

**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-N040-2014-0093-EA

CASEFILE NUMBER

Federal Oil and Gas Leases COC41916 and COC50944; BLM Rights-of-Way COC76417 (gas gathering lines), COC76418 (produced water collection lines), and COC76419 (access road)

PROJECT NAME AND SYNOPSIS

Flatiron Mesa Phase 2. The project is a proposal to drill 79 Federal wells from two existing BLM well pads, one new BLM pad, and one new fee (private surface, private minerals) pad; expand one BLM pad to serve as a centralized frac/tank facility; conduct road and pipeline upgrades to support drilling activities; and issue associated BLM road and pipeline right-of-way (ROW) grants.

PROJECT LOCATION

The project area is located on Flatiron Mesa approximately 5 to 6 miles southwest of Rifle, Garfield County, Colorado, in Township 7 South (T7S), Range 93 West (R93W), Sections 5, 6, 7, and 8, of the Sixth Principal Meridian. The project area is accessed by Garfield County Road (CR) 320 (Rifle-Rulison Road) and CR317 (Beaver Creek Road). Public access would not be allowed within the FMMDP2 area, since access roads to the area cross private lands (Figure 1).

APPLICANT

WPX Energy Rocky Mountain LLC (“WPX”). Contact: Reed Haddock, 1001 Seventeenth Street, Suite 1200, Denver, Colorado 80202.

INTRODUCTION

In 2009, BLM approved the Flatiron Mesa Master Development Plan (FMMDP) and Environmental Assessment (EA), which analyzed 81 Federal wells and 12 fee (private) wells to be directionally drilled on two BLM pads and two fee pads (BLM 2009) (Figure 2). Construction activity in 2010 included expanding the RU 34-6 pad from its original 1996 footprint and modifying the RU 23-5 pad and SR 43-12 pads for different access road and pipeline connections. Exploratory drilling in 2010-2011 established four producing wells on each of these three pads. After a drilling hiatus of 2 years while the buried waterline system was being upgraded, WPX returned in 2013 and commenced drilling 36 directional wells on the RU 23-5 pad (BLM 2013). The RU 42-7 fee pad was finally scheduled for development and is currently under construction with nine wells planned instead of the 15 analyzed in the FMMDP (BLM 2014). The remaining 14 wells initially planned for the RU 34-6 pad are reanalyzed in this EA (Table 1).

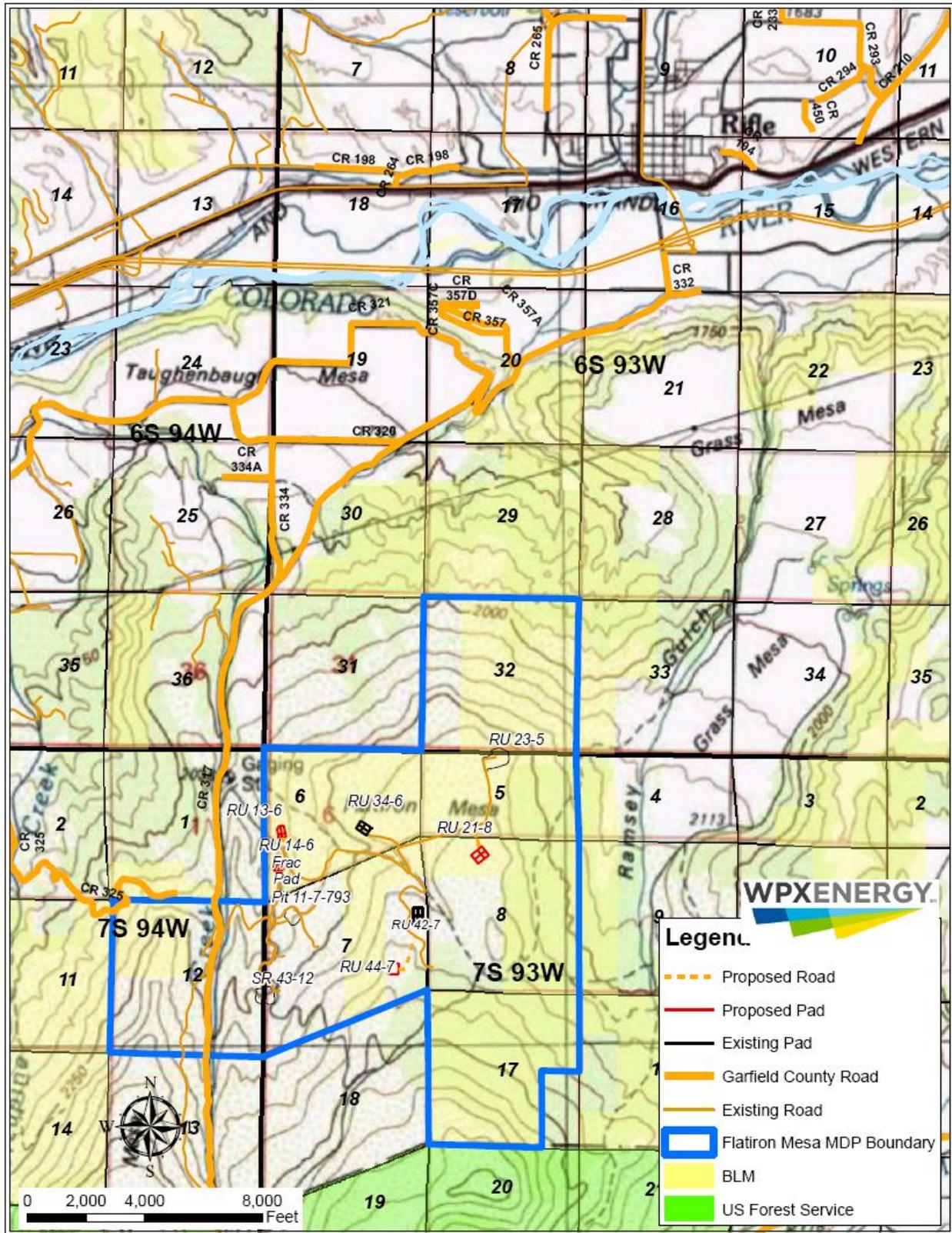
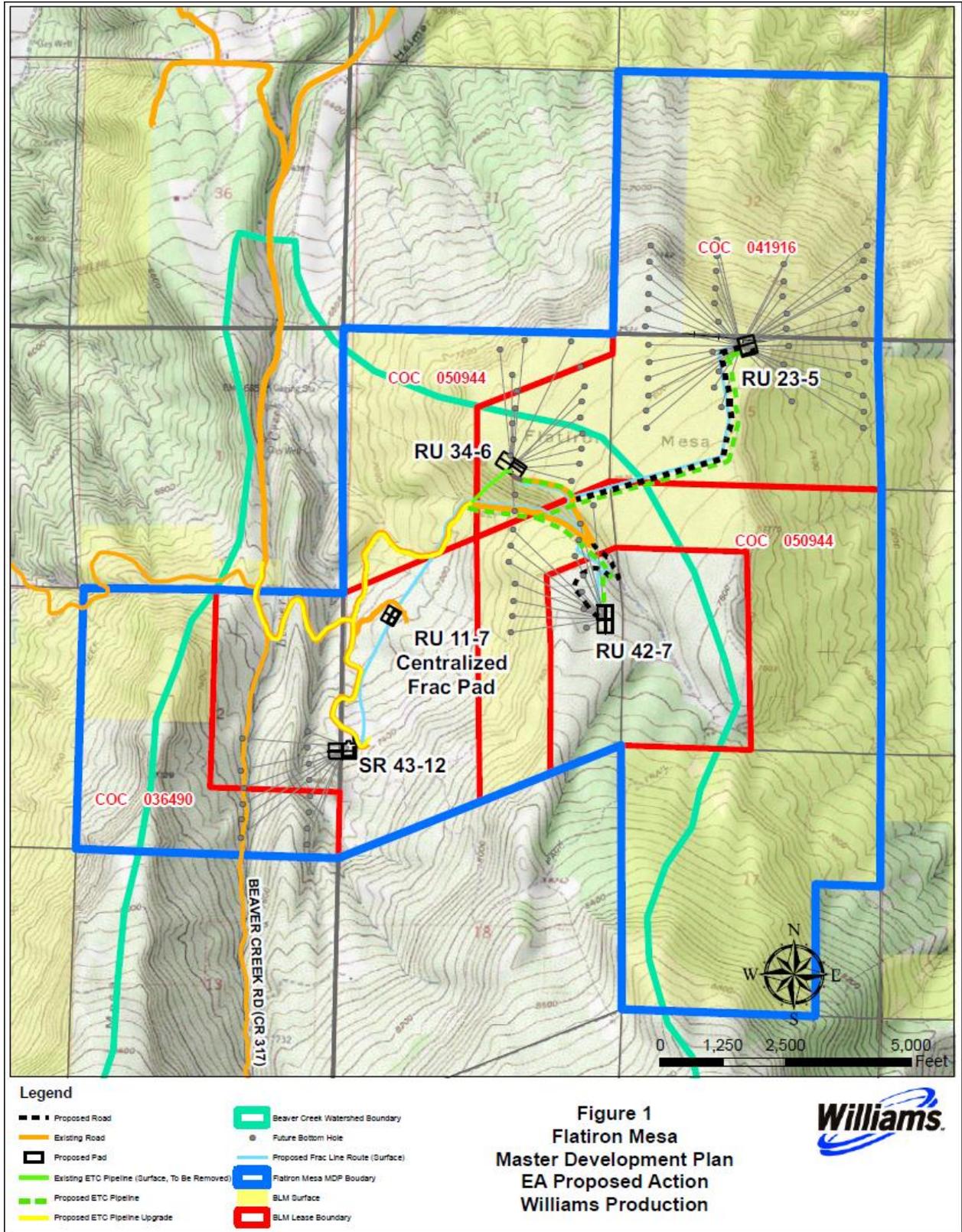


Figure 1. Project Location Map



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Figure 2. Original Flatiron Mesa Master Development Plan Project Boundary

WPX has not pursued the 11 additional wells planned in the FMMDP for the SR 43-12 fee pad, although the pad remains available for future drilling. The RU 11-7 Frac Pad described in the FMMDP was permitted by the state of Colorado (Colorado Oil and Gas Conservation Commission, COGCC) and built as the 11-17-793 Water Storage Facility in 2013. The 58 wells drilled or being drilled to date comprise 53 Federal wells and five fee wells of the original 93 wells proposed in the FMMDP (BLM 2009)(Table 1). The planning boundary established in the FMMDP covers 3,988 acres, including 2,677 acres of Federal surface underlain by Federal minerals, 398 acres of split-estate land (private surface, Federal minerals), and 913 acres of fee land (private surface, private minerals).

Table 1. 2009 FMMDP Development – Implementation To-Date					
<i>Pad/ Facility Analyzed in FMMDP</i>	<i>Construction Date</i>	<i>Existing Pad Disturbance (acres)</i>	<i>Surface</i>	<i>Wells Analyzed in 2009 Federal/Fee</i>	<i>Wells Drilled as of 2014 Federal/Fee</i>
Well Pads					
RU 23-5 New Pad	2010	10.14	BLM	44/0	40/0¹
RU 34-6 Pad Expansion	2010	5.66	BLM	19/0	5/0²
RU 42-7 New Pad	2014	7.63	Private	11/4	8/1³
SR 43-12 New Pad	2010	7.50	Private	7 / 8	0/4
Support Pad					
RU 11-7 Centralized Frac Pit	2013	5.24	Private		
Totals		36.17		81/12	53/5
¹ EA 2013-0007 documented a reduction of four wells for the RU 23-5 pad. ² The remaining 14 wells on the RU 34-6 pad are planned to be drilled in 2014. The pad currently supports five producing wells drilled in 1996 prior to the FMMDP analysis. ³ EA 2014-0011 documented a reduction of six wells for the RU 42-7 pad.					

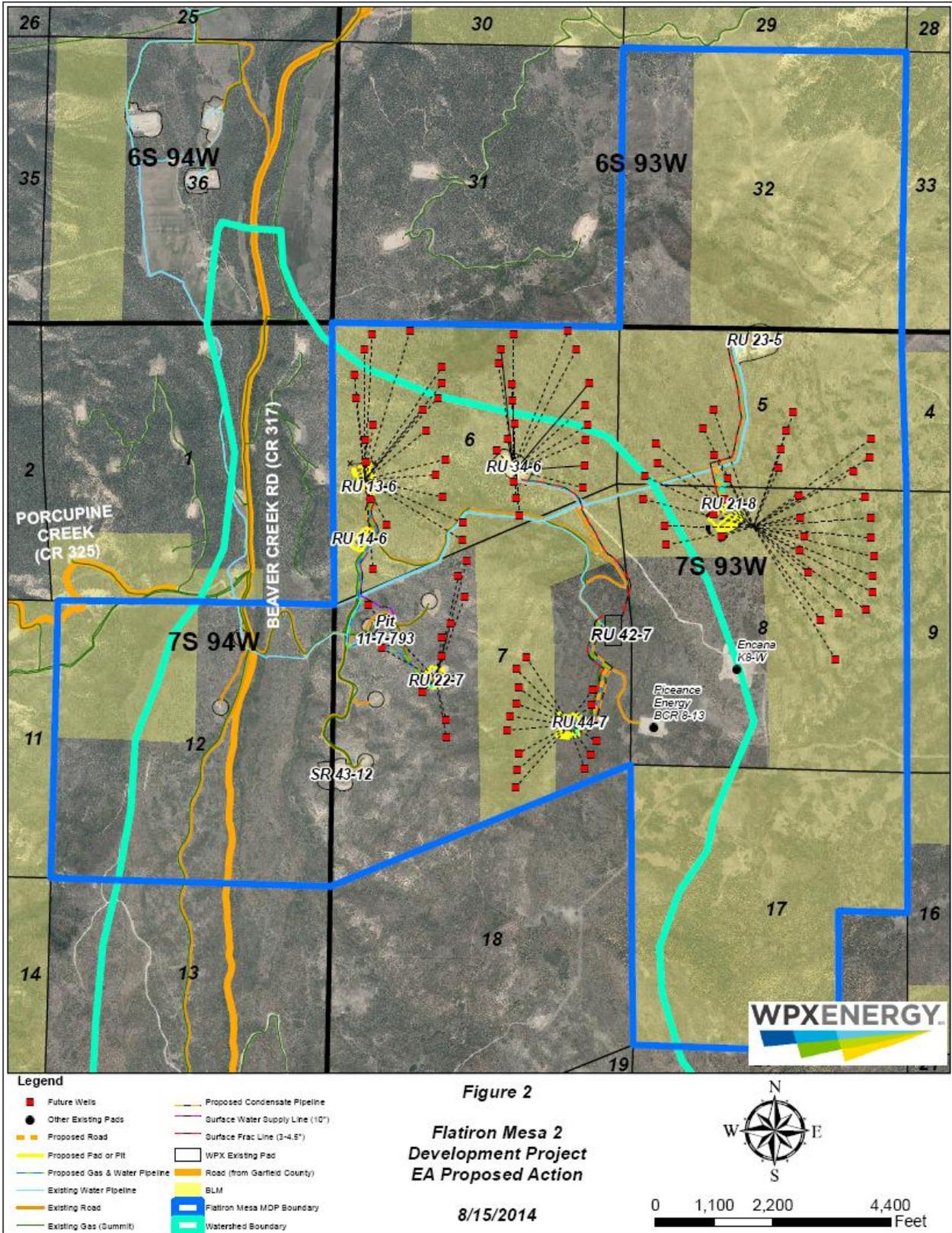
For Phase 2 of development on Flatiron Mesa, the existing FMMDP road and pipeline infrastructure would undergo only minor expansion to serve the new wells. A third phase of development in the south portion (Section 17) of the FMMDP area involving new wells, pads, roads and pipelines is planned in the coming years, with timing dependent on natural gas market demands. A follow-up EA would be prepared at that time to analyze and assess environmental impacts of the Section 17 development. It is important to note that the follow-up EA analyses would all occur within the original FMMDP planning boundary.

A portion of the Proposed Action would occur within the City of Rifle’s Beaver Creek municipal watershed (Figure 3). WPX has an approved permit with the necessary amendments from the City of Rifle to conduct the proposed work and develop appropriate measures to mitigate impacts to the municipal watershed area. Consultation and coordination would occur between the operators, BLM, and the City of Rifle to ensure that the Proposed Action and its best management practices (BMPs) are implemented and continue to protect water quality of the Beaver Creek watershed.

PROPOSED ACTION

Project Components

The Proposed Action is to develop 79 new directional oil and gas wells into Federal leases from two existing BLM pads (RU 34-6 and RU 13-6), one new BLM pad (RU 21-8), and one new fee pad (RU 44-7 pad). The RU 44-7 pad would also be used for drilling six new fee wells (Figure 3 and Table 2).



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Figure 3. Proposed Action for Flatiron Mesa Phase 2

Table 2. Proposed Flatiron Mesa Phase 2 Developments and Drilling Schedule							
<i>Well Pad</i>	<i>Surface</i>	<i>T7S, R93W 6th P.M.</i>	<i>Existing Wells Federal/Fee</i>	<i>Drilling Start (2015)</i>	<i>Future Wells Planned Per Year Federal/Fee</i>		
					<i>2015</i>	<i>2016</i>	<i>Totals</i>
Proposed RU 44-7	Private	Section 7	N/A	Jan 4	9/6	N/A	9/6
Existing RU 34-6	BLM	Section 6	5/0	May 15	14/0	N/A	14/0
Proposed RU 21-8	BLM	Section 8	N/A	Jul 1	17/0	18/0	35/0
Expanded RU 13-6	BLM	Section 6	1/0	Oct 25	15/0	6/0	21/0
Expanded RU 14-6 ¹	BLM	Section 6	1/0	NA	N/A	N/A	N/A
Totals			7/0		55/6	24/0	79/6

¹No new wells are planned on the RU 14-6 pad, which would be expanded as a remote frac/tank pad for RU 13-6 wells.

The four well pads would be built or expanded to provide safe working platforms for the proposed wells. The new Federal wells would be directionally drilled into underlying Federal leases COC41916 and COC50944 over a 2- to 3-year period. Average time for drilling and completing a directional well would be 30 days. Fresh water would be used to augment drilling and ensure proper consistency of drilling muds for maintaining well control during the drilling process. The fresh water would be obtained from approved commercial water sources and trucked to the new wells as needed. Simultaneous operations (“simops”) would be employed, in which drilling and hydraulic fracturing (fracing) would occur at the same time on the well pads.

During the simops operations, the new wells being completed or fraced would have equipment featuring the mixing of recycled water, sand and chemicals and the engines providing the high pressures needed for the completions being staged on a nearby pad with surface steel pipelines laid between the pads delivering pressurized water to the wells and returning flowback water generated from the completed wells. The RU 23-5 pad would be the remote frac location for the RU 21-8 wells, and the RU 42-7 pad would function as the remote frac location for the RU 44-7 wells and the RU 34-6 wells. The existing RU 14-6 pad would be expanded to serve as a remote frac pad for the RU 13-6 wells and a centralized tank facility for nearby pads. A 10-inch poly water line would be laid on the surface between the existing 11-7-793 Water Storage Facility and the RU 14-6 pad to deliver water supporting the RU 13-6 well completions.

The 11-7-793 Water Storage Facility, permitted on private land by COGCC, would continue to provide water storage for well completions with water delivery and flowback occurring through WPX’s existing Flatiron Mesa water pipeline system. WPX’s water pipeline infrastructure between Flatiron Mesa and its valley water treatment facilities would continue to deliver and collect water without using truck transports. Oil truck transports would periodically haul condensate developed from the wells and stored in the various tanks within the Flatiron Mesa area to off-site processing facilities.

New roads would be built to the proposed RU 21-8 and RU 44-7 pads. New gas gathering, water collection, and liquid condensate lines would be collocated and buried alongside the roads to all pads except the existing RU 34-6 pad, which has available pipeline infrastructure. These pipelines would be authorized by amending the existing ROW grants. Installation, use, and maintenance of the new water and oil line connections serving the RU 21-8, RU 13-6, and RU 14-6 pads would be granted under existing ROW grant COC76418 for a WPX waterline.

Summit Midstream Partners LLC (“Summit”), doing business as Red Rock Gathering LLC for this project, purchased the Energy Transfer Corporation (ETC) natural gas pipeline system in 2011,

including contracts to gather natural gas produced by WPX in the Flatiron Mesa area. As a third-party gas gathering provider, Summit would be granted a ROW amendment (COC76417) for constructing, operating, and maintaining the proposed gas gathering lines and connecting those lines to its existing gathering system.

Under the Proposed Action, if approved, WPX could implement all or any combination of the following Flatiron Mesa Phase 2 developments (Figure 3):

- Construct 0.26 mile of new road and the new RU 44-7 fee pad to drill nine Federal and six fee wells.
- Drill 14 Federal wells from the existing RU 34-6 BLM pad.
- Construct 0.18 mile of new road and the new RU 21-8 BLM pad to drill 35 Federal wells.
- Expand the existing RU 13-6 BLM pad and drill 21 Federal wells.
- Expand the existing RU 14-6 BLM pad to conduct remote fracing for the RU 13-6 wells and store fluids in a new centralized tank facility.
- Use the existing RU 42-7 fee pad for remote fracing support for the RU 44-7 wells and RU 34-6 wells, including 1.17 miles of surface frac lines between the pads.
- Use the existing RU 23-5 BLM pad for remote fracing support for the RU 21-8 wells, including 0.61 mile of surface frac lines between the pads.
- Use the existing RU 14-6 BLM pad for remote fracing support for the RU 13-6 wells, including 0.19 mile of surface frac lines between the pads.
- Install 0.33 mile of 10-inch surface poly water delivery line from the 11-7-93 Water Storage Pit to the RU 14-6 pad to provide water for RU 13-6 remote fracing.
- Install 0.46 mile of new 4-inch buried water collection line and 2-inch buried condensate delivery line (to be collocated with the Summit 8-inch gas pipeline) from the RU 44-7 pad to the new RU 42-7 tank facility, occurring entirely on private land and not needing BLM authorization.
- Install 0.21 mile of new 6-inch buried water collection line (to be collocated with the Summit 8-inch gas pipeline) from the RU 21-8 pad to a connection point with the main gather water line, authorized under ROW grant COC76418, with WPX as the holder and operator.
- Install 0.20 mile of new 6-inch buried water collection line and 2-inch buried condensate delivery line (to be collocated with the Summit 8-inch gas pipeline) from the RU 13-6 pad to the new RU 14-6 tank facility, authorized under ROW grant COC76418, with WPX as the holder and operator.
- Install 0.21 mile of new 6-inch buried water line connection (to be collocated with the Summit 8-inch gas pipeline) from the RU 14-6 tank facility south along the access road to the main buried gas and water gather pipelines on private land in Section 7, authorized under ROW grant COC76418, with WPX as the holder and operator.
- Install 0.21 mile of a second new 4-inch buried water line connection (to be partially collocated with the Summit 8-inch gas pipeline along the shared segments) from the RU 14-6 tank facility south along the access road to the existing RU 22-7 fee pad in Section 7, for the purpose of gathering the produced water generated from the fee wells on the RU 22-7 pad and delivering the produced water to a separate tank staged at the RU 14-6 tank farm. The segment of new buried water line across BLM would amend ROW grant COC76418, with WPX as the holder and operator.
- Install production equipment with radio telemetry capability, primarily consisting of gas meters, storage tanks, and multi-well separator units and vapor combusters on the four well pads.
- Conduct interim reclamation on each pad after all of the wells are in production.

Under the Proposed Action, if approved, Summit, as the third-party gas gathering company, could implement all or any combination of the following Flatiron Mesa Phase 2 developments (Figure 3):

- Install 0.46 mile of new 8-inch buried welded steel natural gas pipeline (to be collocated with WPX production water and condensate lines in the same trench) alongside the access road from the RU 44-7 pad to the existing RU 42-7 gas line connection, occurring entirely on private land and not needing BLM authorization.
- Install 0.21 mile of new 8-inch buried welded steel natural gas pipeline (to be collocated with a WPX production water line in the same trench) from the RU 21-8 pad to a connection point with the RU 23-5 gas gathering pipeline, authorized under ROW grant COC76417, with Summit as the holder and operator.
- Install 0.41 mile of new 8-inch buried welded steel natural gas pipeline (to be partially collocated with WPX production water and condensate lines in the same trench) from the RU 13-6 pad to a connection point with the primary Flatiron Mesa gas gathering pipeline near the boundary between Sections 6 and 7, authorized under ROW grant COC76417, with Summit as the holder and operator.

Although not a specific component of the Proposed Action, the existing RU 22-7 pad located on private land could be further developed with new fee wells authorized under COGCC authority. The produced water generated from the existing and new fee wells slated for this pad would be delivered to the tank farm staged on the RU 14-6 pad through a new buried water line authorized under ROW grant COC76418 for the 0.40-mile pipeline segment across public land (Figure 3).

General Considerations

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

During pad construction, topsoil would be stripped during the initial earthwork and windrowed, where feasible, around the outer edge of the disturbance perimeter to serve as storm water diversions and catchments. Topsoil would remain windrowed and temporarily seeded until interim reclamation is scheduled after all of the wells on each pad are placed into production. During road and pipeline construction, topsoil would be segregated along both sides of the road or along one edge of the pipeline corridor for later placement back onto the reclaimed right-of-way.

New road construction would occur within an average 35 foot wide disturbance corridor. The access roads would have a 20-foot running surface with additional width for drainage ditches and occasional turnouts. The pipeline disturbance corridor would be 50 feet, located along an access road, effectively allowing expansion of the pipeline work into the roadway if necessary.

Construction of pads, roads, and pipelines would follow the guidelines established in the BLM Gold Book, *Surface Operating Standards for Oil and Gas Exploration and Development* (USDI and USDA 2007). The new access roads would be graveled to ensure all-weather accessibility to the pad sites; existing roads would undergo review for spot-graveling needs. A road maintenance program would be required during the production phase of the wells. This program would include, but not be limited to blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion occur. Roads would be maintained in a safe and usable condition.

A closed-loop drilling system would be used during drilling, eliminating the need for a fluid-containing reserve pit. Recovered drilling fluid would be stored on location in steel tanks for reuse. Drill cuttings would be collected from the drill rig shaker system, mixed with drying agents, and deposited in the cuttings trench or piled on location against the cut slope for later burial during interim reclamation. The

cuttings would be tested and remediated per COGCC regulations (Table 910-1 standards) prior to reshaping for interim reclamation. The drilling plan includes the use of a self-contained flare unit to restrict venting.

The proposed directional wells would target fluid minerals within the Mesaverde and Williams Fork formations. The reasonable productive life of a gas well completed in the Wasatch and Mesaverde formations is approximately 30 to 35 years.

To eliminate physical impediments to drill-seeding the reclaimed pipeline corridor and to mitigate the visual impact of freshly excavated boulders in the right-of-way, a Condition of Approval (COA) would require removal of concentrations of boulders from flatter portions of the pipeline corridors. All pipelines, whether buried or laid on the surface, would be tested with air compressed from the atmosphere.

The Proposed Action was designed after several early coordination meetings between WPX and BLM, during which various resource concerns were identified and addressed. For example, the pads located on BLM surface were placed and designed to minimize surface disturbance to sensitive plants on Flatiron Mesa.

The Proposed Action would be implemented consistent with the Federal oil and gas leases, 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 COAs to be implemented as mitigation for this project. The operator would be responsible for continuous inspection and maintenance of the access roads, pads, and pipelines.

Activities within the City of Rifle Beaver Creek Watershed

A considerable portion of the Proposed Action would occur within the City of Rifle's Beaver Creek municipal watershed, including use of the existing RU 34-6 pad; construction of the RU 44-7 pad, pipeline, and access road; expansion of the RU 13-6 pad and new pipelines; and expansion of the RU 14-6 frac pad/tank facility and associated new pipelines. These components represent a total of 27.8 acres within the Rifle watershed. Total surface disturbance associated with WPX developments within the watershed are 103.33 acres, of which 33.5 acres has occurred on BLM land. All oil and gas operations within the Rifle watershed—including projects by WPX, Summit Midstream, Encana Oil and Gas (USA) Inc., and Piceance Energy LLC—total 191.4 acres of surface disturbance (Figure 4). This total represents 3.9% of the entire Beaver Creek municipal watershed area of 4,897 acres, of which 687 acres is on BLM land. It should be noted that the large bulk of the City's water is from the Colorado River watershed.

BLM recently approved a Sundry Notice authorizing WPX to install a new 24-inch-diameter culvert with gated inlet in the ephemeral drainage along the RU 13-6 access road. The purpose of the gated culvert is to enable WPX to close off and delay any spills of contaminants within the Beaver Creek municipal watershed. WPX has installed two similar gated culverts on private land to provide a short-term barrier, thereby increasing response capabilities following a spill.

Details of Proposed Surface Disturbance

New Construction for RU 44-7 Pad. The proposed RU 44-7 well pad, access road, and ancillary buried pipelines would be located on private surface. To construct the pad, the maximum cut would be 20.1 feet and maximum fill would be 18.0 feet, resulting in 6.04 acres of short-term disturbance and 0.90 acre of long-term surface impact (Figure 5a).

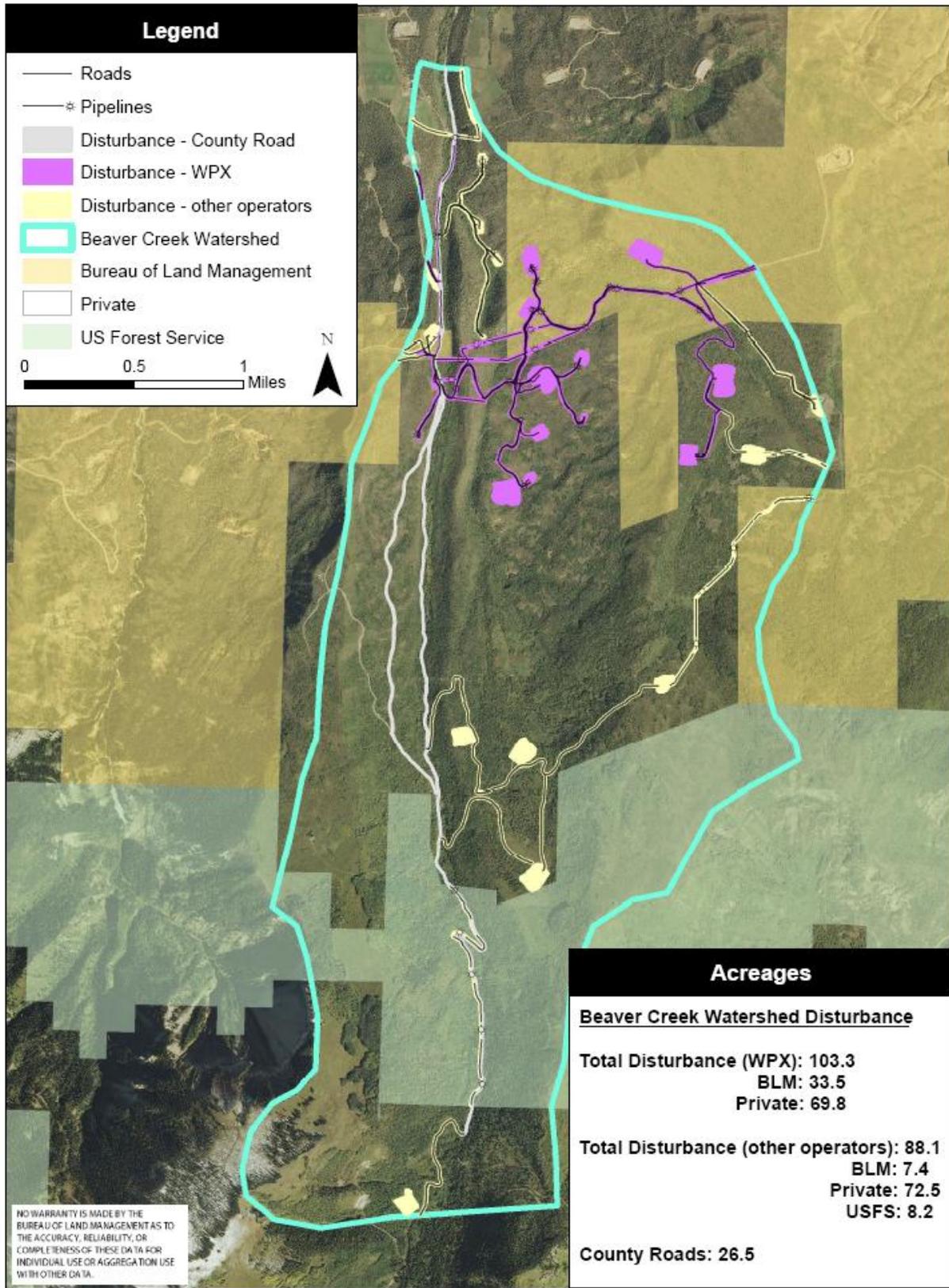


Figure 4. Surface Disturbance within City of Rifle’s Beaver Creek Watershed

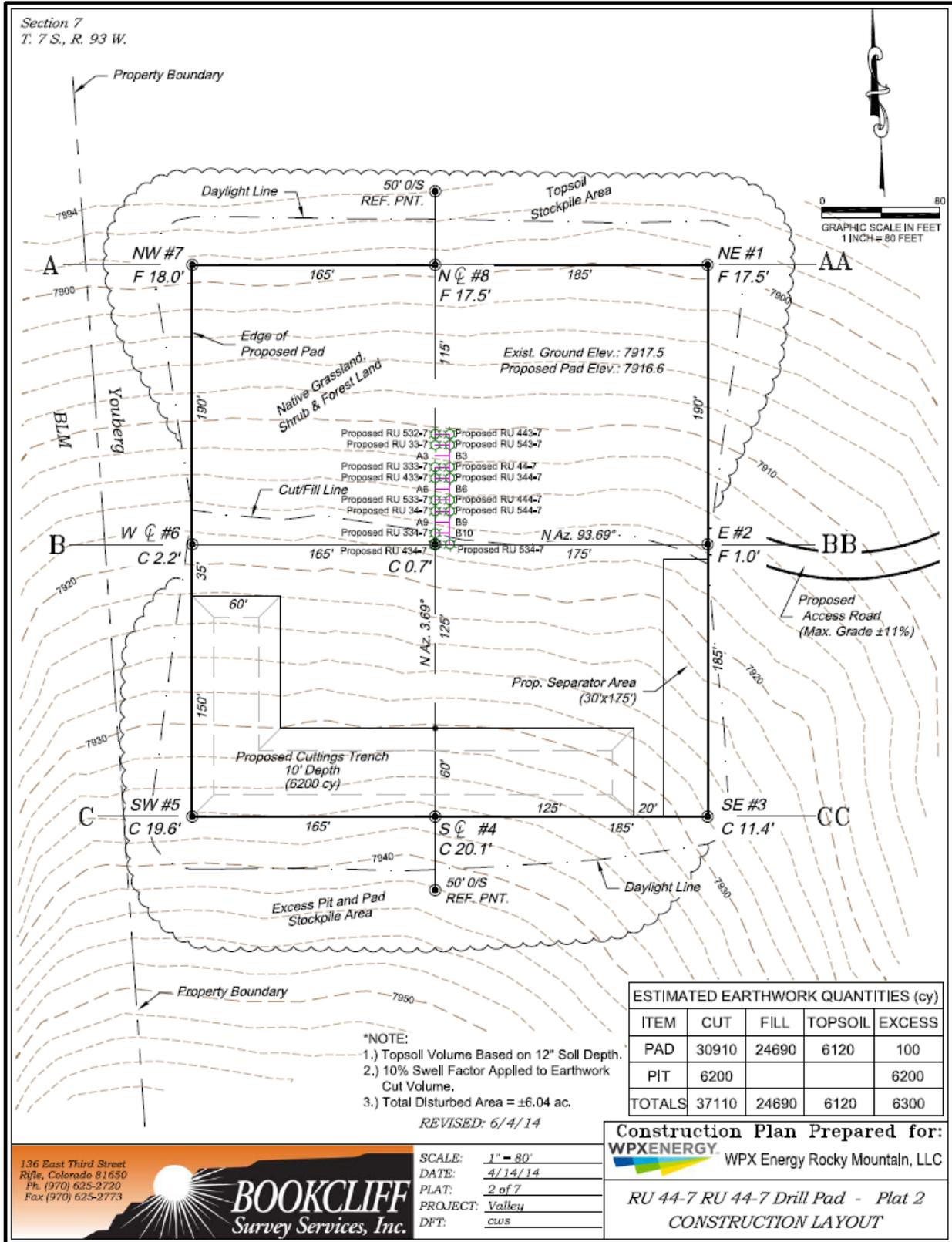


Figure 5a. RU 44-7 Pad Construction Layout

Length of new road would be 1,391 feet (0.26 mile), connecting to an existing road that serves WPX's RU 42-7 pad and a nearby Piceance Energy pad. Natural gas, water, and oil pipelines would be collocated in a buried trench along the new access road between the RU 44-7 and RU 42-7 pads (Figure 5b). Separators would remain on the RU 44-7 pad, but fluids generated from the wells would be piped to an existing tank farm located on the nearby RU 42-7 pad. The new road and 50-foot-wide pipeline corridor would amount to 4.01 acres of short-term disturbance and 0.86 acre of long-term impact. Total disturbance, occurring entirely on private land, would be 10.05 acres short-term and 1.76 acres long-term.

Existing RU 34-6 Pad. The RU 34-6 pad on BLM, representing 2.52 acres of existing disturbance with five producing wells, would be redisturbed with 3.14 acres within the 2010 pad footprint to create the space needed for the planned 14 Federal wells (Figure 6a). Total disturbance would be 5.66 acres short-term and 2.52 acres long-term. Existing production equipment settings, access road, Summit gas pipeline, and WPX buried water lines are adequate to support the new wells (Figure 6b).

New Construction for RU 21-8 Pad. The proposed RU 21-8 pad, access road, and buried pipelines would be located on BLM surface. The proposed pad and road placement were shifted during project planning to minimize loss of Harrington's penstemon plants. Pad construction would create 8.05 acres of new disturbance short-term and 1.60 acres long-term (Figure 7a). The new road and pipelines, including an ancillary tank battery situated off-pad along the access road, would be 950 feet (0.18 mile) in length (Figure 7b). The new road, combined with the adjacent 50-foot-wide pipeline corridor would result in 2.09 acres of short-term impact, while the road would represent 0.59 acre of long-term impact. Total disturbance, entirely on BLM land, would be 10.14 acres short-term and 2.19 acres long-term.

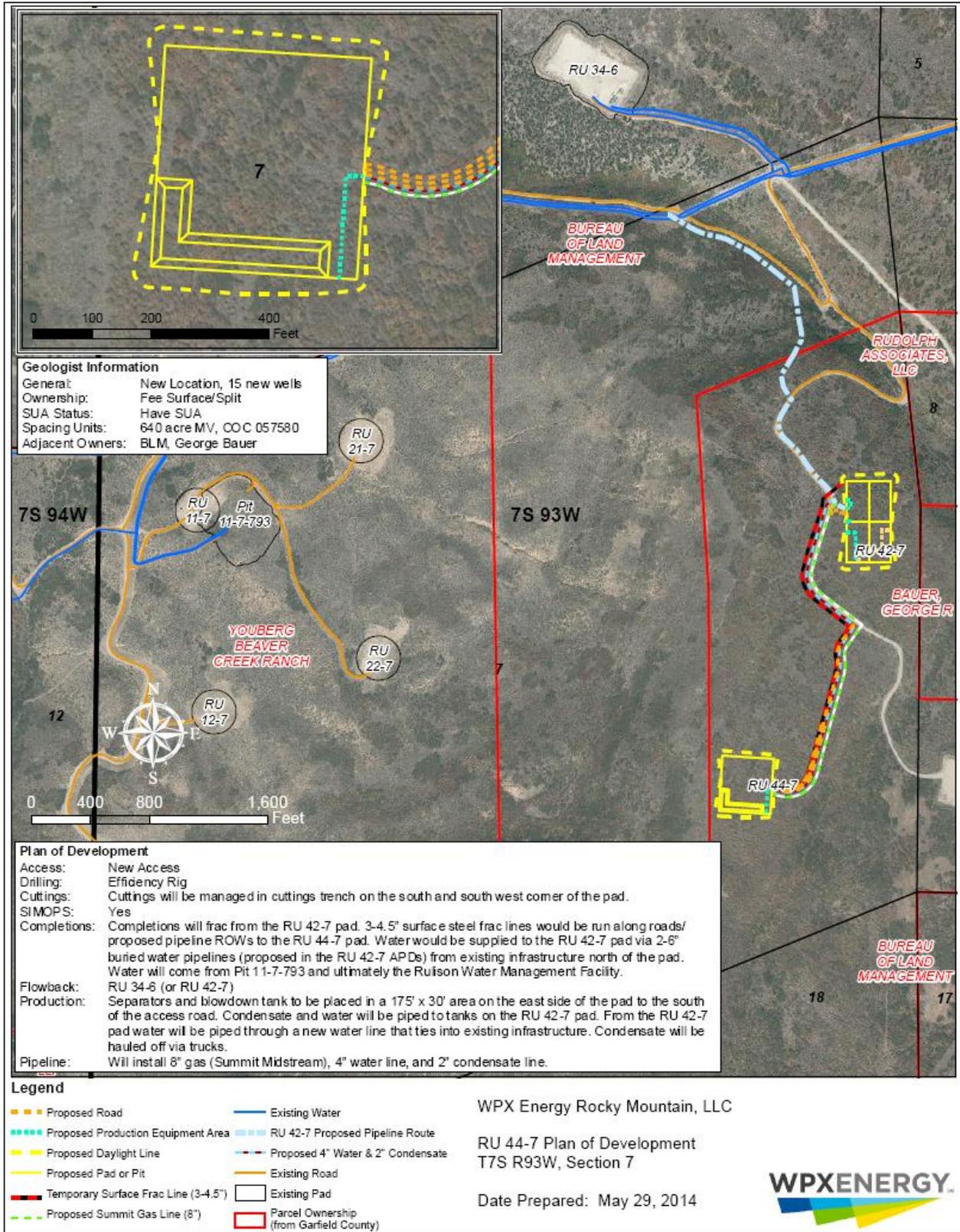
Existing RU 13-6 Pad Expansion. The reclaimed RU 13-6 pad would be expanded entirely on BLM, including 0.45 acre of existing disturbance, 1.45 acres of redisturbance, and 4.15 acres of new disturbance for a short-term impact of 6.05 acres (Figure 8a). Production equipment supporting the RU 13-6 wells would be staged south of the pad in a separate battery adjacent to the road (Figure 8b). The existing road would continue to serve the pad, but gas and water pipeline upgrades would result in 2.33 acres of additional short-term disturbance within the 50-foot corridor. Total impacts would be 8.38 acres short-term and 1.69 acres long-term.

Existing RU 14-6 Frac Pad and Tank Farm Expansion. The reclaimed RU 14-6 pad would be expanded entirely on BLM, with 0.77 acre of existing disturbance, 1.29 acres of redisturbance, and 1.65 acres of new disturbance for a short-term pad impact of 3.71 acres (Figure 9a). After support of well completions for the RU 13-6 pad are finished, the RU 14-6 pad would be reclaimed to a 1.14 acre long-term footprint and continue to serve as a tank battery for nearby wells (Figure 9b).

RU 42-7 Pad and RU 23-5 Pad Existing Remote Frac Locations. Since the existing RU 42-7 pad would continue to serve as a remote frac location during well completions on the RU 44-7 and RU 34-6 pads, the short-term footprint of 7.63 acres would remain into 2016 before being reclaimed to a long-term footprint of 1.65 acres. Disturbance for the RU 42-7 pad was initially analyzed in the 2009 FMMDP and is therefore not re-analyzed in this document.

Similarly, the RU 23-5 pad, currently undergoing drilling of 40 wells as analyzed in the 2009 FMMDP and follow-up 2013 EA, would be used to support fracing on the RU 21-8 pad. This would delay interim reclamation until 2016, at which time the 10.74-acre footprint would be reduced to 1.76 acres.

Collocated Buried Pipelines. Summit's installation of new buried 8-inch diameter welded steel natural gas pipelines shall be accomplished with the collocation of the planned segments of WPX's 6-inch or 4-inch produced water lines and/or 2-inch condensate lines. The disturbance estimates for these buried collocated pipeline installations was addressed in the above-listed pad descriptions and shown in Table 3.



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Figure 5b. RU 44-7 Project Plan of Development

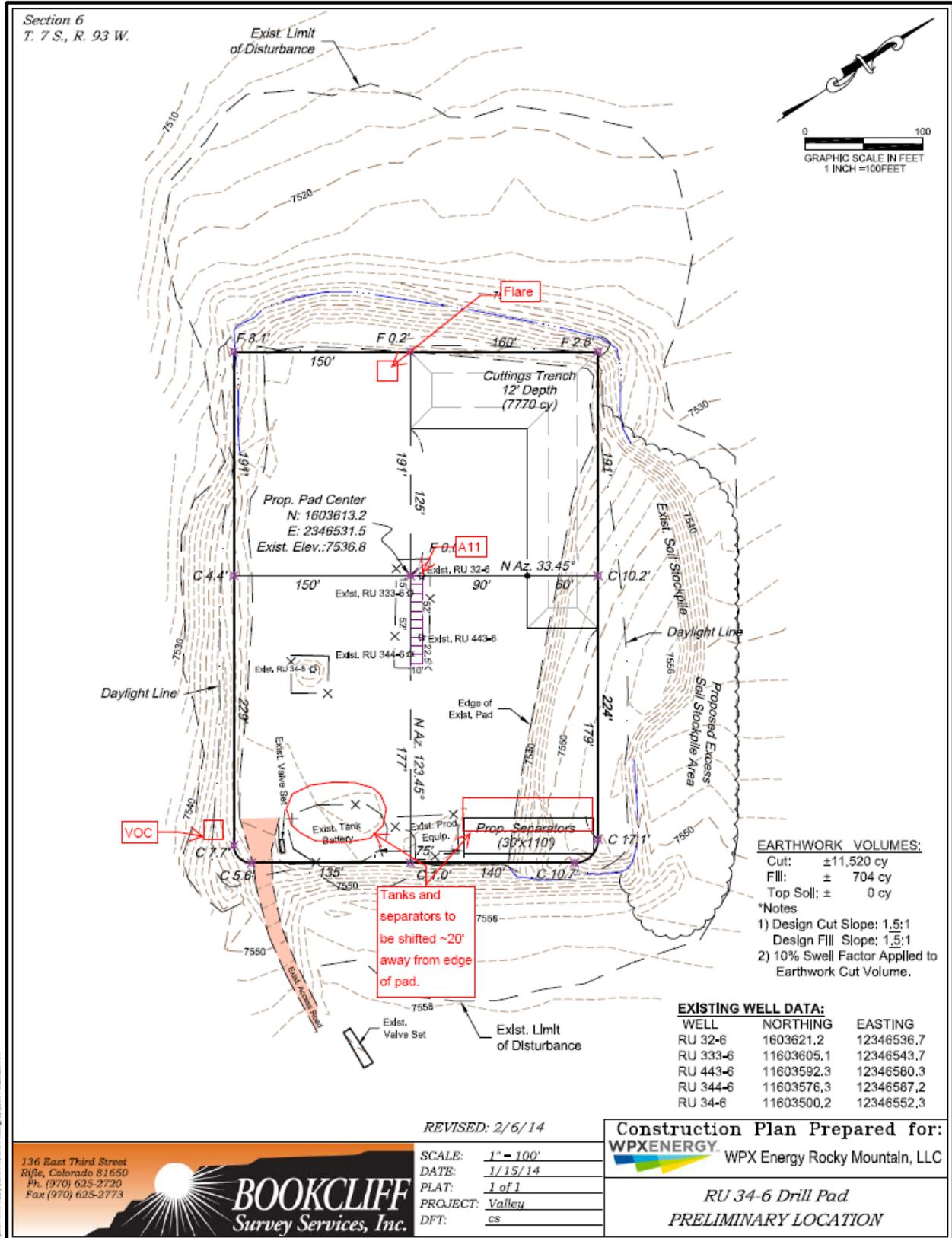
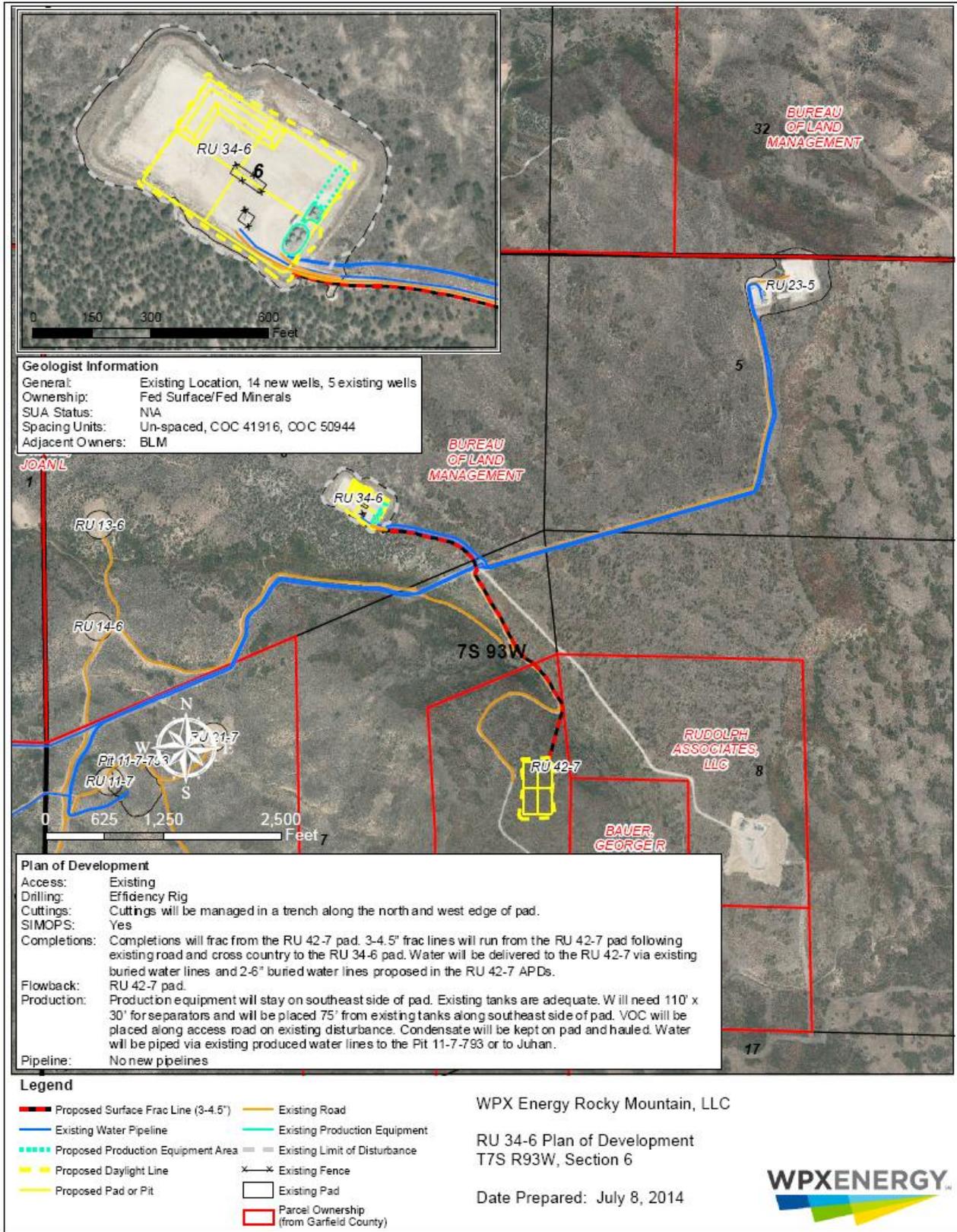


Figure 6a. RU 34-6 Pad Construction Layout



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Figure 6b. RU 34-6 Project Plan of Development

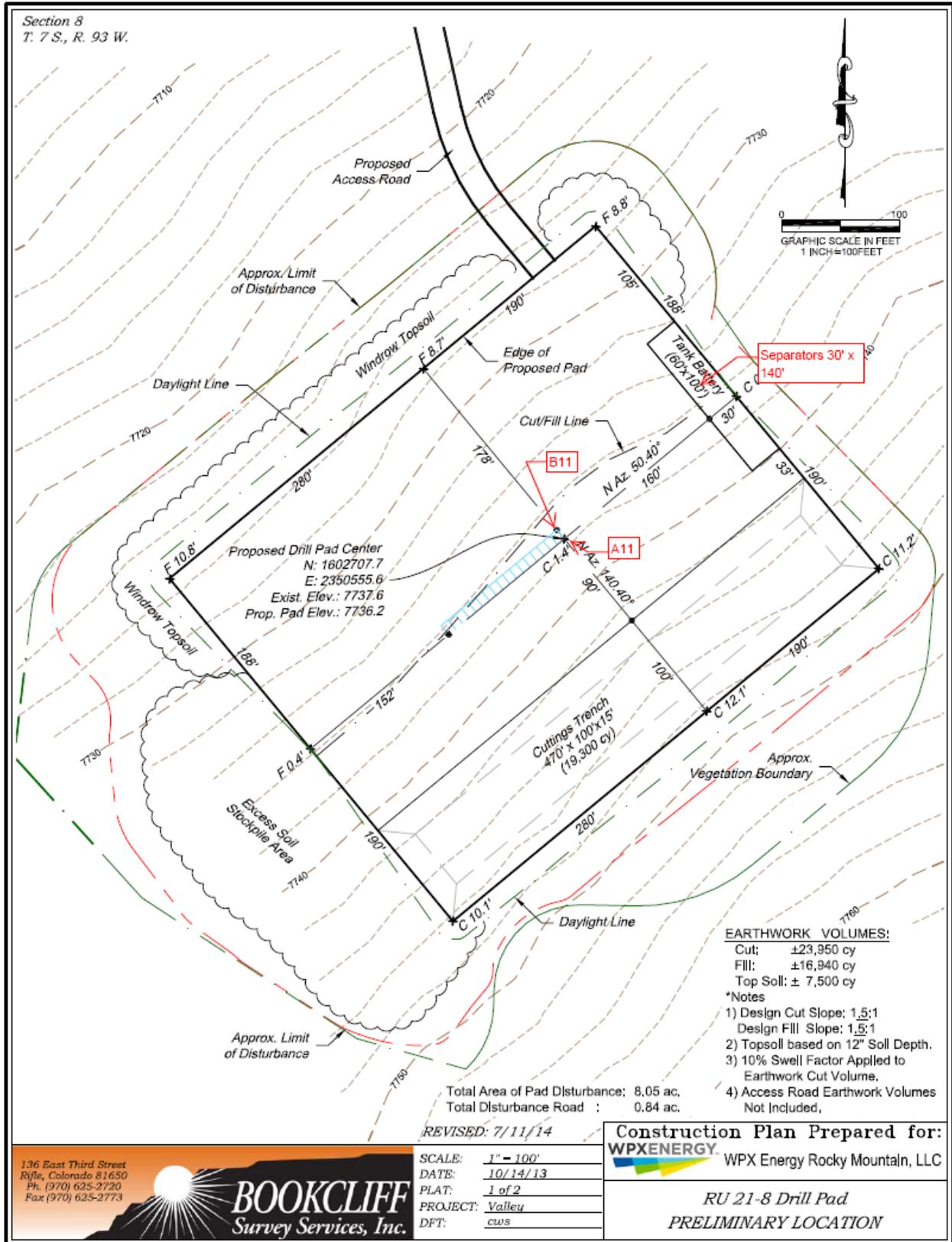
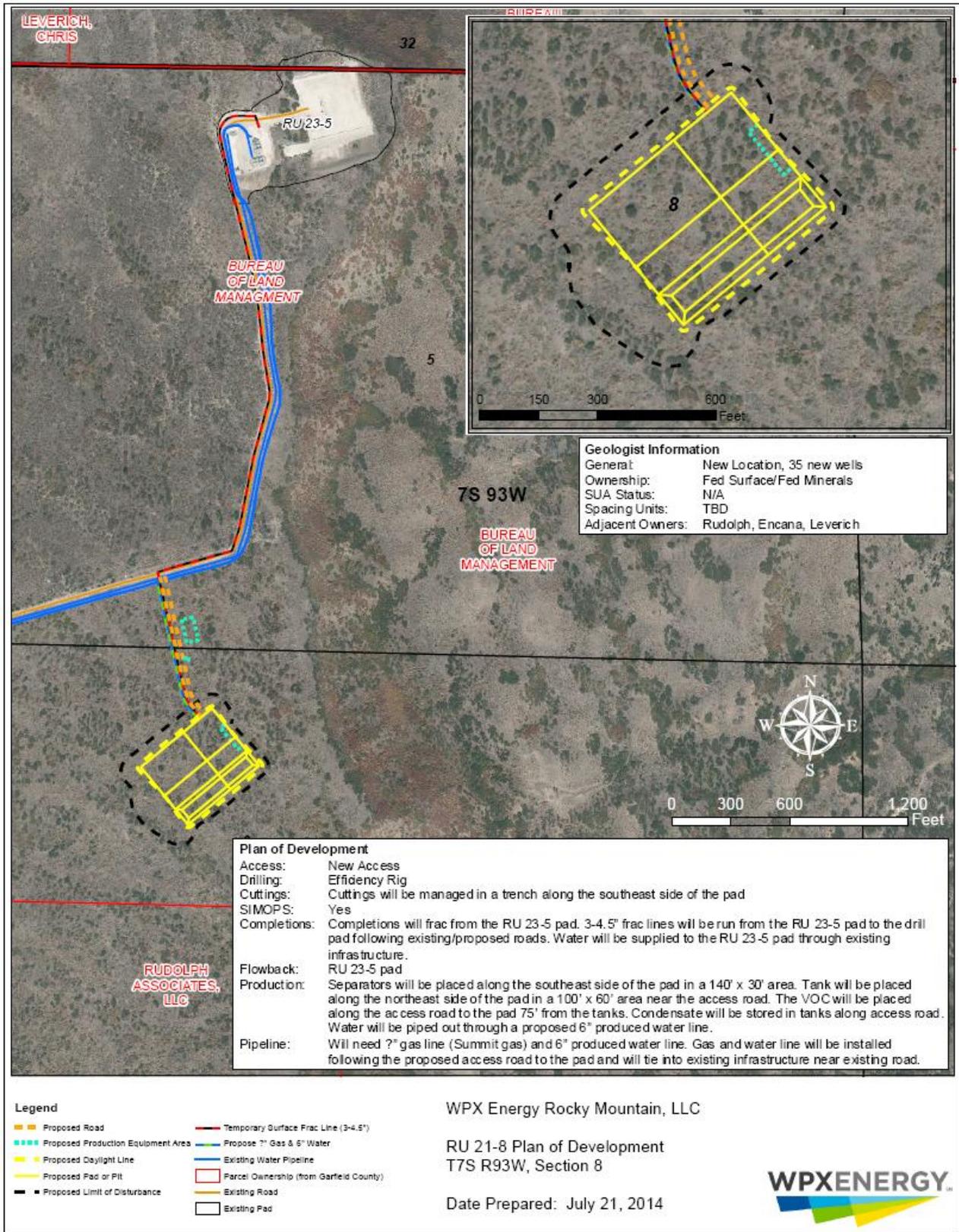


Figure 7a. RU 21-8 Pad Construction Layout



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Figure 7b. RU 21-8 Project Plan of Development

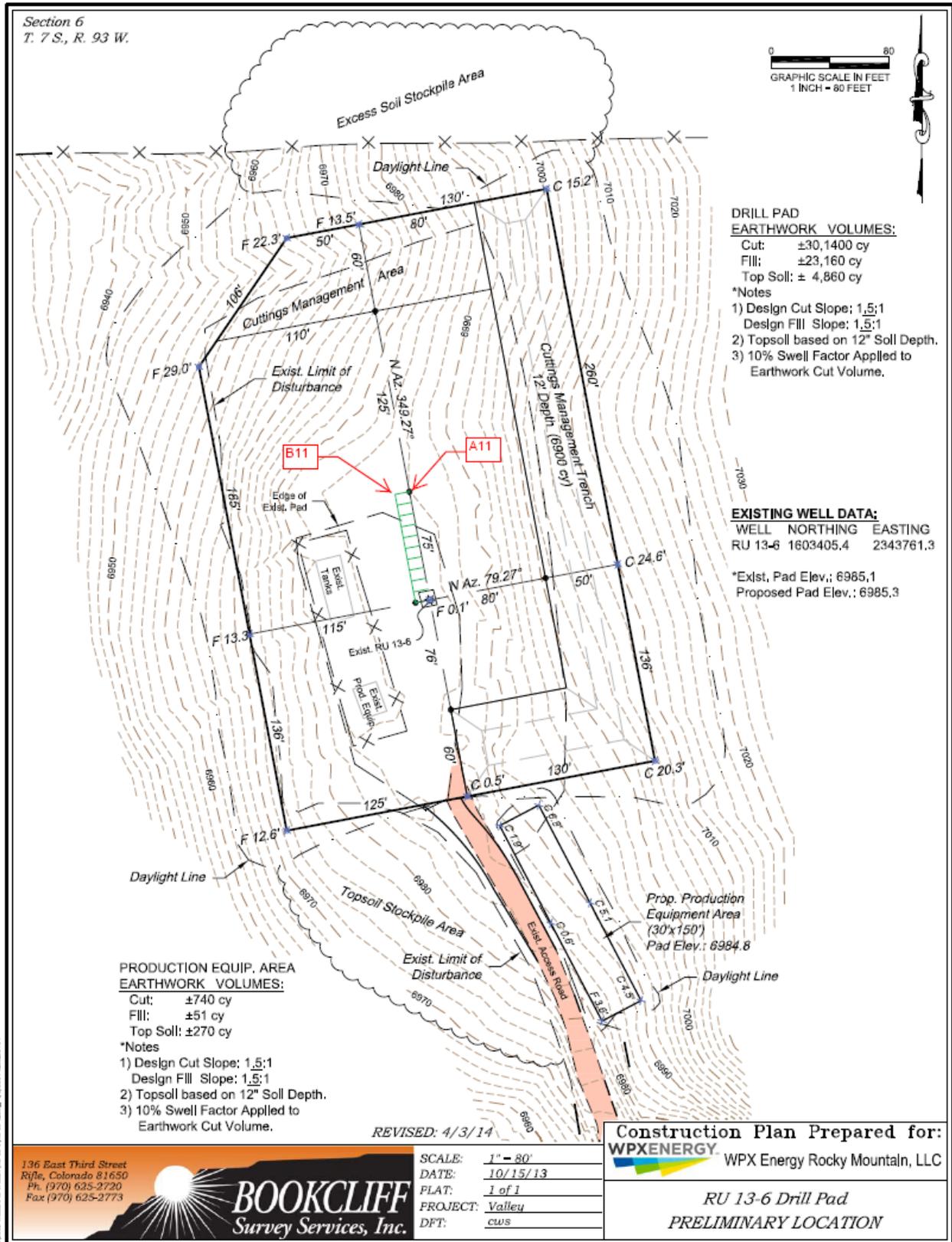
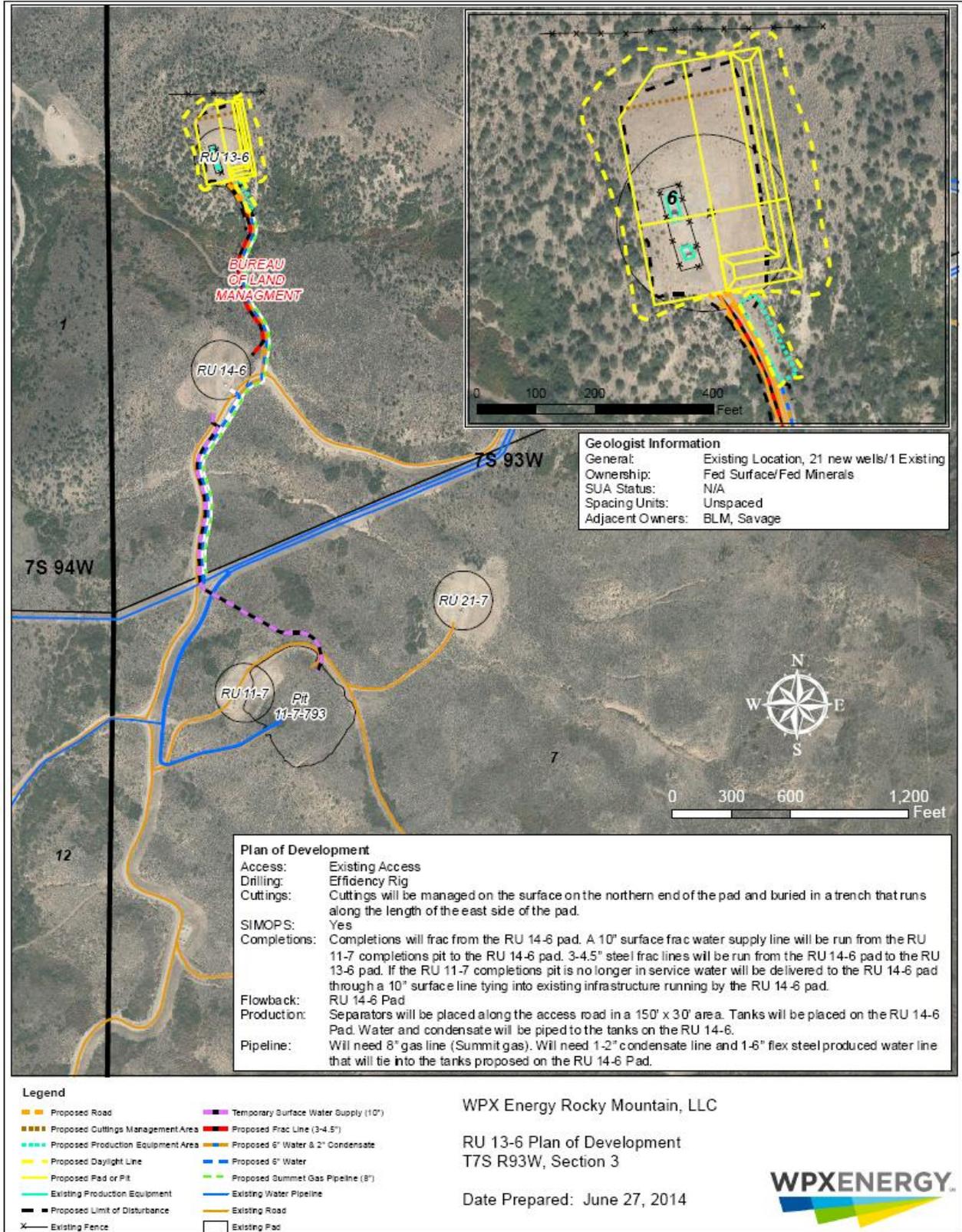


Figure 8a. RU 13-6 Pad Construction Layout



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Figure 8b. RU 13-6 Project Plan of Development

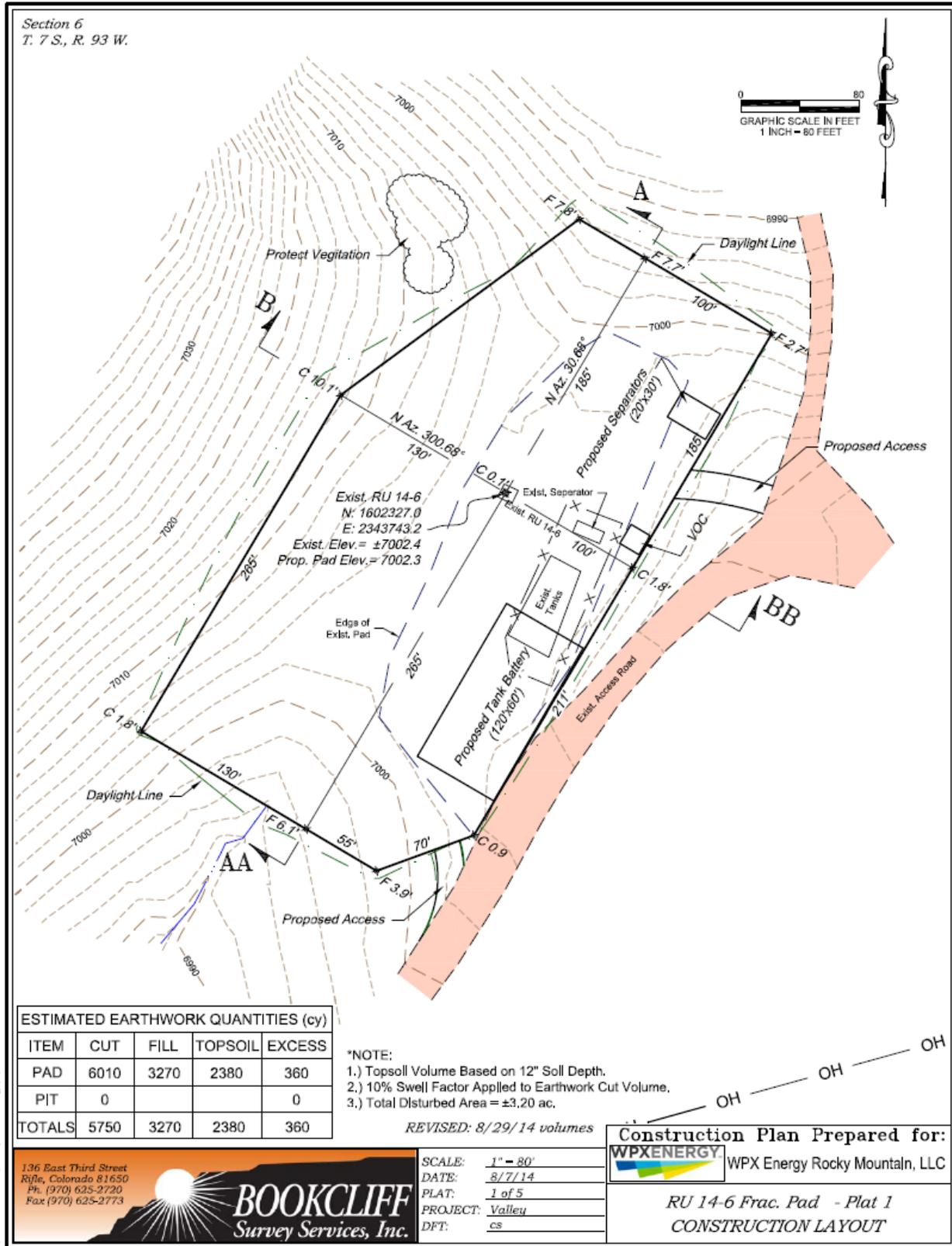


Figure 9a. RU 14-6 Frac Pad Construction Layout

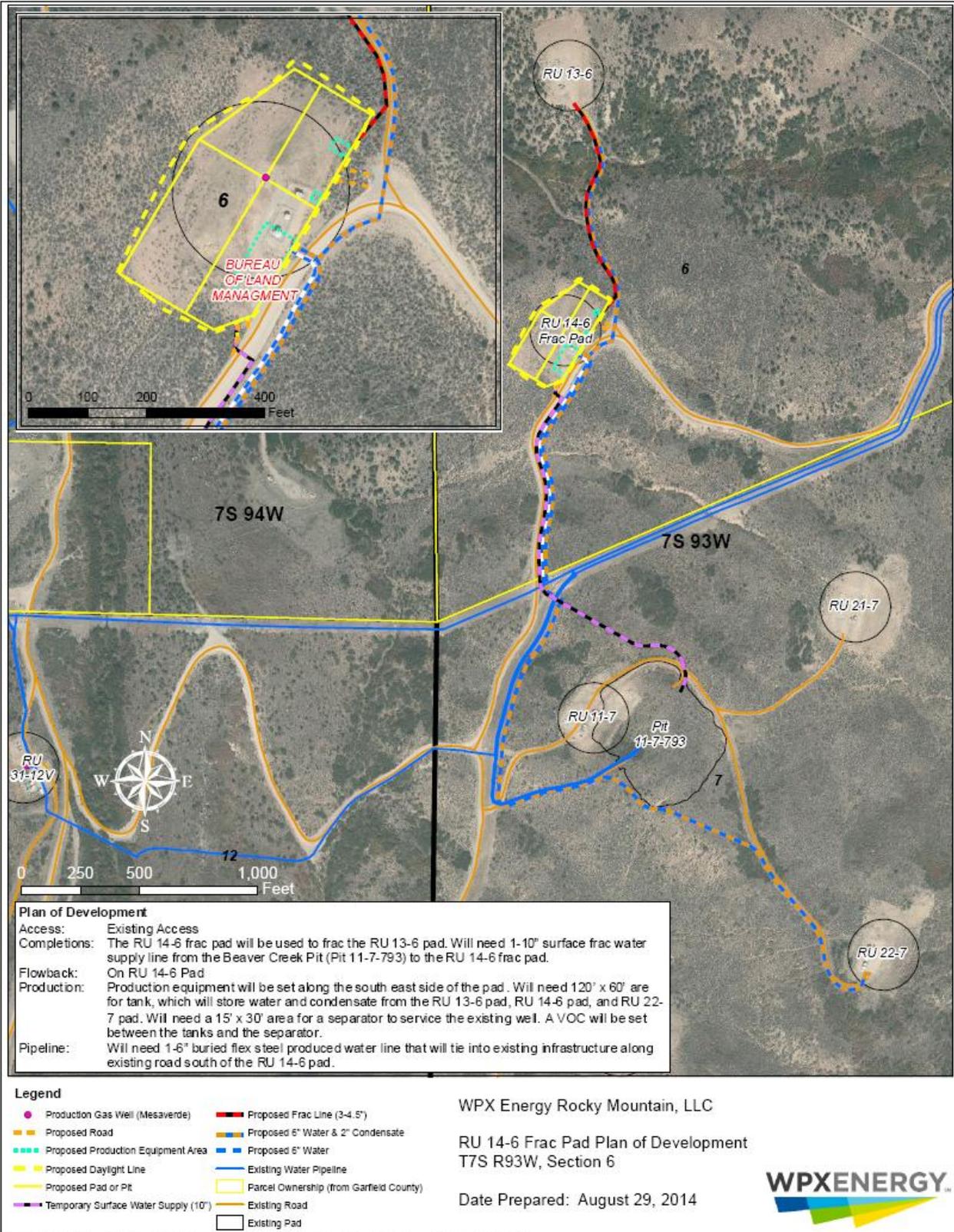


Figure 9b. RU 14-6 Project Plan of Development

Surface Frac Support Lines. No disturbance estimate would be allocated to the various 4½-inch welded steel high-pressure lines or the 10-inch fused poly pipelines since the lines would be laid on the ground surface, generally alongside existing roads or within road corridors. Resource surveys conducted along the proposed alignments for these surface lines resulted in changes to avoid impacts.

Summary of Proposed Project Disturbance

As shown in Table 3, the project would create a total short-term disturbance of 37.94 acres, with 27.89 acres occurring on BLM and 10.05 acres occurring on private land. Long-term disturbance for the project would amount to 9.30 acres, with 7.54 acres occurring on BLM and 1.76 acres on private land when the reclaimed areas satisfy BLM’s reclamation standards identified in the COAs (Appendix).

Proposed pad expansion or construction would total 23.47 acres of short-term disturbance on BLM land, with another 6.04 acres on private land. After interim reclamation, the combined pad area would be reduced to 6.95 acres on BLM and 0.90 acre on private over the life of the producing wells. The road improvements would disturb 2.05 acres during construction, reduced to 1.45 acres of road surface and associated ditches over the long term. Short-term disturbance estimates for the buried gas, produced water, and condensate (oil) gathering systems presented in this project would be 6.38 acres, with 3.58 acres on BLM and 2.80 acres on private land.

Table 3. Disturbance Associated with Well Pads, Roads, and Ancillary Facilities (acres)					
<i>Proposed Action Components on BLM</i>	<i>Short-term Disturbance</i>			<i>Long-term Disturbance</i>	
	<i>Pads</i>	<i>Roads</i>	<i>Pipelines</i>	<i>Pads</i>	<i>Roads</i>
RU 34-6 Existing Pad	5.66			2.52	
RU 21-8 Pad Construction	8.05	0.84	1.25	1.60	0.59
RU 13-6 Pad Expansion	6.05		2.33	1.69	
RU 14-6 Frac Pad/Tanks	3.71			1.14	
<i>BLM Disturbance subtotals</i>	23.47	0.84	3.58	6.95	0.59
<i>Disturbance Impacts on BLM Land</i>	27.89 acres			7.54 acres	
<i>Proposed Action Components on Private</i>	<i>Short-term Disturbance</i>			<i>Long-term Disturbance</i>	
	<i>Pads</i>	<i>Roads</i>	<i>Pipelines</i>	<i>Pads</i>	<i>Roads</i>
RU 44-7 Pad Construction	6.04	1.21	2.80	0.90	0.86
<i>Disturbance Impacts on Private Land</i>	10.05 acres			1.76 acres	
<i>Total Disturbance Impacts</i>	29.51	2.05	6.38	7.85	1.45
<i>Summary of Impacts</i>	37.94 acres			9.30 acres	

NO ACTION ALTERNATIVE

Under the No Action Alternative, one private well pad (RU 44-7), six new fee wells, and the associated buried and collocated natural gas, produced water, and liquid condensate pipelines would still be implemented on private land without any further Federal authorizations. Existing ROW grants already authorize vehicle travel across BLM roads to the RU 44-7 fee pad and the gathering of natural gas serving the RU 44-7 fee wells through existing buried pipelines crossing BLM land. Drilling and completion

impacts of the six fee wells would be approximately 7% of the drilling and completion impacts analyzed under the Proposed Action, assuming such impacts are proportional when compared to the 85 wells included in the Proposed Action.

Table 1 lists 58 operating wells related to the original FMMDP pads plus one producing well each on the RU 13-6 and RU 14-6 pads. Operations of the 60 producing Federal wells drilled since approval of the 2009 FMMDP would continue to occur under, including the related travel, noise, air quality, water quality, and wildlife impacts associated with such operations over the next 25 to 30 years.

PURPOSE AND NEED FOR THE ACTION

The purpose of the Proposed Action is to develop oil and gas resources on Federal Leases COC41916 and 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 79 Federal wells would be directionally drilled into underlying Federal mineral estate from one existing BLM pad, one BLM pad proposed for expansion, one new BLM pad and one new pad located on private land. Table 4 provides a summary of the applicable Federal lease terms. The Appendix lists site-specific conditions of approval (COAs) developed during the APD/EA review and onsite field consultation that would be attached to the Federal APDs.

Table 4. Lease Stipulations Applicable to the Proposed Action		
<i>Lease Number and Pads</i>	<i>Description of Lands</i>	<i>Stipulations</i>
COC41916 (1986) <u>Existing RU 23-5 Pad</u> <u>Existing RU 34-6 Pad</u> <u>New RU 21-8 Pad</u> <i>Winter TL of 1/16 to 4/29 applies to operations based n BLM ROW TL</i>	T6S R93W Section 32: ALL T7S R93W Section 5: Lots 1, 2, S2	Timing Limitation: Seasonal Wildlife (Big Game Winter) Habitat (1/16 to 4/29). Limitation does not apply to maintenance and operation of producing wells. Exceptions may be specifically approved by the BLM Field Manager.
	T7S R93W Section 6: SE4	No Surface Occupancy: Although the lease indicates an NSO, it provides no rationale for the stipulation. However, a review of the 1999 GSFO Supplemental Oil & Gas Environmental Impact Statement (OGSEIS, BLM 1999b) reveals an established NSO for Domestic Watershed Areas, in particular the Rifle municipal watershed within the stated legal descriptions. As such, the 1999 stipulation would be applied. Exception criteria state: Activity may be permitted if the BLM determines, in consultation with the community of Rifle, that the applicant’s proposal would produce only a negligible decrease in water quality.
COC50944 (1990) <u>Expanded RU 13-6 Pad</u> <u>Expanded RU 14-6 Pad</u>	T7S R93W Section 6: Lots 4, 5, 8, 9, E½SW¼ Section 7: Lots 5-9 Section 17: W½	No Surface Occupancy: No surface-use is allowed for the purpose of protecting Critical Watershed Areas, presumably within the boundary of City of Rifle Municipal Watershed. See NSO note above with exception criteria from 1999 OGSEIS (BLM 1999b).

Table 4. Lease Stipulations Applicable to the Proposed Action		
<i>Lease Number and Pads</i>	<i>Description of Lands</i>	<i>Stipulations</i>
<i>Winter TL of 1/16-4/29 applies to operations based on BLM ROW TL</i>	Section 17: W½ T7S R93W Section 6: Lots 6, 7	Timing Limitation: Seasonal Wildlife (Big Game Winter) Habitat (1/16 to 4/29) Limitation does not apply to maintenance and operation of producing wells. Exceptions may be specifically approved by the BLM Field Manager.

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 was designated as open to oil and gas leasing and development, and Federal oil and gas leases COC41916 and COC50944 was duly issued pursuant thereto. In addition, the 1999 RMP amendment requires multi-year development plans known at that time as Geographic Area Plans (GAPs) for lease development over a large geographic area. The current Phase 2 development project is within the boundary of the Flatiron Mesa Master Development Plan (EA #DOI-BLM-CO-N040-2010-0002) and also meets GAP exception criteria in the 1999 RMP Amendments based on its use of existing pads and location along existing access roads and pipeline infrastructure. Therefore, the Proposed Action is in conformance with the current land use plan.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

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

Access and Transportation

Affected Environment

The Flatiron Mesa project area is accessible from Rifle, Colorado by traveling approximately 5-6 miles southwest on Garfield County Roads (CR) 320 (Rifle-Rulison Road) and CR317 (Beaver Creek Road), then east on a private lease road in the Beaver Creek Drainage. Public motorized access is not available within the project area, since access roads to the area cross private lands. The project area would be accessed by vehicles serving the oil and gas development, including traffic related to construction, drilling, completion, and well production. Minor additional vehicle numbers would be attributed to livestock grazing operations during the summer-fall grazing season.

Traffic use counts are not available for the existing private road accessing the FMMDP area. Its present use would be classified as low with traffic related to accessing the existing Williams and EnCana well pads in the area.

Environmental Consequences

Proposed Action

Garfield County’s preferred County Road haul routes would be used, and WPX would be restricted from using other County roads for heavy loads. The Proposed Action would result in periods of substantial increases in traffic volume on the preferred haul routes, the existing private field development roads, and the newly constructed roads within the project area. The largest increase would be during rig-up, drilling, and completion activities. Data indicate that approximately 1,160 truck trips over a 30-day period would be required to support the drilling and completion of each well (Table 5). Once the wells are producing, traffic would decrease to occasional visits for monitoring or maintenance activities, and hauling produced water and condensate. Each well may have to be recompleted once per year, requiring three to five truck trips per day for approximately 7 days.

Table 5. Traffic Associated with Drilling and Completion Activities		
<i>Vehicle Class</i>	<i>Trips per Well</i>	<i>Portion of Total</i>
16-wheel tractor trailers	88	7.6%
10-wheel trucks	216	18.6%
6-wheel trucks	452	39.0%
Pickup trucks	404	34.8%
Total	1,160	100.0%

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

Increased traffic on County roads may cause temporary conflicts with normal traffic, including travel delays and increased vehicle collision rates. Project traffic would also cause an increase in fugitive dust and noise and an increased risk of collision with wildlife. Degradation of County, private, and BLM roads may occur from heavy equipment, resulting in increased maintenance and safety management. Existing field development roads would be maintained and resurfaced as needed with minimum 6-inch layer of gravel.

The proposed new roads, totaling 2,341 feet (0.44 miles), would be constructed to access the new RU 21-8 pad (950 feet) on BLM and the new RU 44-7 pad (1,391 feet) on private land. The new RU 44-7 access road would fall within the City of Rifle watershed boundary. The new roads would be constructed and graveled to meet standards for the anticipated traffic flow and all-weather requirements. Use of multi-well pads and directional drilling minimizes the need for additional access road construction.

Proposed roads would be constructed within an average disturbance corridor 35 feet wide, reduced to 24 feet of finished road surface (including bar ditches) after interim reclamation. A conventional dozer would be used to clear vegetation and large boulders within the proposed limits of disturbance for the planned roads. Portions of the new road construction could be mowed with a hydro-axe attachment on a trackhoe to reduce the amount of brush and vegetation to be cleared by dozer. Earth-moving equipment would be used to segregate and windrow the topsoil along the edge of the proposed road corridor. The roads would be constructed using standard equipment and techniques as described in the *Surface Operating Standards for Oil and Gas Exploration & Development – The Gold Book* (USDI and USDA 2007). Mitigation measures (Appendix) would be required as conditions of approval for road construction and maintenance operations including, but not limited to dust abatement, ditching, draining, crowning, surfacing, sloping, and dipping the roadbed as necessary. A minimum 6-inch layer of gravel would be applied to the road surface to provide an all-weather travelway.

The average road grade would be 10% or less, except for the RU 44-7 access road which has a steady proposed 12% grade in order to access the new pad. Minimum horizontal curve radii would be 100 feet. Where terrain would not allow a 100-foot curve radius, the curve would be widened. Road construction would result in approximately 2.05 acres of short-term surface disturbance. Following interim reclamation, the long-term surface disturbance associated with roads would be approximately 1.45 acres (Table 3).

No Action

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would therefore result in similar types of impacts from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

Air Quality

Affected Environment

Colorado Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based criteria for the maximum acceptable concentrations of air pollutants in areas of public use. Although specific air quality monitoring has not been conducted within the project area, regional air quality monitoring has been conducted in Rifle and elsewhere in Garfield County. Air pollutants measured in the region for which ambient air quality standards exist include carbon monoxide

(CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ozone (O₃), particulate matter less than 10 microns (µ) in diameter (PM₁₀), and particulate matter less than 2.5 µ in diameter (PM_{2.5}).

The project area lies within Garfield County, which has been described as an attainment area under CAAQS and NAAQS. An attainment area is an area where ambient air pollution quantities are below (i.e., better than) NAAQS standards. Regional background values are well below established standards, and all areas within the cumulative study area are designated as attainment for all criteria pollutants. The Garfield County Quarterly Monitoring Report summarizing data collected at monitoring sites in Parachute, Silt, Battlement Mesa, and Rifle in January through June 2012 (the most recent posting) confirms continuing attainment of the CAAQS and NAAQS (Garfield County 2012). Federal air quality regulations are enforced by the Colorado Department of Health and Environment (CDPHE) under its delegated authority from the U.S. Environmental Protection Agency (EPA) pursuant to the Clean Air Act (CAA).

Federal air quality regulations under the 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 includes using the existing RU 34-6 pad in its present footprint, expanding the existing RU 13-6 pad and the RU 14-6 frac pad, and constructing the new RU 21-8 pad and the RU 44-7 pads to provide safe operating space to drill, complete, and operate 79 Federal wells and six fee wells. These pad improvements would result in 29.51 acres of interim surface disturbance with 7.85 acres of long-term disturbance across the life of the producing wells. Building 0.44 miles of new road to access the RU 21-8 and RU 44-7 pads would result in 2.05 acres of new short-term disturbance and 1.45 acres of long-term impact for the existing roadways. Buried pipelines to gather natural gas, produced water and condensate would result in 6.38 acres of interim disturbance until the pipeline reclamation work satisfactorily reestablished. Total short-term disturbance (37.94 acres) for the project would be comprised of 27.89 acres on BLM and 10.05 acres on private land with corresponding long-term surface impacts (9.30 acres) being 7.54 acres on BLM and 1.76 acres on private (Table 3).

Each well would require approximately 7 to 10 days to drill and 5 to 15 days to complete. Air quality in the project area would decrease during construction of access roads, pads, and pipelines and drilling and

completing the wells 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 $PM_{2.5}$), hazardous air pollutants (HAPs) including BTEX (benzene, ethylbenzene, toluene, and xylenes), formaldehyde, and n-hexane. The modeling also addressed potential impacts on visibility due to particulates and “photochemical smog” (caused by chemical reactions in the atmosphere) and on lake chemistry of selected pristine lakes due to modeled deposition rates of sulfur and resultant impacts on acid neutralizing capacity of the lake waters. The visibility analysis predicted a slight impact (one day per year with a reduction in visibility of 1 deciview or greater) in the Flat Tops Wilderness and no days with 1 deciview or greater reduction in visibility at all other modeled Class I and II receptors. For the remaining pollutants analyzed, modeled levels of future oil and gas development within the CRVFO would have no or negligible long-term adverse impacts on air quality. Since the Proposed Action is within the scope of the future development modeled, no significant adverse impacts on air quality are anticipated.

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

Generation of fugitive dust as a result of construction activities and travel on unpaved access roads would also be reduced by BLM's requirement that the operator apply gravel to a compacted depth of 6 inches on the access road, apply water to the access road during the development phase, and apply a dust suppressant surfactant approved by the BLM throughout the long-term production phase (Appendix). 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 that there are uncertainties regarding how climate change may affect different regions. In 2007, the IPCC also concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (man-made) greenhouse gas concentrations" (NAS 2007). Other theories about the effect of GHGs on global climate change exist.

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 would be no more 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 (EPA 2010).

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The

operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would therefore result in similar types of impacts to air quality from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

Cultural Resources

Affected Environment

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

Six Class III (intensive pedestrian survey) cultural resource inventories (CRVFO# 902, 1175, 1196-4, 1100-5, 1109-1 and 1114-14) have been conducted within the proposed project area for current or previous oil and gas related projects. Grand River Institute conducted the most recent cultural resource inventory (CRVFO# 1114-2) specifically for this project. The cultural inventories and pre-field file searches of the Colorado SHPO database and BLM Colorado River Valley Field Office cultural records identified several historic properties within the project area.

Two historic properties that have been evaluated as either need data (potentially eligible) or eligible to the NRHP are within the project area. A non-supporting segment of the eligible historic trail 5GF4219.7 is slightly less than 200 meters from the edge of the proposed pad enlargement for RU 13-6. The potentially eligible cultural site 5GF4216 is located over 200 meters from any proposed pad expansion, pipeline and access road construction or up-grade. Eligible or potentially eligible cultural sites are referred to in Section 106 of the National Historic Preservation Act as “historic properties.”

Environmental Consequences

Proposed Action

Several historic properties have been identified during the cultural inventory for this project. Due to both sites being outside the project’s Areas of Potential Effect (APE), and outside the 100 meter standard buffer recognized by the CRVFO, the BLM has requested a determination of ***no effect to historic properties*** from the Colorado State Historic Preservation Officer (SHPO).

Although it is considered unlikely, indirect long-term damage from increased access and the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the vicinity of the project. These impacts could range from accidental damage or vandalism, illegal collection, and excavation.

An Education/Discovery COA for cultural resource protection will be attached to the EA. The importance of this COA would be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered during construction operations.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The

operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would result in similar types of potential impacts to undiscovered cultural resources from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

Fossil Resources

Affected Environment

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

Both the Wasatch and Green River Formations are considered BLM Condition 4 formations, defined as an area that is known to contain vertebrate fossils or noteworthy occurrences of invertebrate fossils. These types of fossils are known to occur or have been documented, but may vary in occurrence and predictability. The Wasatch Formation is divided into the early Eocene Shire, and the Paleocene age Molina and Atwell Gulch members; while the Eocene aged Green River Formation is divided into the Parachute Creek, Garden Gulch, Douglas Arch, Cow Ridge, and Anvil Points members.

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

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

The Green River Formation consists of fine-grained lacustrine and fluvial-lacustrine rocks that were deposited in the Eocene Lake Uinta. The lake expanded early in its history, during the Long Point transgression (Johnson 1985), to cover much of the Piceance and Uinta Basins. The Green River Formation has yielded hundreds of invertebrate and plant fossils and more than 60 vertebrate taxa have been described from the formation, including crocodiles, boa constrictors, and birds.

Environmental Consequences

Proposed Action

Although mapped as the predominant surface formation of the project area, field inspection revealed the Wasatch exposed only in a few outcrops found on cliff faces and landslide exposures. The thickness of the Quaternary sediments cannot be accurately determined, but construction activities have the potential to adversely affect important fossils that may be present in the underlying Wasatch and Green Formations. The greatest potential for impacts is associated with excavation of shallow bedrock that may

be unearthed during well pad and facilities (especially pipeline) construction. In general, alluvium, colluvium, and other unconsolidated sediments are much less likely than bedrock to contain well-preserved fossils.

An examination of the BLM paleontology database indicates that there are is one known fossil discovery site (in Section 29) within a 2-mile radius of the project area. Areas covered with vegetation and soil cover do not usually yield fossil resources, but inspections should be conducted for proposed facilities that are located on or within 200 feet of Wasatch or Green River Formation bedrock surface exposures. In the event paleontological resources are encountered, BMPs related to the standard paleontological COA would be recommended (Appendix).

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would therefore result in similar types of potential impacts to undiscovered fossil resources from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

Geology and Minerals

Affected Environment

The project area is located near the eastern margin of the Colorado Plateau physiographic province (Fenneman 1946), a region characterized by dissected plateaus of strong relief. A broad, asymmetric, southeast-northwest trending structural basin, the Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary up to 20,000 feet thick. The basin lies between the White River uplift to the northeast, the Gunnison uplift to the south, and the Uncompahgre swell to the west (George 1927, Weiner and Haun 1960). Table 6 lists the geologic formations within the project area.

Table 6. Geologic Formations within the Project Area				
<i>Map Symbol</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>Location</i>
Qes	Earthflow and soil creep deposits	Holocene	Poorly sorted boulder, cobble, and pebble gravel in a sand matrix	Areas underlain by claystone units in the Wasatch formation.
Qop	Pediment gravel deposits	Eocene	Subangular to subrounded pebble, cobble, and boulder gravels.	Forms colluvial fans and mantels topography.
Tws	Wasatch Formation – Shire member	Paleocene	Variegated claystone.	Steep slopes and outcrops.
Source: Donnell et al. 1989				

The predominant bedrock exposures within the proposed development area are the Tertiary Green River and Wasatch Formations. The Green River formation is composed of alternating layers of fine grained sandstones and laminated to massive marlstone. The Green River Formation overlies the Wasatch Formation, which consists of variegated siltstone, claystone, and sandstones and ranges from 1,000 to

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

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

Production of natural gas and associated liquid condensate is derived from three reservoir intervals in the Wasatch, Williams Fork, and Iles Formations. The latter two make up the Upper Cretaceous Mesaverde Group. The proposed drilling program would target the sandstone sequences of the Upper Williams Fork Formation, which provide most of the natural gas production volumes (Lorenz 1989). The upper portions of the Williams Fork include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork Formation includes delta front, distributary channel, strandplain, lacustrine (lake), and palustrine (swamp) environments (Hemborg 2000), while the sandstones and coalbeds of the Iles Formation were deposited in a wave-dominated coastal setting (Johnson 1989, Lorenz 1989).

The hydrocarbon source rocks are interbedded and thermally mature gas-prone shales, mudstones, siltstones, and coals. The reservoir rocks are the fine to medium-grained Williams Fork sandstones, varying in thickness from less than 10 feet to more than 50 feet (Spencer and Wilson 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the gas is both stratigraphic (related to lithology) and diagenetic (related to post-depositional process).

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

Environmental Consequences

Proposed Action

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

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

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would therefore result in similar types of potential impacts to geologic and mineral resources from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

Invasive Nonnative Plants

Affected Environment

State-listed noxious weeds are designated by the Colorado Department of Agriculture. Management of these weeds is regulated under the Colorado Noxious Weed Act, Title 35, Article 5.5. Botanical surveys conducted in April 2014 identified state-listed noxious weeds occurring within the Flatiron Mesa (Phase 2) Field Development area, as well as other nonnative plant species which can also have detrimental impacts on native plant communities. The proposed projects would occur within areas of existing well pads, pipelines, and access roads on a combination of BLM and private lands. In association with these previous disturbances, noxious weeds and other nonnative plant species have established. Weed infestations for specific portions of the project area are described below.

In addition to the noxious weeds described below, the State List C noxious weed, cheatgrass (*Bromus tectorum*), is widely scattered throughout the project area. Three non-native species are also present in association with older reclamation seedings, crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and yellow sweetclover (*Melilotus officinalis*). All of these species have the potential to become invasive, particularly in disturbed areas.

RU 44-7 New Well Pad, Road, and Surface Frac Line. Two species of State List B noxious weeds are present along the surface frac line route, houndstongue (*Cynoglossum officinale*) and plumeless thistle (*Carduus acanthoides*), as well as one State List C species, common mullein (*Verbascum thapsus*). Most of these weed infestations occur along the existing road where the proposed frac line parallels the road. The proposed well pad site is located within a healthy native plant community, with no noxious weeds or non-native plant species currently present.

RU 34-6 Existing Pad Expansion. Two species of State List B noxious weeds are present around the existing well pad, houndstongue and plumeless thistle, as well as one State List C species, common mullein. Houndstongue and another List B species, spotted knapweed (*Centaurea stoebe* ssp. *micranthos*), also occur along the existing access road where the surface frac line would parallel the road.

RU 21-8 New Well Pad, Pipeline, and Road. One State List C noxious weed species, common mullein, is present in an isolated occurrence of two plants located within the proposed well pad site. Otherwise, this area consists of healthy native vegetation and is free of noxious weeds and other non-native plant species.

RU 13-6 Existing Pad Expansion. Three State List B noxious weed species are present around the existing pad, houndstongue, musk thistle (*Carduus nutans*), and plumeless thistle. Houndstongue and plumeless thistle are also present along the proposed pipeline route, paralleling the existing road. Other non-native, invasive species are common around the periphery of this pad, including kochia (*Bassia scoparia*), prickly lettuce (*Lactuca serriola*), and yellow sweetclover.

RU 14-6 Existing Pad Expansion. The two State List B noxious weed species, houndstongue and plumeless thistle, are both present around the existing well pad.

Environmental Consequences

Proposed Action

Under the Proposed Action, a total of 37.94 acres would be disturbed, including 27.89 acres on BLM land and 10.05 acres on private land. Following construction and well completions, interim reclamation would occur on all areas not needed for ongoing operations. A total of 9.3 acres would remain as long-term disturbance, including 7.54 acres on BLM land and 1.76 acres on private land. Temporary reclamation on BLM land would consist of seeding with native plant species in accordance with the reclamation COAs presented in the Appendix. The composition of plant species used for reclamation on private lands 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 nonnative plant species particularly when these species are already present in the surrounding area. The mechanisms for this invasion and establishment are multi-fold. Removal of native vegetation removes the competition from native plants for resources, including water and soil nutrients, opening up niches for invasive species (Parendes and Jones 2000). Linear disturbances, such as roads, provide corridors of connected habitat along which invasive plants can easily spread (Gelbard and Belnap 2003). Well pad construction and subsequent well drilling and operations activities, as well as new road construction and installation of pipelines, require construction equipment and motorized vehicles which often transport invasive plant seeds either alone or in mud clods on the vehicle undercarriage or tires and deposit them in disturbed habitats along access roads and at well pad sites (Zwaenepoel et. al. 2006; Schmidt 1989).

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, Vogelsang and Bever 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 are difficult to eliminate.

Portions of the project area have a history of extensive disturbance associated with oil and gas development, and all of the project area has a history of livestock grazing. As a result, noxious weed occurrences are concentrated primarily near existing disturbance areas, although those species which readily attach to the hair of livestock, such as houndstongue and cheatgrass, are more widely scattered. However, much of the previously undisturbed areas are essentially free of noxious weeds and other non-native species. With new project disturbances, the potential for increased establishment of noxious weeds and other undesirable plants following construction activities is high. Movement of soil by construction equipment could be expected to spread weed seeds throughout 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.

Installation of temporary surface pipelines would cause minimal disturbance, however workers and vehicles installing the pipeline could act as vectors to spread weed seeds. Cheatgrass and houndstongue in particular have seeds which attach easily to clothing if personnel walk through existing occurrences. If the ground is wet and muddy, weed seeds could also be transported in mud sticking to boots. To mitigate

the invasive species risk, treatment of existing noxious weed infestations would be required prior to starting construction, and the standard weed control COA would be attached to APDs to require periodic monitoring and weed control practices to ensure that these weedy plants are controlled (Appendix). Establishment of native plant species is also crucial in preventing invasive nonnative plant species establishment and spread. Therefore, the standard reclamation COAs would also be attached to APDs to require seeding with an appropriate native seed mix and monitoring of reclamation seeding results (Appendix).

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would result in similar types of surface disturbance impacts from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field. However, when compared to the Proposed Action, the No Action Alternative would reduce the potential for development of invasive nonnative plants for existing or proposed project components. However, current occurrence of noxious weeds and undesirable nonnative plants would continue in the disturbed areas except where BLM currently has the authority to require additional weed treatments.

Native American Religious Concerns

Affected Environment

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

Environmental Consequences

Proposed Action

At present, no Native American concerns are known within the project area and none were identified during the cultural inventories or through previous consultation with the Ute Tribes. The Ute Tribe of the Uintah and Ouray Bands, one of the primary Native American tribes in this area of the CRVFO, have indicated that they do not wish to be consulted for small projects or projects where no Native American areas of concern have been identified either through survey or past consultations. Therefore, formal consultation with Native American Tribes was not undertaken for the current project.

If new data regarding cultural resources are identified or disclosed, new terms and conditions may have to be negotiated to accommodate their concerns.

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

The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act

(NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the agency Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).

WPX Energy Rocky Mountain LLC will notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations. A standard Education/Discovery COA for the protection of Native American values would be attached to the APD (Appendix). The importance of these COAs would be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered. The proponent and contractors would also be made aware of requirements under the NAGPRA.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although the No Action Alternative would result in similar types of potential impacts from ongoing activities on Federal and private lands and new activities on private lands, the amount of surface disturbance and extent of human presence would be reduced. This would therefore reduce the potential for any accidental damage, vandalism, illegal collection, and excavation on the lands involved.

Noise

Affected Environment

The Flatiron Mesa development area is located 5-6 miles south of Rifle, Colorado within the Beaver Creek watershed. The Proposed Action includes using the existing RU 34-6 pad in its present footprint, expanding the existing RU 13-6 pad and the RU 14-6 frac pad, and constructing the new RU 21-8 pad and the RU 44-7 pads to provide safe operating space to drill, complete, and operate 79 Federal wells and six fee wells. The Proposed Action would occur within a rural setting characterized by oil and gas development activities. Noise levels in the area are presently created by the ongoing drilling and completion activities within the Flatiron Mesa project area.

Noise is generally described as unwanted sound, weighted and noise intensity (or loudness) is measured as sound pressure in decibels (dBAs). The decibel scale is logarithmic, not linear, because the range of sound that can be detected by the human ear is so great that it is convenient to compress the scale to encompass all the sounds that need to be measured. Each 20-unit increase on the decibel scale increases the sound loudness by a factor of 10. Sound levels have been calculated for areas that exhibit typical land uses and population densities. In rural recreational areas, ambient sound levels are expected to be approximately 30 to 40 dBA (EPA 1974, Harris 1991). As a basis for comparison, the noise level would be 60 dBA during a normal conversation between two people standing five feet apart.

Environmental Consequences

Proposed Action

The project would result in increased levels of noise during the construction, drilling, and completion phases. The noise would be most noticeable along the roads used to haul equipment and at the pad location. Drilling activities are subject to noise abatement procedures as defined in the COGCC Rules and Regulations (Aesthetic & Noise Control Regulations). Operations involving pipeline or gas facility

installation or maintenance, compressors, the use of a drilling rig, completion rig, workover rig, or hydraulic stimulation are subject to the maximum permissible noise levels for industrial zones. The 2006 revised COGCC noise control rules call for noise levels from oil and gas operations at any well site and/or gas facility to comply with the maximum permissible levels (Table 7) at a distance of 350 feet. Given the remote locations of the proposed project activities, with no reasonably close occupied structure or designated recreational area, the light industrial standard is applicable. The allowable noise level for periodic impulsive or shrill noises is reduced by 5 dBA from the levels shown (COGCC 2008).

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

Short-term (7- to 14-day) increases in nearby noise levels would characterize road and well pad construction while the existing cuttings pit is re-opened. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and an typical noise level for construction sites of 65 dBA at 500 feet (Table 5), project-related noise levels would be approximately 59 dBA at a distance of 1,000 feet, approximating active commercial areas (EPA 1974).

Traffic noise would also be elevated as a consequence of the Proposed Action. The greatest increase would be along access roads during the drilling and completion phases. Based on the La Plata County data presented in Table 8 approximately 68 dBA of noise (at 500 feet) would be created by each fuel and water truck that travels these roads. Less noise would be created by smaller trucks and passenger vehicles such as pickup trucks and sport utility vehicles. Although the duration of increased noise from this source would be short, it would occur repeatedly during the drilling and completion phases.

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

Table 8. Noise Levels at Typical Construction Sites and along Access Roads			
<i>Equipment</i>	<i>Noise Level (dBA)</i>		
	<i>50 feet</i>	<i>500 feet</i>	<i>1,000 feet</i>
Air Compressor, Concrete Pump	82	62	56
Backhoe	85	65	59
Bulldozer	89	69	63
Crane	88	68	62
Front End Loader	83	63	57
Heavy Truck	88	68	62
Motor Grader	85	65	59
Road Scraper	87	67	61
Tractor, Vibrator/Roller	80	60	54

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

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would result in similar types of noise impacts from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

Socioeconomics

Affected Environment

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

The population of the county grew by an average of approximately 2.5% per year from 2000 to 2011 but decreased by 2.6% from 2008 to 2011 due to the national economic downturn, resulting in a net increase of 27% from 44,259 to 56,270 residents (CDOLA 2013a). Population growth in Garfield County is expected to nearly double to 109,887 in 2040 (CDOLA 2012). In July 2011, the Garfield County population was 70% urban and 30% rural, with a population density of approximately 19 people per square mile (City Data 2012).

In February 2013, the total estimated civilian labor force was 34,107 with an unemployment rate of 7.8% (CDLE 2013). In the fourth quarter of 2011, the industry groups with the highest percentage of total employment were construction (14.4%), retail trade (13.7%), and Health Care and Social Assistance (13.5%). Table 9 lists the top 10 industries in Garfield County for the fourth quarter of 2011 (CDLE 2013).

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

Personal income in Garfield County has also risen, growing approximately 6% per year from \$1.3 billion in 2000 to \$2.1 billion in 2011. However, personal income dropped by nearly 10% from 2008 to 2011.

Annual per capita income has grown in the same period approximately 3% per year, from \$29,081 to \$37,858, but annual per capita income dropped by nearly 11% from 2008 to 2011 (USDOC 2012).

The communities of Parachute, Rifle, Silt, and New Castle are considered to have the most affordable housing, while the communities of Glenwood Springs and Carbondale have the least affordable housing. In March 2012 the cost of living index in Garfield County was 88.6, below the U.S. average of 100 (City Data 2012). Activities on public land in the vicinity of the project area are primarily ranching/farming, hunting, OHV travel, and the development of oil and gas resources. Hunters contribute to the economy because many require lodging, restaurants, sporting goods, guides and outfitting services, food, fuel, and other associated supplies.

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

Property tax revenue from oil and gas development is a source of public revenue in Garfield County. In 2012, oil and gas assessed valuation in Garfield County was approximately \$2.8 billion, or about 73% of total property tax assessed value distribution (Garfield County 2013b). The county's largest taxpayers are in the oil and gas industry (Garfield County 2013c). The Federal government makes Payments in Lieu of Taxes (PILT) to local governments to help offset losses in property taxes due to nontaxable Federal lands within their boundaries (USDI NBC 2013). The PILT distributions are based on acres for all Federal land management agencies. Approximately 60% of all Garfield County lands are Federally owned (Garfield County 2013a). The amount may also be adjusted based on population and as apportioned by Congress. By formula, payments are decreased as other Federal funds, such as mineral royalty payments, increase. PILT amounts to Garfield County over the last five years ranged from \$1,732, 974 in 2008 to \$403,176 in 2012 (USDI NBC 2013).

In addition to PILT distributions, Federal mineral royalties are levied on oil and gas production from Federal mineral leases. Oil and gas lessees pay royalties equal to 12.5% of the wellhead value of oil and gas produced from public land (BLM 2007a). Half the royalty receipts received from production are distributed to the state and county governments, which are then allocated to fund county services, schools, and local communities.

The NEPA process requires a review of the environmental justice issues as established by Executive Order 12898 (February 11, 1994). The order established that each Federal agency identify any "disproportionately high and adverse human health or environment effects of its programs, policies, and activities on minority and low-income populations." The Hispanic/Latino community is the only minority population of note in the project vicinity. In 2010, approximately 28% of the residents of Garfield County identified themselves as Hispanic/Latino, compared to 17% in 2000 (CDOLA 2013b). Statewide, the population of Hispanic/Latino residents grew 41.2% during the same 10-year period (CDOLA 2013c). African-American, American Indian, Asian, and Pacific Islander residents accounted for a combined 1.6% of the Garfield County population in 2010, compared to a statewide level of 7% (CDOLA 2013b).

Environmental Consequences

Proposed Action

The Proposed Action would have minor positive impacts on the local economy of Garfield County through the creation of additional job opportunities in the oil and gas industry and in supporting trades and services. In addition, Garfield County would receive additional tax and royalty revenues. The Proposed Action could result in negative social impacts including changing the character of the area, reducing scenic quality, increasing dust levels especially during construction, and increasing traffic.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would similar types of socioeconomic impacts, both positive or negative, as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Soils

Affected Environment

The area is located on Flatiron Mesa and surrounding slopes that are generally north-facing, at elevations between 6200 and 9000 feet elevation, with gradients ranging from less than 1% to greater than 90%. The proposed project is covered by the *Soil Survey of Rifle Area, Colorado* (USDA 1985). According to this survey, the FMMDP area contains a number of soil types, as shown in Table 10.

Table 10. Soil Descriptions for the Flatiron Mesa Phase 2 Development Area				
<i>Mapping Unit Name</i>	<i>Description</i>	<i>Erosion Hazard</i>	<i>Permeability</i>	<i>Proposed Infrastructure Type</i> ¹
Morvall-Tridell Complex 6-25% slope	Deep, well-drained soils on alluvial fans and mesa sides from 6,500 to 8,000 ft. Surface layer is loam or stony loam up to 10 inches thick; upper subsoil is clay loam to very stony loam about 12 inches thick.	Moderate	Moderate to moderately rapid,	RU 23-5 Pad/Rd/PL, RU 34-6 Pad/Rd/PL, RU 21-8 Pad/Rd/PL; RU 42-7 Pad, RU 44-7 Pad/Rd/PL
Torriorthents-Camborthids-Rock Outcrop Complex 15-70% slope	Exposed sandstone and shale bedrock, and shallow to moderately deep soils formed over alluvium on foothills and mountainsides. Stony clay to stony loam, covered with stones weathered from outcrops.	Moderate to Severe	N/A	Western half of RU 14-6 Pad (slope)
Villa Grove-Zoltay Loams 15-30% slope	Deep, well-drained soils on mountainsides and alluvial fans from 7,500 to 7,600 feet. Surface layer is loam 4 to 20 inches thick; upper subsoil is clay loam to cobbly clay 11 to 35 inches thick. Permeability is slow to moderately slow, runoff is slow to medium.	Slight to Moderate	Slow to moderately slow	Northern Half of RU 13-6 Pad, eastern half of RU 14-6 and south part of RU 13-6 Rd/PL

Table 10. Soil Descriptions for the Flatiron Mesa Phase 2 Development Area				
Torriorthents-Rock Outcrop Complex 15-70% slope	This complex consists of exposed bedrock, loose stones, shallow soils over bedrock, and stony basaltic alluvium. These soils and rock outcrops are moderately steep to very steep.	Moderate to Severe	N/A	Southern half of RU 13-6 Pad plus north side of Rd/PL.
Cimarron Loam 2-12% slope	Deep, well-drained soil formed in alluvium in narrow valleys from 7,500 to 9,000 feet. Surface layer is loam about 4 inches thick; subsoil is silty clay to silty clay loam up to 30 inches thick.	Moderate	Slow	Gated culvert @ RU 13-6 (small sliver across Rd/PL).
¹ Pad = well pad, RD = road, PL = pipeline				

Environmental Consequences

Proposed Action

The Proposed Action includes using the existing RU 34-6 pad in its present footprint, expanding the existing RU 13-6 pad and the RU 14-6 frac pad, and constructing the new RU 21-8 pad and the RU 44-7 pads to provide safe operating space to drill, complete, and operate 79 Federal wells and six fee wells. These pad improvements would result in 29.51 acres of interim surface disturbance with 7.85 acres of long-term disturbance across the life of the producing wells. Building 0.44 miles of new road to access the RU 21-8 and RU 44-7 pads would result in 2.05 acres of new short-term disturbance and 1.45 acres of long-term impact for the existing roadways. Buried pipelines to gather natural gas, produced water, and condensate would result in 6.38 acres of interim disturbance until the pipeline reclamation work satisfactorily reestablished. Total short-term disturbance (37.94 acres) for the project would be comprised of 27.89 acres on BLM and 10.05 acres on private land with corresponding long-term surface impacts (9.30 acres) being 7.54 acres on BLM and 1.76 acres on private (Table 3).

In general, the portion of the project area that would be affected by the Proposed Action contains adequate vegetation buffers and moderate (2% to 30%) slopes that would minimize the potential for sediment transport. The area generally contains adequate vegetation buffers that would minimize the potential for sediment transport to nearby Beaver Creek and the Colorado River. However, construction activities would cause slight increases in local soil loss, loss of soil productivity, and sediment available for transport to surface waters. Potential for such soil loss and transport would increase as a function of slope, feature (pad, road, or pipeline route) to be constructed, and proximity to streams and drainages.

Most of the area to be disturbed consists of soils with slight to moderate risk of erosion or slope instability. However, some steeper segments of roads and pipelines would cross soils with severe erosion hazard. In addition, short segments of some slopes in areas with seasonally saturated soils may be steepened beyond 30% prior to interim reclamation. Particular care should be taken at these locations to ensure that proper BMPs, including the COAs listed in the Appendix are utilized to prevent erosion and slope instability due to construction activities.

All road sections would be maintained and graveled, as needed. The new pad construction would be designed and positioned in the optimal location to take advantage of the topography and avoid disturbances to the drainages and steep slopes. The Proposed Action would be located on areas with moderate risk of erosion due to the soil characteristics and its location within alluvial fans. Particular care would be taken during construction and reclamation to ensure that proper design and BMPs, including the COAs listed in Appendix, are utilized to prevent erosion and slope movement.

No Action

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would result in similar types of potential impacts to soil resources from ongoing activities on Federal and private lands and new activities on private lands in the Flatiron Mesa field.

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 11 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. There is no suitable habitat present within or adjacent to the project area for any of these four Federally listed plant species.

Table 11. Potential for Occurrence of Threatened or Endangered Plant Species				
<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Parachute penstemon (<i>Penstemon debilis</i>) -- Threatened	Sparsely vegetated, south-facing, steep, white shale talus of the Parachute Creek Member of the Green River Formation; 8,000 to 9,000 feet	Other oil shale endemic species, such as Roan Cliffs blazing-star, Cathedral Bluffs meadow-rue, dragon milkvetch, Piceance bladderpod, and oil shale fescue	No	No
DeBeque phacelia (<i>Phacelia submutica</i>) – Threatened	Sparsely vegetated, steep slopes in chocolate-brown, gray, or red clay on Atwell Gulch and Shire Members, Wasatch Formation; 4,700 to 6,200 feet	Desert shrubland with four wing saltbush, shadscale, greasewood, broom snakeweed, bottlebrush squirreltail and Indian ricegrass, grading upward into scattered junipers	No	No
Colorado hookless cactus (<i>Sclerocactus glaucus</i>) – Threatened	Rocky hills, mesa slopes, and alluvial benches in salt desert shrub communities; often with well-formed microbiotic crusts; can occur in dense cheatgrass 4,500 to 6000 feet	Desert shrubland with shadscale, galleta grass, black sagebrush, Indian ricegrass grading upward into big sagebrush and sagebrush/pinyon-juniper	No	No
Ute lady's tresses orchid (<i>Spiranthes diluvialis</i>) – Threatened	Subirrigated alluvial soils along streams and in open meadows in floodplains; 4,500 to 7,200 feet	Box-elders, cottonwoods, willows, scouring rushes, and riparian grasses, sedges, and forbs	No	No

Environmental Consequences

Proposed Action

Because no occurrences of any Federally listed plant species are known within or near the project area, the Proposed Action would be no effects on any Federally listed plants.

Effects Determinations

Because no suitable habitat for Colorado hookless cactus, DeBeque phacelia, Parachute penstemon, or Ute lady’s-tresses is present within 300 meters of the project area, the Proposed Action would have “**No Effect**” on these species.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have impacts on special status plant species as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field. Because no suitable habitat for Colorado hookless cactus, DeBeque phacelia, Parachute penstemon, or Ute lady’s-tresses occurs within 300 meters of the project area, the No Action Alternative would have “**No Effect**” on these species.

BLM Sensitive Plant Species

Affected Environment

BLM sensitive plant species with habitat and/or occurrence records in Garfield County are listed in Table 12, along with summaries of their habitat requirements, potential for occurrence within the project area, and potential to be impacted by the Proposed Action. Only one of these species, Harrington’s penstemon, has the potential to occur in the project area.

Table 12. Potential for Occurrence of BLM Sensitive Plant Species				
<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Cathedral Bluffs meadow-rue (<i>Thalictrum heliophilum</i>)	Endemic on sparsely vegetated, steep shale talus slopes of the Green River Formation; 6,300-8,800 feet	Pinyon-juniper woodlands and shrublands; often with other oil shale endemics, sometimes with rabbitbrush or snowberry	No	No
DeBeque milkvetch (<i>Astragalus debequaeus</i>)	Varicolored, fine-textured, seleniferous or saline soils of Wasatch Formation; 5,100 to 6,400 feet	Pinyon-juniper woodlands and desert shrublands	No	No

Table 12. Potential for Occurrence of BLM Sensitive Plant Species				
<i>Species and Status</i>	<i>Occurrence</i>	<i>Habitat Association</i>	<i>Range or Habitat in Vicinity?</i>	<i>Potentially Affected?</i>
Harrington's penstemon (<i>Penstemon harringtonii</i>)	Flats to hillsides with rocky loam and rocky clay loam soils derived from coarse calcareous parent materials or basalt; 6,200-9,200 feet	Sagebrush shrublands, typically with scattered pinyon-juniper	Yes	Yes
Naturita milkvetch (<i>Astragalus naturitensis</i>)	Sandstone mesas, ledges, crevices and slopes in pinyon/juniper woodlands; 5,000 to 7,000 feet	Pinyon-juniper woodlands	No	No
Piceance bladderpod (<i>Lesquerella parviflora</i>)	Shale outcrops of the Green River Formation, on ledges and slopes of canyons in open areas; 6,200 to 8,600 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No
Roan Cliffs blazing-star (<i>Mentzelia rhizomata</i>)	Steep, eroding talus slopes of shale, Green River Formation; 5,800-9,000 feet	Pinyon-juniper woodlands, shrublands; often with other oil shale endemic species	No	No

Botanical surveys were conducted in April 2014, with a follow-up visit in June 2014 to better quantify the numbers of Harrington's penstemon plants within the occurrences documented during the April surveys (WWE 2014). Plant number estimates shown in Table 13 are based on the June quadrat sampling. Using these criteria, an estimated 1,455 Harrington's penstemon plants are present with project disturbance areas, with an additional 9,554 plants estimated to occur within adjacent 30-meter buffers (Table 13).

Table 13. Harrington's Penstemon Plants within the Flatiron Mesa Phase 2 Project Area	
<i>Location</i>	<i>Number of Plants</i>
RU 13-6 Disturbance Area	585
RU 14-6 Disturbance Area	51
RU 21-8 and Road/Pipeline Disturbance Areas	794
RU 42-7 Pipeline Disturbance Area	25
Subtotal for Disturbance Areas	1,455
Subtotal for 30-meter Buffer Area	9,554
Total Harrington's Penstemons within Project Area	12,464

Environmental Consequences

Proposed Action

Harrington's penstemon is the only BLM sensitive plant species with the potential to be impacted by this project. The total estimated number of Harrington's penstemon plants directly impacted by project

implementation would be 1,455 plants (13.2% of the mapped project area plants), of which 1,430 are located on BLM land and 25 are located on private land. The distribution of these plants relative to the project components is shown in Table 13. Project implementation would remove all vegetation from approximately 20 acres of Harrington's penstemon habitat on BLM land.

Potential indirect effects could result from increased vehicle traffic and pipeline installation. These indirect effects include increased generation of dust, which could negatively impact Harrington's penstemon plants by clogging stomatal openings in the leaves, impeding gas exchange and reducing light availability at the leaf surface, and thereby reducing photosynthesis rates, plant growth rates, and seed production. Dust on leaf surfaces can also facilitate plant tissue uptake of toxic pollutants (Thompson et. al. 1984, Farmer 1993, Sharifi et. al. 1997). 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, Johnston and Johnston 2004, Field et. al. 2010).

Harrington's penstemon plants could also be indirectly impacted by noxious weeds and other invasive plants, or by herbicides used to control these species. Noxious weeds are present within the project area (WWE 2014). New ground disturbance from project implementation could result in increased noxious weed establishment and spread into Harrington's penstemon habitat, creating competition for resources including water, nutrients, and sunlight. Mulch used in reclamation, even though certified as weed-free, may contain seeds of non-native species which could introduce new species and competition with Harrington's penstemon plants. Herbicides used to treat noxious weeds associated with project implementation have the potential to drift into areas occupied by Harrington's penstemon, with the associated potential for plant mortality or reduced vigor. Herbicides, and loss of native vegetation, could also potentially impact plant pollinators, which in turn could negatively impact Harrington's penstemon.

Direct and indirect effects from project implementation on Harrington's penstemon would contribute to cumulative effects to the species from other planned and existing oil and gas projects within this habitat area. In combination with other existing, proposed, and analyzed projects within the Rifle-Rulison population center, an estimated 2.4% of the known Harrington's penstemon plants would experience direct mortality from oil and gas projects. This exceeds the cap of 2% impact recommended by the Colorado State BLM office for Harrington's penstemon. In addition, other surveys in the area have noted extensive impacts to this species from cattle, deer, and/or elk herbivory, with a high percentage of flowering stalks browsed off. These cumulative impacts could negatively affect the ability of Harrington's penstemon to reestablish within the project disturbance area following project completion, due to the reduction in seed availability from remaining plants.

To mitigate for the loss of Harrington's penstemon plants, WPX Energy would be required to either collect viable seed from Harrington's penstemon plants or salvage plants from the disturbance area prior to start of construction, utilizing a contractor approved by the BLM, and pay \$15,000 to the Upper Colorado Environmental Plant Center for propagation of these plants at this facility for 3 years of seed production.

To increase the probability of successful Harrington's penstemon reestablishment, a site-specific reclamation seed mix would be used to promote shrubs and forbs commonly co-occurring with Harrington's penstemon, and Harrington's penstemon seed produced at the Upper Colorado Environmental Plant Center would be sown within the pipeline corridor during reclamation.

To reduce the risk of introducing non-native plant species to Harrington's penstemon habitat, no mulch would be used during the reclamation in these areas. To reduce the risk of negative indirect impacts to adjacent Harrington's penstemon plants, specific COAs would require dust mitigation with restrictions on

substances used for dust mitigation. In addition, specific COAs would require noxious weed treatment and place restrictions on herbicide use.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have impacts on a special status plant species (Harrington’s penstemon) as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

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 14 lists these species and summarizes information on their distribution, habitat associations, and potential to occur or be adversely affected.

Table 14. Potential for Occurrence of Threatened or Endangered Animal Species				
<i>Species and Status</i>	<i>Distribution in Region</i>	<i>Preferred Habitats</i>	<i>Potentially Present in Vicinity?</i>	<i>Potentially Adversely Affected?</i>
Canada lynx (<i>Lynx canadensis</i>) – Threatened	Dispersed use in in upper montane and subalpine zones of Colorado mountains.	Subalpine spruce-fir forests; also lodgepole pine and aspen to as low as upper montane.	No	No
Yellow-billed cuckoo (<i>Coccyzus americanus</i>) –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 (<i>Strix occidentalis lucida</i>) – Threatened	No historic occurrence in area; present in southwestern Colorado and southern Front Range.	Rocky cliffs in canyons with closed-canopy coniferous forests.	No	No
Razorback sucker (<i>Xyrauchen texanus</i>) – Endangered	Colorado River and major 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 (<i>Ptychocheilus lucius</i>) – Endangered			Yes	Yes
Humpback chub (<i>Gila cypha</i>) -- Endangered	Mainstem Colorado River and major tributaries – upstream to Black Rocks near Utah state line.	Rocky runs, riffles, and rapids in swift, deep rivers.	Yes	Yes
Bonytail chub (<i>Gila elegans</i>) – Endangered			Yes	Yes

Table 14. Potential for Occurrence of Threatened or Endangered Animal Species				
<i>Species and Status</i>	<i>Distribution in Region</i>	<i>Preferred Habitats</i>	<i>Potentially Present in Vicinity?</i>	<i>Potentially Adversely Affected?</i>
*Green Lineage Colorado River cutthroat trout (<i>Oncorhynchus clarki</i> 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.	Yes	Yes
*Green Lineage = Relict populations of cutthroat trout indigenous to the Colorado/Gunnison/Dolores River drainages. Currently protected under the ESA pursuant to prior listing of the greenback cutthroat trout (<i>O. c. stomias</i>) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.				

Environmental Consequences

Proposed Action

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 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**” for 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 as well as the Green Lineage Colorado River cutthroat trout 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 and Beaver Creel 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 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 this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would also have potential impacts on the endangered big-river fishes from water-depleting activities associated with ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

BLM Sensitive Animal Species

Affected Environment

Table 15 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 the species listed are discussed following the table.

Table 15. BLM Sensitive Vertebrate Species Present or Potentially Present in the Project Area		
<i>Common Name</i>	<i>Habitat</i>	<i>Potential for Occurrence</i>
Fringed myotis (<i>Myotis thysanodes</i>)	Roosting: Caves, trees, mines, and buildings. Foraging: Pinyon-juniper, montane conifers, and semi-desert shrubs.	Possible
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)		
Northern goshawk (<i>Accipiter gentilis</i>)	Montane and subalpine coniferous forests and aspen forests; may move to lower elevation pinyon/juniper woodland in search of prey during winter.	Possible in winter
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Nesting/Roosting: Mature cottonwood forests along rivers. Foraging: Fish and waterfowl along rivers and lakes; may feed on carrion, rabbits, and other foods in winter.	Nests and roosts along Colorado River
Peregrine falcon (<i>Falco peregrinus</i>)	Nesting: Cliffs, usually near a river, large lake, or ocean. Foraging: Waterfowl on rivers and lakes; upland fowl in open grassland or steppe.	Unlikely
Brewer's sparrow (<i>Spizella breweri</i>)	Extensive stands of sagebrush, primarily Wyoming sagebrush on level or undulating terrain.	Possible
Midget faded rattlesnake (<i>Crotalus oreganus concolor</i>)	Cold desert of NW Colorado, SW Wyoming, and NE Utah, primarily in sagebrush with rock outcrops and exposed canyon walls.	Possible – habitat marginal
Great Basin spadefoot (<i>Spea intermontana</i>)	Permanent or seasonal ponds and slow-flowing streams in pinyon-juniper woodlands and semi-desert shrublands.	Absent
Northern leopard frog (<i>Lithobates pipiens</i>)	Clean, perennial waters in slow-flowing streams, wet meadows, marshes, and shallows of clean ponds and lakes.	Possible
Bluehead sucker (<i>Catostomus latipinnis</i>)	Primarily smaller streams with a rock substrate and mid to fast-moving waters; also shallows of larger rivers.	Possible
Flannelmouth sucker (<i>Catostomus discobolus</i>)	Runs, riffles, eddies, and backwaters in large rivers.	Present in Colorado River
Roundtail chub (<i>Gila robusta</i>)	Slow-moving waters adjacent to fast waters in large rivers.	
*Blue Lineage Colorado River cutthroat trout (<i>Oncorhynchus clarki</i> ssp.)	Headwaters streams and ponds with cool, clear waters isolated from populations of non-native cutthroats and rainbow trout.	Absent
*Blue Lineage = Relict populations of cutthroat trout indigenous to the Yampa/Green River drainages but widely transplanted throughout the state. Managed as a BLM sensitive species pursuant to prior designation of the Colorado River cutthroat trout (<i>O. c. pleuriticus</i>) pending completion of genetic and morphometric studies and taxonomic reassessment of native cutthroat trout in Colorado.		

Environmental Consequences

Proposed Action

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.

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

Brewer's Sparrow. Although the habitat is marginal in the project area, the possibility exists of nesting by this species. The 60-day TL to prohibit removal of vegetation during the period May 1 to July 1 (Appendix) would avoid or minimize the potential for impacts to nesting Brewer's sparrows. Construction activities outside this period could cause individuals to avoid the disturbance while feeding. However, this impact would be limited in duration at any point along the corridor, and individuals are expected to feed across very large home ranges outside the nesting season, thus minimizing the severity of this potential indirect impact.

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 (Parker and Anderson 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.

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

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have similar types of impacts on BLM sensitive animal species as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Vegetation

Affected Environment

The project area is located on Flatiron Mesa south of Rulison, Colorado, at elevations ranging from approximately 7,000 to 7,920 feet. Vegetation in this area is a patchwork of sagebrush shrublands dominated by mountain sagebrush (*Artemisia tridentata* ssp. *pauciflora*) and Wyoming sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), interspersed with mountain shrublands dominated by Gambel's oak (*Quercus gambelii*).

Although there has been extensive oil and gas development in the area, the remaining undisturbed vegetation is rich in native species diversity. Common native grasses include bluebunch wheatgrass (*Pseudoroegneria spicata*), bottlebrush squirreltail (*Elymus elymoides*), galletagrass (*Pleuraphis jamesii*), Indian ricegrass (*Achnatherum hymenoides*), Junegrass (*Koeleria macrantha*), and needle-and-thread grass (*Hesperostipa comata*). Common shrub and forb species here include Arrowleaf balsamroot (*Balsamorhiza sagittata*), ball cactus (*Pediocactus simpsonii*), bitterbrush (*Purshia tridentata*), bluebells (*Mertensia brevistyla*), chokecherry (*Prunus virginiana*), cinquefoil (*Potentilla* sp.), clover (*Trifolium gymnocarpum*), dusty penstemon (*Penstemon comarhennus*), Harrington's penstemon (*Penstemon harringtonii*), longleaf buckwheat (*Eriogonum lonchophyllum*), lupine (*Lupinus caudatus*), mountain mahogany (*Cercocarpus montanus*), wild onion (*Allium* sp.), Oregon grape (*Mahonia repens*), prickly pear cactus (*Opuntia polyacantha*), puccoon (*Lithospermum ruderale*), rabbitbrush (*Chrysothamnus nauseosus*), Rocky Mountain locoweed (*Oxytropis sericea*), Rocky Mountain penstemon (*Penstemon strictus*), skunkbrush sumac (*Rhus aromatica*), snakeweed (*Gutierrezia sarothrae*), sticky-flowered rabbitbrush (*Chrysothamnus viscidiflorus*), sulphur-flower buckwheat (*Eriogonum umbellatum*), tansy-aster (*Machaeranthera pinnatifida*), Woods' rose (*Rosa woodsii*), yarrow (*Achillea millefolium*), and yucca (*Yucca harrimaniae*).

Previously reclaimed areas around existing well pads consist primarily of reclamation grass species, including bluebunch wheatgrass, bottlebrush squirreltail, slender wheatgrass (*Elymus trachycaulus*), and western wheatgrass (*Pascopyrum smithii*), in addition to non-native species such as crested wheatgrass, smooth brome, and yellow sweetclover.

Environmental Consequences

Proposed Action

Under the Proposed Action, a total of 37.94 acres of native sagebrush and mountain shrub vegetation would be removed, of which 27.89 acres would be on BLM land and 10.05 acres would be on private land. Following project completion, 28.64 acres would undergo interim reclamation, and 9.30 acres would remain as long-term disturbance. Interim reclamation would consist of seeding in accordance with the reclamation COAs presented in the Appendix. A seed mix consisting of native grasses, forbs, and

shrubs would be used on BLM land, but for portions of the project located on private land, the composition of plant species used for reclamation would be at the discretion of the landowner.

Adjacent native vegetation would not be directly impacted, but could be indirectly impacted by increased dust deposition on leaves. Dust levels could be expected to increase above ambient levels in the short term from pad expansion, well drilling, new road construction, and new pipeline installation. 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 (Thompson et. al. 1984, Farmer 1993, Sharifi et. al. 1997). 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, Johnston and Johnston 2004, Field et. al. 2010, Gieselman 2010).

Additional indirect impacts to adjacent vegetation could occur from noxious weeds and other non-native plants associated with project area disturbances. The proposed 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 and other non-native species. Neighboring vegetation would also become more vulnerable to invasion by noxious weeds and other non-native species. 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 (Schmidt 1989, Parendes and Jones 2000, Gelbard and Belnap 2003, Larson 2003, Zaenepoel et. al. 2006).

These non-native species can negatively impact native plant communities, both directly through competition for resources, and indirectly through alteration of soil microbial communities (Klironomos 2002, Hierro et. al. 2006, Reinhart and Callaway 2006, Vogelsang 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 (BLM 2007b). Implementation of standard COAs for noxious weeds and temporary reclamation (Appendix) would reduce the risk of noxious weed and invasive species establishment and spread through the combination of chemically treating noxious weeds while also reestablishing desirable vegetation through interim reclamation.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have similar types of impacts on native vegetation as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Visual Resources

Affected Environment

The Proposed Action is located on fee and BLM land approximately 4 air-miles southwest of Rifle, Colorado. The proposed RU 44-7 well pad would occur entirely on private land. The proposed RU 21-8,

existing RU 34-6, RU 13-6, and RU 14-6 well pad expansions would occur on BLM land. The proposed pipeline construction would occur on private and BLM land.

BLM land in the CRVFO area is classified as Visual Resource Management (VRM) Class IV as identified by the 1984 Glenwood Springs Resource Management Plan. The objective for VRM Class IV, as defined in the BLM's Manual H-8410-1 – Visual Resource Inventory (BLM 1986), is described below.

- The objective of VRM Class IV is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of the viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

VRM objectives do not apply to non-BLM lands, and visual values for those lands are protected by landowner discretion. The BLM can only make recommendations to mitigate impacts to scenic values.

The Proposed Action is located within Visual Resource Inventory (VRI) Class 4, Scenic Quality Class B, Sensitivity Level Medium, and within the Background Distance Zone.

The project area lies on Flatiron Mesa, which stands above the Colorado River Valley floor and is bound by the Colorado River to the north, Grass Mesa to the east, the White River National Forest (WRNF) to the south, and Log Mesa/Beaver Creek to the West. The natural landscape has been historically altered with human modifications including electric transmission lines, support towers, and access roads. Existing oil and gas developments with associated well pads, pipelines, and access roads also occur within the project area. Ranching and livestock grazing operations have occurred historically and continue to occur throughout. Vegetation consists of mountain brush species including Gambel's oak, mountain-mahogany, and serviceberry. Open sagebrush parks are found within the mountain brush community, creating a mosaic of visual contrasts in texture and color across the landscape.

Environmental Consequences

Proposed Action

Garfield County Road 320 (Rifle-Rulison Road) and County Road 317 (Beaver Creek Road) provide primary access to the project vicinity from the city of Rifle. However, project components have no public access because access roads to the area cross private land. The Proposed Action is within the background of the I-70 viewshed but is not visible from I-70 and is only visible from CR317 along the upper reaches of the Beaver Creek watershed near the WRNF boundary line. The Proposed Action is set back from the edge of Flatiron Mesa and the topography surrounding the Proposed Action provides visual screening from the Colorado River Valley floor and the city of Rifle.

New surface disturbance and impacts to visual resources have been minimized because the proposed buried pipelines would be collocated in the same trench along the access roads to all of the well pads, except for the existing RU 34-6 well pad which has available pipeline infrastructure. The proposed temporary surface water pipelines would be located alongside existing roads to support well completions.

Short-term visual impacts due to the expansion of two well pads and construction of two new well pads with associated access roads, gas gathering pipelines, water collection pipelines, and condensate pipelines would occur within the project area. Contrast would be created in the landscape by removing vegetation, exposing bare ground, and creating distinct lines and forms in the landscape. There would also be an increase in the presence of drilling rigs, heavy equipment (e.g. dozers, graders, track hoes), and vehicular

traffic with an increase in dust and light pollution. Long-term impacts associated with the Proposed Action include additional production equipment which would increase the existing visual contrast associated with human modifications already present in the area. Over the long term, the well pads would remain visible predominantly within the foreground along the oil and gas field development roads.

In summary, the VRM Class IV objective allows for major modifications to the existing character of the landscape. Overall, the contrast created by the Proposed Action diminishes against the scale of the existing Flatiron Mesa and Beaver Creek Watershed landscape. The project area is not readily visible from I-70 or from County Roads 320 or 317 and the project design has resulted in screening the Proposed Action from view. Additional reductions in contrast would be realized by implementing the standard Best Management Practices (BMPs) related to reclamation and facility paint colors, and screening the production facilities from view (Appendix). With these mitigation measures, long-term visual impacts would be reduced and the Proposed Action would meet the VRM Class IV objective.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have similar types of impacts on visual resources as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Wastes – Hazardous or Solid

Affected Environment

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

BLM Instruction Memoranda numbers WO-93-344 and CO-97-023 require that all National Environmental Policy Act documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed project. The Glenwood Springs Resource Area, Oil & Gas Leasing & Development, Draft Supplemental Environmental Impact Statement (June 1998), Appendix L, Hazardous Substance Management Plan, contains a comprehensive list of materials that are commonly used for oil and gas projects. It also includes a description of the common industry practices for use of these materials and disposal of the waste products. These practices are dictated by various Federal and State laws and regulations, and the BLM standard lease terms and stipulations that would accompany any authorization resulting from this analysis. Among pertinent Federal laws dealing with hazardous materials are as follows:

- The Oil Pollution Act (Public Law 101-380, August 18, 1990) prohibits discharge of pollutants into Waters of the U.S., which by definition would include any tributary, including any dry wash that eventually connects with the Colorado River.
- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Public Law 96-510 of 1980) provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. It also provides national, regional, and local

contingency plans. Applicable emergency operations plans in place include the National Contingency Plan (40 CFR 300, required by section 105 of CERCLA), the Region VIII Regional Contingency Plan, the Colorado River Sub-Area Contingency Plan (these three are Environmental Protection Agency produced plans), the Mesa County Emergency Operations Plan (developed by the Mesa County Office of Emergency Management), and the BLM Grand Junction Field Office Hazardous Materials Contingency Plan.

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

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

Environmental Consequences

Proposed Action

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

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

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

Because of the use or production of solid and hazardous wastes, the potential exists for accidental contamination of surface water or groundwater. While uncommon, an accident could occur that would result in a release of one or more of these materials directly or indirectly into surface waters or in a way that poses a potential for transport to groundwater. For example, improper casing and cementing of the boreholes could result in the contamination of groundwater resources. Releases are also possible from tanks used for storage on the pads, from haul trucks used to transport materials to and from the pads, or

from pipelines. Storage tanks on the pad are required to be placed within an area of secondary containment equal to 110% of the volume of the enclosed tanks.

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

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have similar types of impacts from hazardous or solid wastes as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Water Quality – Surface and Ground

Surface Water

Affected Environment

The Flatiron Mesa development area is located 5 to 6 miles south of Rifle, Colorado, within the Beaver Creek watershed. The Proposed Action includes using the existing RU 34-6 pad in its present footprint, expanding the existing RU 13-6 pad and the RU 14-6 frac pad, and constructing the new RU 21-8 and RU 44-7 pads to provide safe operating space for drilling, completing, and operating 79 new Federal wells and six new fee wells.

The Proposed Action would occur within in the earlier Flatiron Mesa Master Development Plan boundary, which covers portions of two USGS 6th-code hydrologic unit watersheds. Most of the project area, including the portion where all proposed activities would occur, is within the Colorado River below Cache Creek unit, while the southeastern portion is within the Colorado River at Silt unit. The project area drains toward three different streams, each of which empties directly into the Colorado River approximately 2 miles north of the northern boundary. The western portion of the project area, including most of the disturbed area, drains west toward Beaver Creek; the northern portion, including the RU 23-5 pad site, drains north toward Helmer Gulch; and the southeastern portion drains toward Ramsey Creek.

According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37) (CDPHE 2007), the unnamed ephemeral drainages that drain most of the project area are within segment 4a, which includes most tributaries to the Colorado River from its confluence with the Roaring Fork River to a point immediately below its confluence with Parachute Creek. Following is a brief description of segment 4a.

- Segment 4a – This segment has been classified aquatic life cold 2, recreation 2, water supply, and agriculture. Aquatic life cold 2 indicates that this water course is not capable of sustaining a wide variety of cold or warm water biota due to habitat, flows, or uncorrectable water quality conditions. Recreation class 2 refers to waters that are not suitable or intended to become suitable

for primary contact recreation. This segment is, however, suitable or intended to become suitable for potable water supplies and agricultural purposes that include irrigation and livestock use.

Beaver Creek crosses a portion of the project area. Beaver Creek is within WQCC segment 7, which includes the mainstem of several perennial streams within the same area covered by segment 4a. Following is a brief description of segment 7.

- Segment 7 – This segment has been classified as aquatic life cold 1, recreation 1a, water supply, and agriculture. Aquatic life cold 1 indicates that this water course is currently capable of sustaining a wide variety of cold water biota, including sensitive species, or could sustain such biota but for correctable water quality conditions. Recreation class 1a refers to waters with existing primary contact uses. Water supply and agriculture are as described for segment 4a.

All streams within segment 4a are on the State of Colorado’s 303(d) List of Water Quality Limited Segments Requiring TMDLS (CDPHE, WQCC Regulation No. 93) (CDPHE 2010) for naturally high levels of selenium; no streams within segment 7 are on this list.

The USGS has collected limited surface water flow and quality data at sites along Beaver Creek near the project area (USGS 2007). Data were also collected from the Colorado River below the project area near Rulison in 1977 and 1978 (Table 16).

Table 16. Selected Water Quality Data for Two Sampling Locations near the Project Area		
Parameter	Beaver Cree near Silt, CO USGS Site #09092500; Date: 10/8/1976	Colorado River below Rulison, CO; USGS Site #09092570; Date: 4/8/1977
Instantaneous discharge (cfs)	2.6	1,560
Temperature, water (°C)	10.0	11.0
Field pH (standard units)	8.6	8.1
Specific conductance (µS/cm/cm at 25°C)	950	1,200
Calcium (mg/L)	74	74
Magnesium (mg/L)	17	17
Sodium (mg/L)	110	160
Sodium adsorption ratio	3	4.4
Potassium (mg/L)	3.8	4.8
Bicarbonate (mg/L)	170	160
Chloride (mg/L)	150	230
Sulfate (mg/L)	130	160
Selenium (µg/L)	1	1
Dissolved oxygen (mg/L)	10.8	10.4
COD, high level, unfiltered water (mg/L)	21	17.0
Organic nitrogen (mg/L)	0.12 (unfiltered)	0.28 (filtered)
Phosphorus, unfiltered water (mg/L)	0.01	0.02
Source: USGS 2007.		

Sediment is a pollutant of concern for the Colorado River Basin (CDPHE, WQCC Regulation No. 94). The closest downstream sediment measuring station on the Colorado River is USGS station 9093700 near De Beque, Colorado. For the period of 1974 to 1976 the mean sediment yield was 1,818 tons per day and varied between 8 and 41,300 tons per day. The median value for the same period was 267 tons per day (USGS 2007).

Environmental Consequences

Proposed Action

The Proposed Action includes using the existing RU 34-6 pad in its present footprint, expanding the existing RU 13-6 pad and RU 14-6 frac pad, and constructing the new RU 21-8 and RU 44-7 pads to provide safe operating space to drill, complete, and operate 79 Federal wells and six fee wells. These pad improvements would result in 29.51 acres of interim surface disturbance with 7.85 acres of long-term disturbance across the life of the producing wells. Building 0.44 mile of new road to access the RU 21-8 and RU 44-7 pads would result in 2.05 acres of new short-term disturbance and 1.45 acres of long-term impact. Buried pipelines to gather natural gas, produced water, and condensate would result in 6.38 acres of interim disturbance until pipeline revegetation is satisfactorily completed. Total short-term disturbance (37.94 acres) for the project would be comprised of 27.89 acres on BLM and 10.05 acres on private land. Long-term surface impacts (9.30 acres) being 7.54 acres on BLM and 1.76 acres on private (Table 3).

Direct impacts to the unnamed ephemeral tributaries of Beaver Creek and the Colorado River could occur but would be minimized and mostly avoided by many design features of the pad expansion, access road maintenance, cuttings placement, and buried pipeline installation. All road sections would be maintained and graveled, as needed. Pad expansion would be designed and positioned in the optimal location to take advantage of topography and avoid disturbances to drainages and steep slopes.

Potential impacts to surface water associated with the Proposed Action are associated with surface-disturbing activities, traffic, waste management, and the use, storage and transportation of fluids (i.e., chemicals, condensate, and produced water). Surface-disturbing activities associated with well and facility pads, roads, and pipelines result in loss of vegetation cover, soil compaction and displacement, increased volume and velocity of runoff, and increased sedimentation and, potentially, salinity in surface waters. Impacts can be minimized by implementing stormwater management BMPs, stockpiling topsoil, controlling erosion, and rehabilitating disturbed surfaces quickly.

Long-term soil protection would be achieved by continued road and pad maintenance to reduce erosion, by remediation of contaminated soils, and by minimizing the long-term pad disturbance footprints with interim reclamation. As proposed, these measures would include limiting cut slope steepness, step-cutting, crowning road surfaces, installing culverts and drainage systems, and applying gravel to all upgraded roads in the project area to a compacted thickness of 6 inches (Appendix).

Oil and gas waste management practices have the potential to contaminate soils and surface water. Contamination of soils could cause long-term reduction in site productivity, resulting in increased erosion and potential sediment and contaminant delivery to nearby waterways during runoff. Use, storage, and transportation of fluids such as produced water, hydraulic fracturing fluids, and oil condensate have the potential for spills that could migrate to surface water or groundwater. Elements of the Proposed Action are designed to minimize and mitigate risks to surface waters associated with the release and migration of drilling fluids, produced water, and condensate. A closed-loop drilling system would be implemented which recycles drilling fluids. Cuttings would be dried through the use of a shaker system, decontaminated to COGCC standards, and be stacked against the cutslope on the pad. A traditional

reserve pit would not be constructed. Completions may be conducted either onsite or from remote locations, and fluids may be stored in surface containment or a pit.

In addition to individual containment measures, the entire pad would be bermed to contain an accidental release on the pad. In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area to prevent migration to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure-tested to detect leakage prior to use. Implementation of the standard COAs for mitigating impacts to surface waters (Appendix) would minimize risks of adverse impacts associated with construction and ongoing production activities.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have potential for similar types of impacts to surface water as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Waters of the U.S.

Affected Environment

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

The existing Flatiron Mesa access road crosses Beaver Creek, which drains directly to the Colorado River approximately 2 miles north of the northern boundary of the project area. The access road also crosses two unnamed ephemeral drainages to the east of Beaver Creek, both of which empty into Beaver Creek near the northwestern corner of the project area and are potentially Waters of the U.S.

Environmental Consequences

Proposed Action

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

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have potential for similar types of impacts to surface water as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Groundwater

Affected Environment

The Lower Piceance Basin contains both alluvial and bedrock aquifers (CGS 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 wells are limited to 15 gallons per minute (gpm) administratively, while municipal wells are designed and constructed for maximum 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 present beneath higher portions 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 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. Although no primary (health-based) water quality standard has been established for TDS, the secondary (aesthetic, or non-health-based) standard for TDS in drinking water is 500 mg/L or less (USEPA 2006). Water quality of 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 contain relatively fresh water. However, water quality in the Piceance Basin is generally poor overall due to the presence of nahcolite deposits and salt beds throughout the basin. Only very shallow waters such as those from the surficial Wasatch Formation are used for drinking water (USEPA 2004).

According to the Colorado Division of Water Resources (CDWR), no fresh-water wells are found within the Flatiron Mesa project area boundary. Twenty registered wells are located within a 0.5-mile buffer of the boundary. The closest of these wells are located just under a mile east of the proposed RU 23-5 well pad, in Section 33, T6S, R93W, and Section 4, T7S, R93W. Wells with accompanying quantitative data listed well depths of 160 feet and water levels of 100 feet or less. Primary use for these five wells is

defined as domestic. Six registered fresh water wells are found just over a mile east of the RU 42-7 well pad in Section 9, 7S93W. Of these wells, three are monitoring wells and three are domestic-use wells. Well depths ranged between 135 and 320 feet, with water levels of 105 feet or less. Well yields were fair, ranging between 4 and 8 gallons per minute (gpm). Other wells identified within the buffer are shallow as well, two wells identified in Section 18 have well depths less than 12 feet, and are used primarily for stock purposes. Three domestic/stock wells are located in SWSE Section 36, T6S, and R94W within 400 feet of Beaver Creek. Only one of the wells is defined by quantitative data, which lists a well depth of 150 feet and a poor water yield of 1 gpm. Surface deposits within the FMMDP area are primarily alluvium and colluvium, so it is likely the wells are completed in alluvial aquifers, typical for this part of the basin.

Environmental Consequences

Proposed Action

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

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

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 2009). 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 1.0 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 1.0 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 well depth can be estimated.

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

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

Based on a review of available information on microseismic monitoring and fracture dimensions, Fisher and Warpinski (2011) concluded that fractures from deep horizontal wells are not a threat to propagate across the long vertical 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 shallow fresh-water wells are 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 space between the casing and borehole wall is sealed.

No single list of chemicals currently used in hydraulic fracturing exists for western Colorado, and the exact combinations and ratios used by operators are considered proprietary. However, the general types of compounds and relative amounts used are well known and relatively consistent (Table 17). Since fracture jobs are tailored to the downhole environment and companies are aware of the concerns involving hydraulic fracturing, the chemicals listed in Table 17 may or may not be used, and the information is provided solely as general information.

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

Although a variety of chemical additives are used in hydraulic fracturing—the examples in Table 17 being drawn from a total of 59 listed on the FracFocus website—the vast bulk of fluid injected into the formation during the process is water mixed with sand, representing 99.51% of the total by volume in the typical mixture shown in Table 17. The sand listed in the table is used as a proppant to help keep the newly formed fractures from closing.

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

In 2011, the COGCC published an analysis of 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.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would have potential for similar types of impacts to groundwater as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Wildlife

Aquatic Organisms

Affected Environment

Beaver Creek is a perennial stream located within the Flatiron Mesa project boundary. It is found in Section 12 on the western edge of the project area and is a tributary to the Colorado River. Fish surveys by Colorado Parks and Wildlife (CPW) and the U.S. Forest Service (USFS) have documented the presence of Green Lineage Colorado River cutthroat trout—a Federally listed threatened subspecies—in upper reaches of Beaver; see **Special Status Species** for detailed information.

A non-native sportfish introduced to the U.S. from Europe, the brown trout (*Salmo trutta*) occupies lower reaches of Beaver Creek. In Colorado, the brown trout has been widely stocked and established in

streams and lakes with warmer and less well oxygenated waters than required by other non-native trout and by native cutthroat trout and often becomes established.

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

Environmental Consequences

Proposed Action

Implementation of the Proposed Action has the potential to result in increases in erosion and sedimentation into nearby drainages and eventually the Colorado River. Because the Proposed Action includes summer use of the project areas, it is likely that roads and pads would not be muddy for extended periods of time. Roads are generally drier and in better condition during the non-winter months and consequently are less prone to erosion. Vehicular use during muddy road conditions could contribute to increased erosion of sediments into nearby ephemeral washes and eventually the Colorado River. The potential increase of sedimentation into the Colorado River would probably be nominal given background sediment loads currently carried by the river. Sediment-intolerant aquatic wildlife could be negatively affected, as increased erosion potential would persist and impair water and habitat quality. Measures to minimize erosion and sedimentation of aquatic environments are included in the COAs (Appendix).

No Action Alternative

Under the No Action Alternative, one private well pad (RU 44-7), six new fee wells, and the associated buried and collocated natural gas, produced water and condensate pipelines would still be implemented as these developments would occur on private land without any further Federal authorizations. Although to a lesser degree than the Proposed Action, the No Action Alternative would have potential for similar types of impacts to aquatic biota as a result of ongoing activities on Federal and private lands and new activities on private lands within the Flatiron Mesa field.

Migratory Birds

Affected Environment

The project area includes pinyon-juniper woodlands, sagebrush grasslands, and Gambel oak thickets as the elevation increases on Flatiron Mesa. Given this vegetation, the project area provides cover, forage, breeding, and nesting habitat for a variety of migratory birds.

Species on the U.S. Fish and Wildlife Service (2008) list of Birds of Conservation Concern (BCC) for the project region include two species associated with pinyon-juniper woodlands, the pinyon jay (*Gymnorhinus cyanocephalus*) and juniper titmouse (*Baeolophus griseus*). Another BCC species, Cassin's finch (*Haemorhous cassinii*), nests in higher elevation montane and subalpine conifer forests but commonly moves into pinyon-juniper woodlands following nesting and throughout winter. None of these

species was observed during the most recent survey (WWE 2014). Non-BCC species associated with this habitat type include the broad-tailed hummingbird (*Selasphorus platycercus*), black-chinned hummingbird (*Archilochus alexandri*), western kingbird (*Tyrannus verticalis*), Say's phoebe (*Sayornis saya*), gray flycatcher (*Empidonax oberholseri*), Townsend's solitaire (*Myadestes townsendii*), American robin (*Turdus migratorius*), mountain bluebird (*Sialia sialis*), plumbeous vireo (*Vireo plumbeus*), gray vireo (*V. vicinior*), blue-gray gnatcatcher (*Polioptila caerulea*), black-throated gray warbler (*Dendroica nigrescens*), chipping sparrow (*Spizella passerina*), lark sparrow (*Chondestes grammacus*), and lesser goldfinch (*Spinus psaltria*).

Areas of mountain shrubs such as mountain-mahogany and serviceberry, although limited, have the potential to attract additional non-BCC species such as the black-headed grosbeak (*Pheucticus melanocephalus*) and spotted towhee (*Pipilo maculata*).

Sagebrush habitats may support one BCC species associated almost entirely with sagebrush steppe, the Brewer's sparrow (*Spizella breweri*), as well as other migrants such as the western meadowlark (*Sturnella neglecta*), vesper sparrow (*Pooecetes gramineus*), and lark sparrow. Based on the extent and quality of the sagebrush, the habitat is marginal for Brewer's sparrow and outside the normal range of the sagebrush sparrow (*Artemisiopiza belli*), another obligate on sagebrush occurring in the Wyoming Basin of northwestern Colorado.

Oakbrush and mixed mountain shrub habitats in the area are suitable for migrants such as common poorwill (*Phalaenoptilus nuttallii*), dusky flycatcher (*Empidonax oberholseri*), western scrub-jay (*Aphelocoma californica*), Virginia's warbler (*Oreothlypis virginiae*), MacGillivray's warbler (*Oporornis tolmiei*), spotted towhee (*Pipilo maculatus*), green-tailed towhee (*P. chlorurus*), black-headed grosbeak (*Pheucticus melanocephalus*), and lazuli bunting (*Passerina amoena*).

See the following subsection for a discussion of raptors, resident passerines, and upland fowl.

Environmental Consequences

Proposed Action

The Proposed Action would result in a loss of nesting, roosting, perching, and foraging habitat for migratory birds on disturbed areas and reduce habitat effectiveness adjacent to areas where disturbance-related effects could be expected. The various new pads and pad expansions in the Flatiron Mesa area would result in 37.94 acres of surface disturbance with 27.89 acres occurring on BLM. These changes to the habitat could negatively affect bird species that require large expanses of intact habitat. Habitat fragmentation could result in increased competition, increased exposure to predators, and a higher likelihood of nest parasitism. It is also possible that individual nests could be destroyed if the well pad, pipeline, and production facilities are constructed during the nesting season.

In addition to the physical loss of habitat and habitat fragmentation, it is possible that during construction activities, individual birds could be displaced to adjacent habitats due to noise and human presence. Effects of displacement could include increased risk of predation or failure to reproduce if adjacent habitat is at carrying capacity. Furthermore, impacts to birds at the species or local population level could include a change in abundance and composition as a result of cumulative habitat fragmentation from energy development in the larger area. Impacts to migratory bird species that nest in pinyon-juniper and sagebrush habitats can be minimized by avoiding surface-disturbing activities during the nesting season. take place outside the nesting season.

All migratory bird species are protected by the Migratory Bird Treaty Act (MBTA), which makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds. Consistent with Executive Order 13186 and BLM Colorado guidelines, CRVFO has established as a COA (Appendix) a Timing Limitation (TL) prohibiting initiation of vegetation removal or ground-disturbing activities during the period **May 15 to July 15**, the peak period for incubation and brood rearing among migratory birds in the project vicinity. The BLM may grant an exception to this COA if surveys by a qualified biologist during the nesting season of BCC species potentially present indicate no active nests within 30 meters (100 feet) of the disturbance area.

Also for the protection of migratory birds is a COA specifying that any pits containing fluids must be fitted with one or more devices to avoid or minimize exposure to the fluids by migratory birds (Appendix). Such exposures could result in acute toxicity or compromised insulation or buoyancy due to dissolution of protective oil on the feathers.

No Action Alternative

Under this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would create impacts to migratory birds from the RU 44-7 pad, road and pipeline construction, the drilling and completion of the six fee wells on the RU 44-7 pad and the continued operation of the 60 Federal wells in the Flatiron Mesa field.

Other Terrestrial Species

Affected Environment

The project area would be located in medium density pinyon-juniper woodlands with openings of sagebrush; dense mountain brush becomes more predominant at the higher elevations of the project area with aspen stands at the highest elevations. 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 species.

MAMMALS

The project area is within overall ranges of mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsoni*), which are recreationally important species that are common throughout suitable habitats in the region. Because of its low elevation the project area is primarily winter range, which means that deer and elk populations increase during the winter months when animals migrate to lower elevations from the Battlements to the south. Winter densities of big game animals in a given area are dependent on the type of habitat present and the severity of the winter. Deeper snows and colder temperatures result in increase in the number of big game animals using the area. Although most of the area is mapped as mule deer winter range, the project area also receives use by deer during the summer.

Large carnivores potentially present in the project vicinity include the mountain lion (*Felis concolor*), which moves seasonally with its preferred prey, the mule deer, and the black bear (*Ursus americanus*). Black bears are uncommon in the lowlands north of I-70 due to the scarcity of sufficient forest cover and

suitable foods (including acorns and berries). 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. Other small carnivores potentially present are the raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*) primarily along Beaver Creek and their close relatives the ringtail (*Bassariscus astutus*) and spotted skunk (*Spilogale gracilis*) in drier and more rugged, higher terrain and along smaller drainages.

Small mammals present within the planning area include rodents such as the rock squirrel (*Otospermophilus variegatus*), golden-mantled ground squirrel (*Callospermophilus lateralis*), least chipmunk (*Tamias minimus*), and packrat (bushy-tailed woodrat) (*Neotoma cinerea*) and lagomorphs such as the desert cottontail (*Sylvilagus audubonii*) and black-tailed jackrabbit (*Lepus californicus*). Rodents and, to a lesser extent, lagomorphs are the primary prey base for a variety of avian and mammalian predators.

BIRDS

Raptors potentially nesting in the area include the red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*A. striatus*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginiana*), and long-eared owl (*Asio otus*), the latter uncommonly. Two small owls potentially nesting in the area include a BCC species, the flammulated owl (*Psiloscoops flammeolus*), and a non-BCC species, the long-eared owl (*Asio otus*). The latter was located during biosurveys. Other raptors nesting in the vicinity and potentially visiting the project area during foraging include two BCC species, the golden eagle (*Aquila chrysaetos*) and prairie falcon (*Falco mexicanus*), both potential transients from suitable nesting sites on cliffs and rocky bluffs throughout the area. The carrion-feeding turkey vulture (*Cathartes aura*) is also likely to search the area for food. Two BCC species that nest in the general project region but are not expected to forage within or near the site are the bald eagle and prairie falcon (see the section on Special Status Species).

A raptor survey completed in July 2014 identified one occupied long-eared owl nest, one occupied Cooper's hawk nest, and two unoccupied Cooper's hawk nests within 0.25 mile of proposed pads and within 0.125 mile of proposed pipelines. Multiple black-billed magpie (*Pica hudsonia*) nests—sometimes used by smaller raptors for nesting—were also observed but apparently not used by raptors in 2014. One suspected American crow (*Corvus brachyrhynchos*) nest, documented in previous surveys, was severely dilapidated in 2014. Due to the transitory nature of many raptor species, the area will need to be resurveyed if the development is to be initiated in subsequent raptor nesting seasons (Appendix).

Passerine (perching) birds commonly found in the area include year-round residents such as the common raven (*Corvus corax*), American crow, black-billed magpie, western scrub-jay (*Aphelocoma californica*), mountain chickadee (*Poecile gambeli*), and house finch (*Haemorhous mexicanus*). These are in addition to passerines described under Migratory Birds and Special-Status Species.

REPTILES AND AMPHIBIANS

The project area is within elevational range of most reptile species known to occur in Garfield County. Species most likely to occur include the short-horned lizard, (*Phrynosoma hernandesi*), western fence lizard (*Sceloporus undulatus*), tree lizard (*Urosaurus ornatus*), and gopher snake (bullsnake) (*Pituophis catenifer*) in pinyon-juniper woodlands, sagebrush shrublands, or grassy clearings. Other reptiles potentially present along riparian areas are the milk snake (*Lampropeltis triangulum*), western terrestrial garter snake (*Thamnophis elegans*), and smooth green snake (*Liochlorophis vernalis*).

The area is also within the known range of Woodhouse's toad (*Anaxyrus woodhousii*), and western chorus frog (*Pseudacris triseriata*). Within the CRVFO and vicinity, Woodhouse's toad occurs primarily along ephemeral washes that do not support fish and contain pools of water for a period of at least a few weeks every spring. The western chorus frog occurs primarily in cattail and bulrush wetlands and along the vegetated margins of seasonal or perennial ponds and slow-flowing streams.

Environmental Consequence

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 37.94 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 this alternative, construction of the RU 44-7 fee pad, drilling and development of the six fee wells proposed for that pad and the ancillary private road and pipeline improvements would occur. The operation of the 60 Federal wells within the FMMDP project area would also continue. Although to a lesser degree than the Proposed Action, the No Action Alternative would create impacts to migratory birds from the RU 44-7 pad, road and pipeline construction, the drilling and completion of the six fee wells on the RU 44-7 pad and the continued operation of the 60 Federal wells in the Flatiron Mesa field.

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 activities,

many existing and future actions will continue or begin to have adverse effects on various elements of the human and natural environment. Anticipated impacts for existing and future actions range from negligible to locally major, and primarily negative, for specific resources.

The primary bases for this assessment are twofold: First, although the rate of development, including oil and gas development, has slowed in recent years due to the general economic downturn and depressed natural gas prices, some development continues to occur, adding to the previous residential, commercial, and industrial growth and to the previous habitat loss, modification, and fragmentation. Second, residential and commercial expansion, as well as most of the oil and gas development, has occurred on private lands where mitigation measures designed to protect and conserve resources may not be in effect to the same extent as on BLM lands. 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.

Based on the above, the Proposed Action would contribute to the collective adverse impact for some resources. Although the contribution would be minor, the Proposed Action would contribute incrementally to the collective impact to air quality, native vegetation, migratory birds, terrestrial wildlife, and other resources.

PERSONS AND AGENCIES CONSULTED

Colorado Oil and Gas Conservation Commission – Dave Kubeczko

Summit – Tracey Jensen, Cameron Bingham

WPX Energy: April Mestas, Adam Tankersley, Kent Rider, Wally Hammer, Kris Meil, Eric DeKam, Wayne Gallahan,

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 18.

Table 18. BLM Interdisciplinary Team Authors and Reviewers		
<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
John Brogan	Archaeologist	Cultural Resources, Native American Religious Concerns
Jim Byers	Natural Resource Specialist	EA Project Lead, Access & Transportation, Socioeconomics, Wastes-Hazardous or Solid, Air Quality, Noise, Soils, Surface Water, Waters of the U.S.
Allen Crockett, Ph.D.	Supervisory Natural Resource Specialist	Technical Review, NEPA Review
Bob Hartman	Petroleum Engineer	Downhole COAs
Julie McGrew	Realty Specialist	Visual Resources, Realty Actions
Judy Perkins, Ph.D.	Botanist	Invasive Nonnative Species, Special Status Plants, Vegetation
Sylvia Ringer	Wildlife Biologist	Migratory Birds, Special Status Species Animals, Aquatic and Terrestrial Wildlife

Table 18. BLM Interdisciplinary Team Authors and Reviewers

<i>Name</i>	<i>Title</i>	<i>Areas of Participation</i>
Todd Sieber	Geologist	Geology and Minerals, Groundwater, Paleontology

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APPENDIX

**SURFACE-USE CONDITIONS OF APPROVAL
Flatiron Mesa Phase 2 Development Project**

Including Site-Specific COAs for following project components

**RU 44-7 Pad
RU 34-6 Pad
RU 21-8 Pad
RU 13-6 Pad
RU 14-6 Frac Pad
Pipelines**

**DOWNHOLE CONDITIONS OF APPROVAL
for the
RU 44-7 Wells
RU 34-6 Wells**

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SURFACE-USE CONDITIONS OF APPROVAL
Flatiron Mesa Phase 2 Development Project
DOI-BLM-CO-N040-2014-0093-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 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. 12.

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

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. 12. 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 plans, which include contours and indicate irregular rather than smooth contours as appropriate for visual and ecological benefit; timeline for drilling completion, interim reclamation earthwork, and seeding; soil test results and/or a soil profile description; amendments to be used; soil treatment techniques such as roughening, pocking, and terracing; erosion control techniques such as hydromulch, blankets/matting, and wattles; and visual mitigations if in a sensitive VRM area.
 - b. Deadline for Interim Reclamation Earthwork and Seeding. Interim reclamation to reduce a well pad to the maximum size needed for production, including earthwork and seeding of the interim reclaimed areas, shall be completed within 6 months following completion of the last well planned to be drilled on that pad as part of a continuous operation. If a period of greater than one year is expected to occur between drilling episodes, BLM may require implementation of all or part of the interim reclamation program.

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

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

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

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

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 Attachment 1 of the letter provided to operators dated September 9, 2014).

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.

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

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

- g. Mulch. Mulch shall be applied within 24 hours following completion of seeding in project areas within pinyon-juniper, sagebrush shrubland, and/or salt desert shrub habitat types. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil. Mulch shall not be used within mountain shrub or spruce-fir forest habitat types, unless requested or approved by the BLM.

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), including GPS data in accordance with the February 27, 2014, letter to operators, shall be submitted to BLM by **December 1**.

9. Big Game Winter Range Timing Limitation. To minimize impacts to wintering big game, no construction, drilling or completion activities shall occur during a Timing Limitation (TL) period from **January 16 through April 29 annually**.
10. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to “take” of either eagle species. Under the Eagle Act, “take” includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5 miles from a nest that may disturb eagles, shall be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative to the BLM Field Office (970-876-9051).
11. Raptor Nesting. To protect nesting raptors, a survey shall be conducted prior to construction, drilling, or completion activities that are to begin during the raptor nesting season (February 1 to August 15). The survey shall include all potential nesting habitat within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. Results of the survey shall be submitted to the BLM. If a raptor nest is located within the buffer widths specified above, a 60-day raptor nesting TL will be applied by the BLM to preclude initiation of construction, drilling, and completion activities during the period of **March 1 to May 1**. The operator is responsible for complying with the MBTA, which prohibits the “take” of birds or of active nests (those containing eggs or young), including nest failure caused by human activity (see COA for Migratory Birds).
12. Migratory Birds – Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all vegetation removal or surface disturbance in previously undisturbed lands that provide potential nesting habitat for Birds of Conservation Concern (BCC) is prohibited from **May 15 to July 15**. An exception to this TL may be granted if nesting surveys conducted no more than one week prior to surface-disturbing activities indicate that no BCC species are nesting within 30 meters (100 feet) of the area to be disturbed. Nesting shall be deemed to be occurring if a territorial (singing) male is present within the distance specified above. Nesting surveys shall include an audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 AM under favorable conditions for detecting and identifying a BCC species. This provision does not apply to ongoing construction, drilling, or completion activities that are initiated prior to May 1 and continue into the 60-day period at the same location.
13. Migratory Birds – 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.

14. 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 must be protected until notified to proceed by the BLM.

Where feasible, the operator shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM of any finds. The BLM 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.

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

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

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

Antiquities, historic ruins, prehistoric ruins, and other cultural or paleontological objects of scientific interest that are outside the authorization boundaries but potentially affected, either directly or indirectly, by the Proposed Action shall also be included in this evaluation or mitigation. Impacts that

occur to such resources as a result of the authorized activities shall be mitigated at the operator's cost, including the cost of consultation with Native American groups.

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

16. 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.

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.

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

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. 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.

19. 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.

PROJECT-SPECIFIC COAS APPLICABLE TO THE FOLLOWING PROJECT COMPONENTS

RU 44-7 Well Pad, Road, and Pipeline

Hydro-axe equipment shall be used to clear vegetation from the pad construction footprint and road and pipeline corridors prior to topsoil stripping and windrowing or storage.

The entire access road serving the RU 44-7 pad shall be surfaced with a minimum 6-inch depth of gravel. New culverts shall be installed during the road improvement work based on BLM/WPX field review prior to construction work.

RU 34-6 Well Pad

The topsoil on the north end of the pad shall be pushed and windrowed approximately 30 feet north to provide storage envelope for the excess material from the construction of cuttings trench. The excess material and boulders from the east-side pad expansion will be placed on top of the existing east-side excess pile.

RU 21-8 Well Pad and Road

A perimeter fence capable of holding grazing livestock shall be installed prior to pad construction around the pad perimeter to help provide a barrier to grazing livestock during the drilling/completion phase and mitigate potential surface impacts to surrounding special status plant species and /or habitat. In areas where Harrington's penstemon plants are present within 10 meters of the edge of disturbance, a botany monitor approved by the BLM shall be present on the site during all temporary fence installation and removal to prevent negative impacts to adjacent plants.

During vegetation clearing for the pad, the trees and brush shall be grubbed, broken down with construction equipment and windrowed at the outside edge of the pad perimeter just beyond the topsoil windrow.

Round all corners of the pad to minimize pad disturbance at the pad corners.

The entire access road serving the RU 21-8 pad shall be surfaced with a minimum 6-inch depth of gravel. New culverts shall be installed during the road improvement work based on BLM/WPX field review prior to construction work.

RU 13-6 Well Pad and Road

A perimeter fence capable of holding grazing livestock shall be installed prior to pad construction around the pad perimeter to help provide a barrier to grazing livestock during the drilling/completion phase and mitigate potential surface impacts to surrounding special status plant species and /or habitat. In areas where Harrington's penstemon plants are present within 10 meters of the edge of disturbance, a botany monitor approved by the BLM shall be present on the site during all temporary fence installation and removal to prevent negative impacts to adjacent plants. The new perimeter fence installed along the northern extent of the pad shall be connected into the existing east-west aligned range fence to maintain the integrity of the pasture fence boundary.

During vegetation clearing for the pad, the trees and brush shall be grubbed, broken down with construction equipment and windrowed at the outside edge of the pad perimeter just beyond the topsoil windrow.

Round all corners of the pad to minimize pad disturbance at the pad corners.

The entire access road serving the RU 13-6 pad shall be surfaced with a minimum 6-inch depth of gravel. New culverts shall be installed during the road improvement work based on BLM/WPX field review prior to construction work.

RU 14-6 Remote Frac Pad and Surface Lines

The northernmost corner of the pad shall be shifted approximately 50-75 east to avoid surface disturbance to the known Harrington's penstemon plants growing in the vicinity.

During vegetation clearing for the pad, the trees and brush shall be grubbed, broken down with construction equipment and windrowed at the outside edge of the pad perimeter just beyond the topsoil windrow.

A perimeter fence capable of holding grazing livestock shall be installed prior to pad construction around the pad perimeter to help provide a barrier to grazing livestock during the drilling/completion phase and mitigate potential surface impacts to surrounding special status plant species and /or habitat. In areas where Harrington's penstemon plants are present within 10 meters of the edge of disturbance, a botany monitor approved by the BLM shall be present on the site during all temporary fence installation and removal to prevent negative impacts to adjacent plants.

Round all corners of the pad to minimize pad disturbance at the pad corners.

The access road spurs including a drive-through way across the RU 14-6 pad shall be surfaced with a minimum 6-inch depth of gravel. The RU 14-6 pad shall be surfaced with suitable gravel to withstand the all-weather frac operations planned for this remote frac location.

The 10-inch fused poly surface water supply line shall be temporarily laid in a cross-country alignment north from the RU 11-7 water storage facility to the Flatiron Mesa Road, and then laid further north alongside the Flatiron Mesa Road to the RU 14-6 pad where well completion operations are to be remotely conducted. A botany monitor shall be required during the surface line installation to guide the line location work around areas with Harrington's penstemon plants.

PROJECT-SPECIFIC COAS APPLICABLE TO BURIED GAS, WATER, AND CONDENSATE PIPELINES IN THE FLATIRON MESA FIELD

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

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. Project staking including trench centerlines and offset limits along the disturbance corridor shall be completed to the satisfaction of the AO prior to commencing any surface disturbing activities. Furthermore, all old flagging along alternate routes or unnecessary flagging installed during the planning of this project shall be located and removed from the project area prior to construction start-up.

2. Pipeline Construction and Maintenance. The disturbance limits of the pipelines shall be staked and/or flagged prior to any commencement of operations. The width of the disturbance corridor for the pipeline work shall be 50 feet excluding any adjacent roadway. All trees and brush within the disturbance corridor shall be hydro-axed or chipped prior to beginning excavation work. 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.

The new welded steel natural gas pipeline operated by Red Rock Gathering shall be buried concurrently with the WPX water and/or condensate lines (authorized under separate right-of-way) in the same trench. The pipelines shall be buried within the authorized 50-foot right-of-way width. The pipelines shall be installed to industry and BLM "Gold Book" standards. (*Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development: The Gold Book. Fourth Edition—Revised 2007; (P-417 BLM/WO/ST-06/021+3071/REV 07.)*)

The pipeline(s) shall be buried with at least 4 feet of cover from the top of the pipe to the surface. 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.

To eliminate physical impediments to drill-seeding the reclaimed pipeline corridor and mitigate the visual impact of excavated white-faced boulders strewn across the right-of-way, the operator shall remove concentrations of boulders along the flatter segments of the corridor as directed by the BLM Authorized Officer.

All pipelines, buried or laid on the surface, would be tested with air compressed from the atmosphere.

The holder shall conduct all activities associated with the construction, operation, and termination of the right-of-way within the authorized limits of the right-of-way.

The holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the plan of development. Any relocation, additional construction, or use that is not in accord with the approved plan of development, shall not be initiated without the prior written approval of the authorized officer.

3. Indemnification. The operator agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601 *et seq.* or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*) on the ROW (unless the release or threatened release is wholly unrelated to the operator's activity in the ROW). This agreement applies without regard to whether a release is caused by the operator, its agent, or unrelated third parties.
4. Compliance with Laws and Regulations. The holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the operator shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601 *et seq.*) with regard to any toxic substances that are used, generated by, or stored on the ROW or on facilities authorized under the ROW grant (see 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193). Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b.

A copy of any report required or requested by any Federal agency or state government as a result of a reportable release of spill of any toxic substances shall be furnished to the BLM concurrent with the filing of the reports to the involved Federal agency or state government.

5. Private Landowners and Existing Rights-of-Way. The operator shall obtain agreements allowing construction with all existing authorized surface users of Federal ROW locations prior to surface disturbance or construction of the location, staging areas, or access across or adjacent to any existing ROW locations. In the case of privately owned surface, the operator shall certify to BLM that a Surface Use Agreement has been reached with the authorized surface user prior to construction.
6. Chemical Storage and Use. The operator shall not store hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating activities within 200 feet of any waterbody or dry drainage. Equipment or vehicles that are crossing or working within 200 feet of water bodies shall not be refueled unless the Environmental Inspector gives a specific exception. If any hazardous material must be temporarily stored or transferred within 200 feet of a waterbody (i.e. stationary pumps), then it must be placed within a secondary containment structure that is capable of containing 110 percent of the volume of the stored material.
7. Saturated Soil Conditions. When saturated soil conditions exist on or along the ROW any type of construction shall be halted until soil material dries out or is frozen sufficiently for construction to proceed without undue damage and erosion to soils.
8. As-Built Survey. An “as-built” center line survey of the right-of-way crossing Federal land, provided by a Certified Land Surveyor licensed to work in the State of Colorado, shall be provided to the AO within 2 months of completion of the project.
9. Utilities Locates. All existing pipelines, surface valves, and other utilities shall be field located, clearly marked, and the appropriate Utility Notification Center (www.unc.org) shall be notified before any construction/surface work occurs. All publicly owned underground facilities shall be marked according to the APWA color code.
10. Survey Monuments. The holder shall protect all survey monuments found within the right-of-way. Survey monuments include, but are not limited to, General Land Office and BLM Cadastral Survey Corners, reference corners, witness points, U.S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the holder shall immediately report the incident, in writing, to the authorized officer and the respective installing authority, if known. Where General Land Office or BLM right-of-way monuments or references are obliterated during operations, the holder shall secure the services of a registered land surveyor or a BLM Cadastral Surveyor to restore the disturbed Monument(s) and References using survey procedures found in the Manual of Surveying Instruction of the Survey of the Public Lands in the United States, latest edition. The holder shall record survey into the appropriate county and send a copy to the authorized officer.

PROJECT-SPECIFIC COAS FOR HARRINGTON’S PENSTEMON PROTECTION AND MITIGATION

The Operator shall incorporate the following steps to avoid, minimize, and mitigate impacts to Harrington’s penstemon:

1. Weed Control. Noxious weeds shall be treated where Harrington’s penstemon presence is confirmed prior to construction to minimize the threat to Harrington’s penstemon in the area. The BLM or a BLM-approved botany monitor shall be present to monitor the pre-treatment activities in areas occupied by Harrington’s penstemon

- A Pesticide Use Permit (PUP), specific to Harrington's penstemon sites, shall be obtained from the BLM prior to any herbicide treatment of noxious weeds within occupied Harrington's penstemon habitat.
 - Noxious weed treatments within occupied Harrington's penstemon habitat, and within a ½ mile buffer of occupied habitat, shall be restricted to spot spraying or wicking only. No broadcast spraying shall be permitted.
2. **Dust Control.** Dust control measures for construction activities shall be implemented in all areas within 100 meters of occupied Harrington's penstemon habitat, and limited to water only. No additive agents shall be used for dust control in these areas.
 3. **Pad Site Fencing and Use of Botany Monitor.** On the RU 21-8 pad, RU 13-6 pad, and RU 14-6 frac pad, a perimeter fence capable of holding grazing livestock shall be installed prior to pad construction around the pad perimeter to help provide a barrier to grazing livestock during the drilling/completion phase and mitigate potential surface impacts to surrounding special status plant species and /or habitat. In areas where Harrington's penstemon plants are present within 10 meters of the edge of disturbance, a botany monitor approved by the BLM shall be present on the site during all fence installation and removal to prevent negative impacts to adjacent plants.
 4. **Mulch.** No hay or straw mulch shall be used during reclamation within occupied Harrington's penstemon habitat areas. Hydromulch may be used if approved by the BLM prior to application.
 5. **Harrington's Penstemon Mitigation.** Because Harrington's penstemon plants will be directly impacted by the proposed project (see table below), the operator shall conduct the following prior to any surface disturbance work on the two pads where Harrington's penstemon is present at the highest densities (RU 13-6 and RU 21-8): (1) salvage whole plants using protocols approved by the Upper Colorado Environmental Plant Center (UCEPC) and the BLM, and using personnel approved by the BLM, and (2) transport salvaged plants to the UCEPC within 24 hours of collection. All Harrington's penstemon plants found within the mapped and staked disturbance area for the RU 13-6 pad and RU 21-8 pad and access road at the time of salvage shall be collected. Plants shall be dug up with sufficient surrounding soil to contain all of the plant roots. Plants shall be placed on plastic sheeting or tarp material within boxes, and watered sufficiently to keep soil and roots moist. Mulching material, such as rice straw matting, shall be placed over plants to retain moisture during transportation.

Harrington's Penstemon Plants, Flatiron Mesa Phase 2 Project Area	
<i>Location</i>	<i>Number of Plants</i>
RU 13-6 Disturbance Area	585
RU 21-8 and Road/Pipeline Disturbance Areas	794
Total Number of Plants for Salvage	1,379

If pad construction and plant salvage are delayed until after the 2015 Harrington's penstemon growing season, the operator shall either:

- Collect seed from Harrington's penstemon plants within the disturbance areas prior to disturbance (if sufficient seed is produced prior to construction), or
- Salvage whole plants from the disturbance areas prior to disturbance.

Which of these actions occurs shall be determined by the BLM depending on the time of construction and the potential for viable seed collection. Seed collection or plant salvage shall be performed by personnel approved by the BLM, using collection protocols approved by the UCEPC and the BLM. Seed collection shall occur only after seed has achieved ripeness, such that the seed is hard and cannot be dented or cut by a hard edge. Seed shall be collected in paper bags to prevent heating and molding. Collection bags shall be labelled with: (1) collection site location, including pad name and legal description, (2) plant species name, (3) collection date, and (4) name of the person making the collection.

In addition to the salvage portion of the mitigation described above, a total of \$15,000 shall be paid by WPX Energy to the UCEPC to cover the costs of plant propagation, harvest, cleaning, and testing of produced seed, and field sowing of seed on reclamation sites. Mitigation planting sites shall be within the reclaimed well pad areas and/or reclaimed pipelines at or near the locations of impacted Harrington’s penstemon occurrences, or, if agreed upon by both the BLM and the operator, in wildlife habitat improvement sites occurring within Harrington’s penstemon habitat.

If the UCEPC has the staffing capability to perform plant salvage and/or seed collection, they may be utilized to perform these tasks as described above. In this case, the amount paid by WPX to the UCEPC shall cover the costs of plant salvage and/or seed collection in addition to the plant propagation, seed harvest, cleaning, and testing, and reclamation seeding costs shown above.

f. Within the well pad reclamation areas and sections of the pipeline corridor occupied by Harrington’s penstemon, the seed mix shown in Table A-3 shall be used instead of CRVFO’s standard menu-based seed mix.

Table A-3. Seed Mix for Initial Seeding of Harrington’s Penstemon Sites¹				
<i>Common Name</i>	<i>Scientific Name</i>	<i>Variety</i>	<i>Season</i>	<i>Form</i>
Choose Five Grasses (50% of Total PLS)				
Bottlebrush Squirreltail	<i>Elymus elymoides, Sitanion hystrix</i>	VNS	Cool	Bunchgrass
Bluebunch Wheatgrass	<i>Pseudoroegneria spicata, Agropyron spicatum</i>	Secar, P-7, Anatone, Goldar	Cool	Bunchgrass
Indian Ricegrass	<i>Achnatherum [Oryzopsis] hymenoides</i>	Paloma, Rimrock	Cool	Bunchgrass
Needle and Thread Grass	<i>Hesperostipa [Stipa] comata</i>	VNS	Cool	Bunchgrass
Junegrass	<i>Koeleria macrantha</i>	VNS	Cool	Bunchgrass
Columbia Needlegrass	<i>Achnatherum nelsonii, Stipa columbiana</i>	VNS	Cool	Bunchgrass
Muttongrass	<i>Poa fendleriana</i>	VNS	Cool	Weakly Rhizomatous
Choose Three Forbs (30% of Total PLS)				
Arrowleaf Balsamroot	<i>Balsamorhiza sagittata</i>	Rocky Mountain Beeplant	<i>Cleome serrulata</i>	
Silverleaf Lupine	<i>Lupinus argenteus</i>	Scarlet Globemallow	<i>Sphaeralcea coccinea</i>	
Fernleaf Biscuitroot	<i>Lomatium dissectum</i>	Sulphur Flower Buckwheat	<i>Eriogonum umbellatum</i>	
Include One Shrub (20% of Total PLS)				
Fourwing Saltbush	<i>Atriplex canescens</i>	NA	NA	

¹ Because Harrington's penstemon was confirmed within the project area: (a) it shall be broadcast seeded into formerly occupied areas using seeds from the Upper Colorado Environmental Plant Center when available; and (b) mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*) shall be broadcast seeded into the reclaimed areas for the RU 21-8, RU 13-6, and RU 14-6 well pads and the RU 21-8 access roadside prior to snowfall using seeds collected adjacent to the well pads and RU 21-8 access roadside.

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-3). 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. *vaseyana*) shall be collected from plants in the vicinity of the 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.

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
Lease Number: COC50944 and COC
Pad(s): RU 44-7
Engineer: Shauna Kocman
Surface Location: Garfield County; SESE 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 the petroleum engineer 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, the petroleum engineer 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 utilized.
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 flare 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 to the petroleum engineer on the first well drilled on the pad or any horizontal well and record results in the IADC log. A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes. Report failed test to the petroleum engineer.
10. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format shall be submitted to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 48 hours. If the TOC is lower than required or the cement sheath of poor quality, a CRVFO petroleum engineer shall be notified for remedial operations within 48 hours from running the CBL and prior to commencing fracturing operations,

A greater volume of cement may be required to meet the 200-foot cement coverage requirement for the Williams Fork Formation /Mesaverde Group. Evaluate the top of cement on the first cement job on the pad (Temperature Log). If cement is below 200-foot cement coverage requirement, adjust cement volume to compensate for low TOC/cement coverage.
11. On the first well drilled on this pad, a triple combo open-hole log shall be run from the base of the surface borehole to surface and from TD to bottom of surface casing shoe. This log shall be in submitted within 48 hours in .las and .pdf format to: CRVFO – Todd Sieber, 2300 River Frontage Road, Silt, CO 81652. Contact Todd Sieber at 970-876-9000 or asieber@blm.gov for clarification.
12. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CFR 3160-9 (a).
13. Prior to commencing fracturing operations, the production casing shall be tested to the maximum anticipated surface treating/fracture pressure and held for 15 minutes without a 2% leak-off. If leak-off is found, the petroleum engineer 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 the petroleum engineer 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.

16. All surface casing strings must be set to a depth of 1,000 feet or deeper to protect potentially useable water zones. Please submit updated Geological and Drilling Prognosis for the wells with surface casing set less than 1,000' by Sundry Notice (Form 3160-5).

Contact Information

Colorado River Valley
 Petroleum Engineer

Office: (970) 876-9000
 CRVFO_PE@blm.gov

Bob Hartman
 Petroleum Engineer

Office: (970) 244-3041
 Cell: (970) 589-6735
 bhartman@blm.gov

List of Wells			
<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Locations</i>	<i>Bottom Hole Locations</i>
RU 44-7 Pad (Fee Surface)	RU 534-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 9
	RU 533-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 8
	RU 532-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 7
	RU 434-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 9
	RU 433-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 8
	RU 334-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 9
	RU 333-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 8
	RU 34-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 8
	RU 33-7	T7S R93W, Sect. 7 SESE	T7S R93W, Sect. 7 Lot 7

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
Lease Number: COC41916 COC50944
Pad(s): RU 34-6
Engineer: Bob Hartman
Surface Location: Garfield County; T7S R93W, Section 6 SWSE, 6th P.M.

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 the petroleum engineer 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, the petroleum engineer 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 30,000 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 to the petroleum engineer on the first well drilled on the pad or any horizontal well and record results in the IADC log. A failed pressure integrity test is more than 10% pressure bleed off in 15 minutes. Report failed test to the petroleum engineer.
10. As a minimum, cement shall be brought to 200 feet above the Mesaverde. After WOC for the production casing, a CBL shall be run to verify the TOC and an electronic copy in .las and .pdf format shall be submitted to CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652 within 48 hours. If the TOC is lower than required or the cement sheath of poor quality, a CRVFO petroleum engineer shall be notified for remedial operations within 48 hours from running the CBL and prior to commencing fracturing operations.

A greater volume of cement may be required to meet the 200-foot cement coverage requirement for the Williams Fork Formation /Mesaverde Group. Evaluate the top of cement on the first cement job on the pad (Temperature Log). If cement is below 200-foot cement coverage requirement, adjust cement volume to compensate for low TOC/cement coverage.
11. On the first well drilled on this pad, a triple combo open-hole log shall be run from the base of the surface borehole to surface and from TD to bottom of surface casing shoe. This log shall be in submitted within 48 hours in .las and .pdf format to: CRVFO – Petroleum Engineer, 2300 River Frontage Road, Silt, CO 81652. Contact 970-876-9000 for clarification.
12. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Pressure Integrity Test results within 30 days of completed operations (i.e. landing tubing) per 43 CFR 3160-9 (a).
13. Prior to commencing fracturing operations, the production casing shall be tested to the maximum anticipated surface treating/fracture pressure and held for 15 minutes without a 2% leak-off. If leak-off is found, the petroleum engineer 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 the petroleum engineer 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.
16. All surface casing strings must be set to a depth of 1,000' or deeper to protect potentially useable water zones. Please submit updated Geological and Drilling Prognosis for the wells with surface casing set less than 1,000' by Sundry Notice (Form 3160-5).

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List of Wells			
<i>Proposed Pads</i>	<i>Proposed Wells</i>	<i>Surface Location</i>	<i>Bottom Hole Locations</i>
RU 34-6 Pad (BLM Surface)	RU 33-6	T7S R93W, Sect. 6 SWSE	T7S R93W, Sect. 6 NWSE
	RU 332		T7S R93W, Sect. 6 Lot 7
	RU 334-6		T7S R93W, Sect. 6 SWSE
	RU 343-6		T7S R93W, Sect. 6 NESE
	RU 42-6		T7S R93W, Sect. 6 Lot 6
	RU 43-6		T7S R93W, Sect. 6 NESE
	RU 432-6		T7S R93W, Sect. 6 Lot 7
	RU 433-6		T7S R93W, Sect. 6 NWSE
	RU 434-6		T7S R93W, Sect. 6 SWSE
	RU 444-6		T7S R93W, Sect. 6 SESE
	RU 532-6		T7S R93W, Sect. 6 Lot 7
	RU 533-6		T7S R93W, Sect. 6 NWSE
	RU 543-6		T7S R93W, Sect. 6 Lot 6
	RU 544-6		T7S R93W, Sect. 6 SESE

FONSI
DOI-BLM-CO-N040-2014-0093-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 added to the existing well pad may commence only upon approval by BLM of the Application for Permit to Drill (APD). Similarly, surface-disturbing activities related to the natural gas and water pipeline installations on BLM land or the use of the existing BLM Flatiron Mesa Road to access the project area 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 will be incorporated as COAs for both surface and drilling operations and attached to APDs for Federal wells on the RU 44-7, RU 34-6, RU 21-8 and RU 13-6 well pads. Because no APDs have yet been submitted by WPX for the RU 21-8 and RU 13-6 pads, this EA has analyzed impacts based on information provided with the Notice of Staking (NOS) and does not include Downhole COAs for wells on the RU 21-8 and RU 13-6 wells. Surface-use and Downhole COAs consistent with CRVFO's standard practices (Appendix) will be attached to APDs for the RU 21-8 and RU 13-6 wells at such time as those APDs may be approved by the BLM. Furthermore, the mitigation measures outlined in the Appendix will be attached to the road and pipeline rights-of way to be amended as part of this decision.

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:



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

DATE: 9-22-14