator: | WPX Energy Rocky Mountain LLC. |
| Agreement Number: | COC57580 (Lease: COC50944) |
| Pad(s): | RU 42-7 |
| Engineer: | Shauna Kocman |
| Surface Location: | Garfield County; SENE, Sec. 7 T7S R93W |

See list of wells following the COAs.

1. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) cementing/running casing strings, and (d) within 24 hours *after* spudding, the CRVFO shall be notified. One of the following CRVFO inspectors shall be notified by phone. The contact number for all notifications is: 970-876-9064. The BLM CRVFO inspectors are Julie King, Lead PET; David Giboo, PET; Greg Rios, PET; Tim Barrett, PET; Alex Provstgaard, PET; Brandon Jamison, PET.

2. A CRVFO petroleum engineer shall be contacted for a verbal approval prior to commencing remedial work, plugging operations on newly drilled boreholes, changes within the drilling plan, sidetracks, changes or variances to the BOPE, deviating from conditions of approval, and conducting other operations not specified within the APD. Contact Shauna Kocman or Peter Cowan for verbal approvals (contact information below).

3. If a well control issue or failed test (e.g. kick, blowout, water flow, casing failure, or a bradenhead pressure increase) arises during drilling or completions operations, Shauna Kocman or Peter Cowan shall be notified within 24 hours from the time of the event. IADC/Driller's Logs and Pason Logs (mud logs) shall be forwarded to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 24 hours of a well control event.

4. The BOPE shall be tested and conform to Onshore Order No. 2 for a **3M** system and recorded in the IADC/Driller's log. A casing head rated to 3,000 psi or greater shall be used.

5. Flexible choke lines shall meet or exceed the API SPEC 16C requirements. Flexible choke lines shall have flanged connections and configured to the manufacturer's specifications. The flexible choke lines shall be anchored in a safe and workmanlike manner. At minimum, all connections shall be effectively anchored in place for safety of the personal on location. Manufacturer specifications shall be kept with the drilling rig at all times and immediately supplied to the authorized officer/inspector upon request. Specifications at a minimum shall include acceptable bend radius, heat range, anchoring, and the working pressure. All flexible choke lines shall be free of gouges, deformations, and as straight/short as possible.

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

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

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

9. After the surface/intermediate casing is cemented, a Pressure Integrity Test/Mud Equivalency Test/FIT shall be performed on the first well drilled in accordance with OOGO No. 2; Sec. III, B.1.i. to ensure that the surface/intermediate casing is set in a competent formation. This is not a Leak-off Test, but a formation competency test, insuring the formation at the shoe is tested to the highest anticipated mud weight equivalent necessary to control the formation pressure to the next casing shoe depth or TD. Submit the results from the test via email (skocman@blm.gov) on the first well drilled on the pad or any horizontal well and record results in the IADC log. Report failed test to Shauna Kocman or Peter Cowan. A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes.

10. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an <u>electronic copy in .las and .pdf format shall be submitted to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 48 hours.</u> If the TOC is lower than required or the cement sheath of poor quality, a CRVFO petroleum engineer shall be notified for remedial operations within 48 hours from running the CBL and prior to commencing fracturing operations,

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

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

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

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

14. During hydraulic frac operations, monitor the bradenhead/casing head pressures throughout the frac job. Frac operations shall be terminated upon any sharp rise in annular pressure (+/- 40 psi or greater) in order

to determine well/wellbore integrity. Notify Shauna Kocman or Peter Cowan immediately.

15. Per 43 CFR 3162.4-1(c), no later than the 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.

## Contact Information

**Shauna Kocman, PhD, PE**
Petroleum/ Environmental Engineer

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**Peter Cowan**
Petroleum Engineer

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| List of Wells | | | |
|---|---|---|---|
| ***Proposed Pads*** | ***Proposed Wells*** | ***Surface Locations*** | ***Bottomhole Locations*** |
| RU 42-7 (Fee Surface) | Youberg RU 32-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 7 |
| | Youberg RU 41-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 5 |
| | Youberg RU 331-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 6 |
| | Youberg RU 332-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 7 |
| | Youberg RU 341-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 5 |
| | Youberg RU 431-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 5 |
| | Youberg RU 432-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 7 |
| | Youberg RU 531-7 | T7S R93W, Sec. 7 SENE | T7S R93W, Sec. 7 Lot 6 |

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# FONSI
## DOI-BLM-CO-N040-2014-0011-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 would 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 wells to be drilled from the fee surface RU 42-7 well pad may commence only upon approval by BLM of the Application for Permit to Drill (APD). Similarly, surface-disturbing activities related to the gas or water pipeline installation on BLM land or the use of the existing BLM Flatiron Mesa Road to access the RU 42-7 pad for construction purposes may commence only upon BLM's issuance of the appropriate Right-of-way Grant or Temporary Use Permit.

MITIGATION MEASURES: Mitigation measures presented in the appendix of the EA would be incorporated as COAs for both surface and drilling operations and attached to APDs for the Federal wells drilled on the RU 42-7 pad. Furthermore, the Terms and Conditions outlined in the appendix would be attached to the various road and pipeline rights-of way to be issued as part of this decision.

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SIGNATURE OF AUTHORIZED OFFICIAL:

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