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Colorado State Office

Colorado River Valley Field Office June 2010



West Mamm Master Development Plan **DOI-BLM-CO-N040-2010-0008-EA**



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Laramie Energy II, LLC

WEST MAMM MASTER DEVELOPMENT PLAN
DOI-BLM-CO-N040-2010-0008-EA

Garfield County, Colorado

Prepared by:

U.S. Department of Interior
Bureau of Land Management
Colorado River Valley Field Office
Silt, Colorado

In cooperation with:

USDA Forest Service
White River National Forest
Glenwood Springs, Colorado

and

Rifle Ranger District
Rifle, Colorado

June 2010

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FONSI
DOI-BLM-CO-N040-2010-0008-EA

The Bureau of Land Management (BLM), Colorado River Valley Field Office (CRVFO), has reviewed the attached Environmental Assessment of the West Mamm Master Development Plan (WMMDP) for oil and gas exploration and development proposed by Laramie Energy II, LLC. The project design and approved mitigation measures result in a Finding of No Significant Impact on the human environment for the selected alternative. Therefore, an Environmental Impact Statement under the National Environmental Policy Act is not necessary to analyze the impacts further.

DECISION RECORD

DECISION: It is my decision to approve the project as described in the Proposed Action (Alternative A) and Operator-Requested Alternative (Alternative B). These alternatives are identical except with regard to whether the White River National Forest (WRNF) would apply an elk winter range seasonal restriction as a condition for issuance of a Special Use Authorization for use of Forest Service Road (FSR) 818 to access the project. BLM would not apply a big game winter range TL to the approval of Applications of Permits to Drill (APDs) and related surface facilities, which would be located entirely on Fee (private surface, private mineral) land and outside elk winter range. Both Alternatives A and B involve drilling of up to 68 new Federal wells and 21 new Fee wells from two existing well pads and three proposed pads located in Sections 29 and 32, Township 7 South, Range 93 West and Section 5, Township 8 South, Range 93 West, of the Sixth Principal Meridian, in Garfield County, Colorado. The project would result in 10.5 acres of new surface disturbance and 0.06 mile of new access roads and pipelines, all on Fee land.

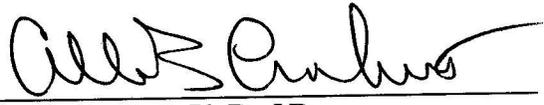
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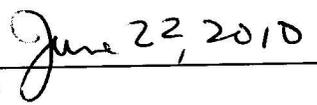
1. This decision will provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources associated with valid Federal oil and gas leases.
2. This decision does not authorize the development of new Federal oil and gas wells on new or existing well pads. Development of Federal wells shall not commence until approval by BLM approves APDs for the Federal wells, with applicable Conditions of Approval (COAs).
3. This decision does not authorize use of FSR818 (West Mamm Creek Road) to support development of the new Fee and Federal oil and gas wells. Use of FSR818 for that purpose pursuant to issuance by the WRNF of a Special Use Authorization is the purview of the Forest Supervisor.

MITIGATION: Environmental impacts will be avoided, minimized, or mitigated a variety of COAs to be attached to authorizations by the BLM for project-related work (Appendix A of the EA).

NAME OF PREPARER: Rebecca Beavers, Natural Resource Specialist, Project Lead

SIGNATURE OF AUTHORIZED OFFICIAL:


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


Date

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Executive Summary

Laramie Energy II, LLC (LEII) is proposing a 3- to 11-year development program for oil and gas approximately 9 miles south of Rifle, Garfield County, Colorado. The variation in duration would depend on whether one or two drill rigs are used, and whether LEII is allowed to access the project area across National Forest System (NFS) land during the winter in conjunction with development of the proposed Federal and Fee wells. The proposal, known as the West Mamm Master Development Plan (WMMDP), covers an area of 983 acres in portions of Section 29 and 32, Township 7 South, Range 93 West, and Section 5, Township 8 South, Range 93 West, Sixth Principal Meridian. Surface ownership comprises 241 acres of Fee land (private surface, private minerals), 82 acres of split-estate land (private surface, Federal minerals), and 660 acres of NFS land with underlying Federal minerals. The NFS land is administered by the Rifle Ranger District of the White River National Forest (WRNF). The private landowner is the Johnson family, who use the area for recreation. Mineral ownership within the WMMDP area consists of 742 acres of Federal oil and gas leases, including 61.7 acres in Federal Lease COC73256 and 20 acres in Federal Lease COC67149 underlying the split-estate land and 660 acres in Federal Lease COC67150 underlying the NFS land. The remaining 241 acres of the WMMDP area is underlain by private minerals.

The Proposed Action—and an Operator-Requested Alternative that is identical in most respects except that it would include wintertime development activities—consists of constructing, drilling, completing, and operating up to 89 new wells (68 Federal, 21 Fee) from three new well pads and two existing well pads located on private surface. These new wells would be in addition to six existing wells (three Federal and three Fee) on two existing pads within the WMMDP area. Like the two existing well pads, the three proposed pads would be located on Fee land, with the Federal wells drilled directionally into adjacent Federal leases. No NFS land would be directly affected by the well pads and associated surface facilities. However, the adjacent NFS land would be subject to direct and indirect impacts to wildlife as a result of intensive oil and gas activities. Additionally, existing Forest Service Road 818 (FSR818) would be used to access the development area, and up to 1 acre of new disturbance could occur in conjunction with road and drainage improvements. A Special Use Authorization from the WRNF would be required for LEII to use this route to access the WMMDP area.

Drilling and completion—the latter consisting of hydraulic fracturing to increase the flowrate of natural gas from the targeted bedrock formation—would require approximately 40 to 50 days for each well. LEII would use one or drilling rigs. After removing drilling and completion equipment off the pad and performing interim reclamation, each pad would continue to include separators and storage tanks for produced water and condensate (liquid hydrocarbons) in addition to the wellheads.

The three new pads would result in approximately 10.1 acres of surface disturbance, of which approximately 3.6 acres would be long-term impacts following interim reclamation to reduce the pad sizes to the minimum amount needed to accommodate long-term production. New access roads and pipelines would result in another 0.4 acre of new surface disturbance (along 0.06 mile of road and collocated pipeline length), of which approximately 0.2 acre would be long-term impacts following reclamation of areas disturbed temporarily during construction. These impacts would be in addition to those associated with the two existing pads (8.9 acres initial disturbance, 2.4 acres long-term) and collocated roads and pipelines (8.9 acres initial disturbance, 5.4 acres long-term disturbance).

At the end of its productive life, estimated at approximately 30 years, each well would be plugged. Following plugging of all wells on a pad, the pad would undergo final reclamation to return the area to the approximate original contours or an alternative configuration requested by the private landowner and to reestablish a self-sustaining plant cover, also consistent with the wishes of the private landowner. The access roads would also be reclaimed unless the private landowner requests that they remain.

The BLM, Colorado River Valley Field Office (CRVFO), administers the Federal mineral estate within the WMMDP area. The WRNF, Supervisor's Office, administers surface use of NFS lands within the WMMDP area and along FSR818, the access route to the project area. The CRVFO Interagency Energy Team has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA). The WRNF is a Cooperating Agency on the project.

The BLM CRVFO Field Manager is responsible for:

- Decisions affecting proposed Federal wells, including pad layout, surface facilities, spur roads, pipelines, and downhole well design, construction, and operation, to be authorized through the approval of Applications for Permits to Drill (APDs) submitted by LEII for each Federal well.
- Enforcement of surface use-and downhole Conditions of Approval (COAs) attached to this EA and the individual APDs for the proposed Federal wells.

The WRNF Forest Supervisor is responsible for:

- Decisions affecting use by LEII of the existing FSR818 access route, to be authorized through issuance of a Special Use Authorization.
- Enforcement of special terms and conditions attached to the Special Use Authorization.

All aspects of the Proposed Action would be subject to the application and enforcement of best management practices (BMPs) and mitigation measures specified by BLM and WRNF under their regulatory authority. These protections are discussed in the body of this EA and listed in Appendix A. Responses to public comments on the Proposed Action, published on BLM's website and in local newspapers during scoping, are provided in Appendix B. The Master Surface Plan of Operations and Master Drilling Plan submitted by LEII are provided in Appendices C and D, respectively.

The bulk of this EA analyzes and discloses impacts to surface and subsurface resources under three development scenarios: the Proposed Action (Alternative A), the Operator-Requested Alternative (Alternative B), and a No Action Alternative (Alternative C). Alternatives A and B are identical except as follows: Under the Proposed Action (Alternative A), the WRNF would apply a seasonal restriction prohibiting use of FSR818 to support construction, drilling, or completion activities from December 1 through April 14 of each year. This restriction would not apply to traffic on FSR818 associated with production or maintenance activities. Under the Operator-Requested Alternative (Alternative B), the WRNF would apply the seasonal restriction to traffic in support of construction, drilling, and completion activities during the first year of well development but would not apply the restriction to such activities in subsequent years if one new well has been drilled or one new pad has been constructed. This provision is intended to avoid physical habitat removal during the winter season while shortening the total duration of drilling and completion activities.

Under both Alternatives A and B, the WRNF would apply a seasonal restriction to prohibit use of FSR818 to support construction, drilling, or completion activities during the elk calving season of May 1 through June 20 of each year, except that such use would be allowed during these dates for a well pad, road, and pipeline constructed outside the season. The latter provision is intended to avoid physical habitat removal during the calving season while not unduly lengthening the total duration of drilling and completion activities in the project area.

The No Action Alternative would consist of denial by BLM of APDs for the proposed Federal wells and by WRNF of authorization to use FSR818 in conjunction with the Federal wells. However, the 21 proposed Fee wells would be allowed under the authority of the Colorado Oil and Gas Conservation Commission (COGCC). Seasonal restrictions on use of FSR818 could be applied by the WRNF.

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1. INTRODUCTION

Laramie Energy II, LLC (LEII) is proposing a 3- to 11-year development program for natural gas on private lands within a total project area of approximately 983 acres located in the Piceance Basin approximately 9 miles south of Rifle, Garfield County, Colorado. The project area includes portions of Sections 29 and 32, Township 7 South, Range 93 West, and Section 5, Township 8 South, Range 93 West, Sixth Principal Meridian (Figure 1).

This proposal, referred to as the West Mamm Master Development Plan (WMMDP), arises from the successfully demonstrated potential of the area to contain economically viable reserves of natural gas from wells drilled and completed by LEII in 2008. The total of 983 acres within the WMMDP area includes 660 acres of Federal surface underlain by Federal minerals, 82 acres of split-estate land (private surface underlain by Federal minerals), and 241 acres of Fee lands (private surface underlain by private minerals). Figure 2 shows project components in relationship to surface ownership. Figure 3 shows project components in relation to mineral ownership. It is the policy of the BLM Colorado River Valley Field Office (CRVFO) to include the entirety of the targeted Federal oil and gas leases within an MDP project area, along with applicable and adjacent private lands. The White River National Forest (WRNF), Supervisor's Officer, administers surface use of NFS lands within the WMMDP area.

The CRVFO Interagency Energy Team has prepared this Environmental Assessment (EA) in conformance with the National Environmental Policy Act (NEPA). The WRNF is a Cooperating Agency on the project. The EA discloses the direct, indirect, and cumulative impacts of Alternative A (Proposed Action), including a seasonal restriction on use of the access route across National Forest System (NFS) lands within the WRNF during the winter to protect use by elk; Alternative B (Operator-Requested Alternative), identical to Alternative A except not including a winter seasonal restriction on use of the access route across NFS lands after one new well has been drilled or one new pad constructed; and Alternative C (No Action Alternative), constituting denial of the proposed Federal wells and access across NFS lands to support the development of the Federal wells. The variation in duration of the project, from 3 to 5 years with two drill rigs or 6 to 11 years with one drill rig, would depend on whether LEII is allowed to access the project across NFS lands during the winter period of December 1 through April 14.

This proposal consists of constructing, drilling, completing, and operating up to 68 new Federal wells and 21 new Fee wells from three new well pads and two existing pads, all on private land. BLM previously approved three Federal wells within the WMMDP boundary on the existing pads, and three Fee wells private wells were previously approved by the State of Colorado on the same two existing pads. This results in a total development (new plus existing) of 95 wells (71 Federal, 24 Fee) within the WMMDP boundary. The new Federal wells would be drilled directionally into Federal oil and gas leases underlying adjacent National Forest System (NFS) lands within the White River National Forest (WRNF). Additional components of the project would include access roads, pipelines to convey natural gas and produced water, and a variety of surface production equipment. In addition to approximately 0.06 mile of new access road to be constructed on Fee lands, access to the project would utilize an existing road (Forest Service Road [FSR] 818), which crosses Federal lands administered by the WRNF.

The three new pads would result in 10.1 acres of initial surface disturbance, of which 3.6 acres would remain over the long term following interim reclamation to reduce the pad sizes to the minimum needed to support ongoing production and maintenance through the 20- to 30-year project life. Interim reclamation consists of reducing the pad size to the minimum area needed for routine operations and maintenance and establishing a self-sustaining vegetation cover on the reclaimed surfaces. The two existing pads include a total of 8.9 acres of surface disturbance, of which 2.4 acres would remain following interim reclamation.

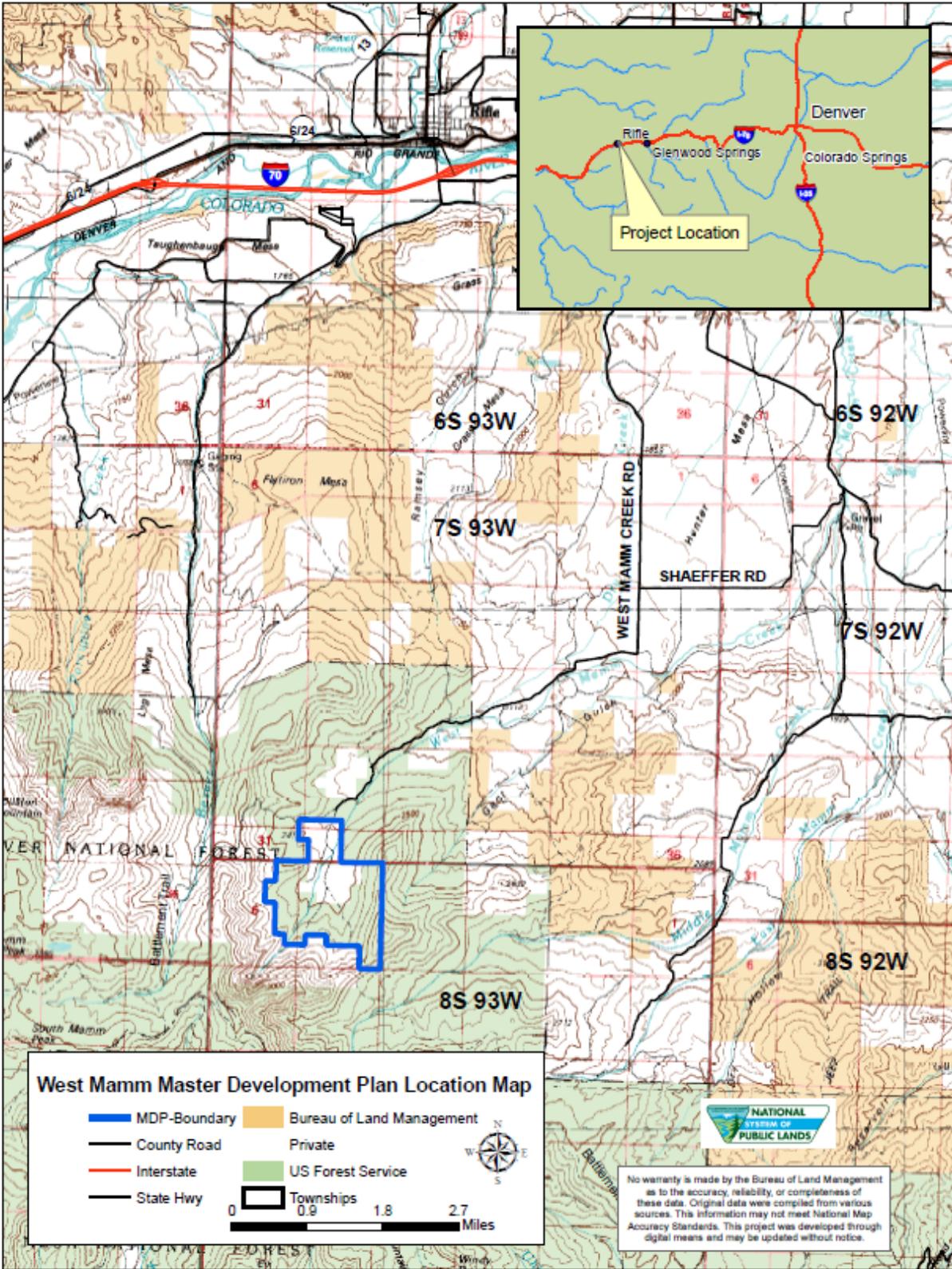


Figure 1. Project Location Map

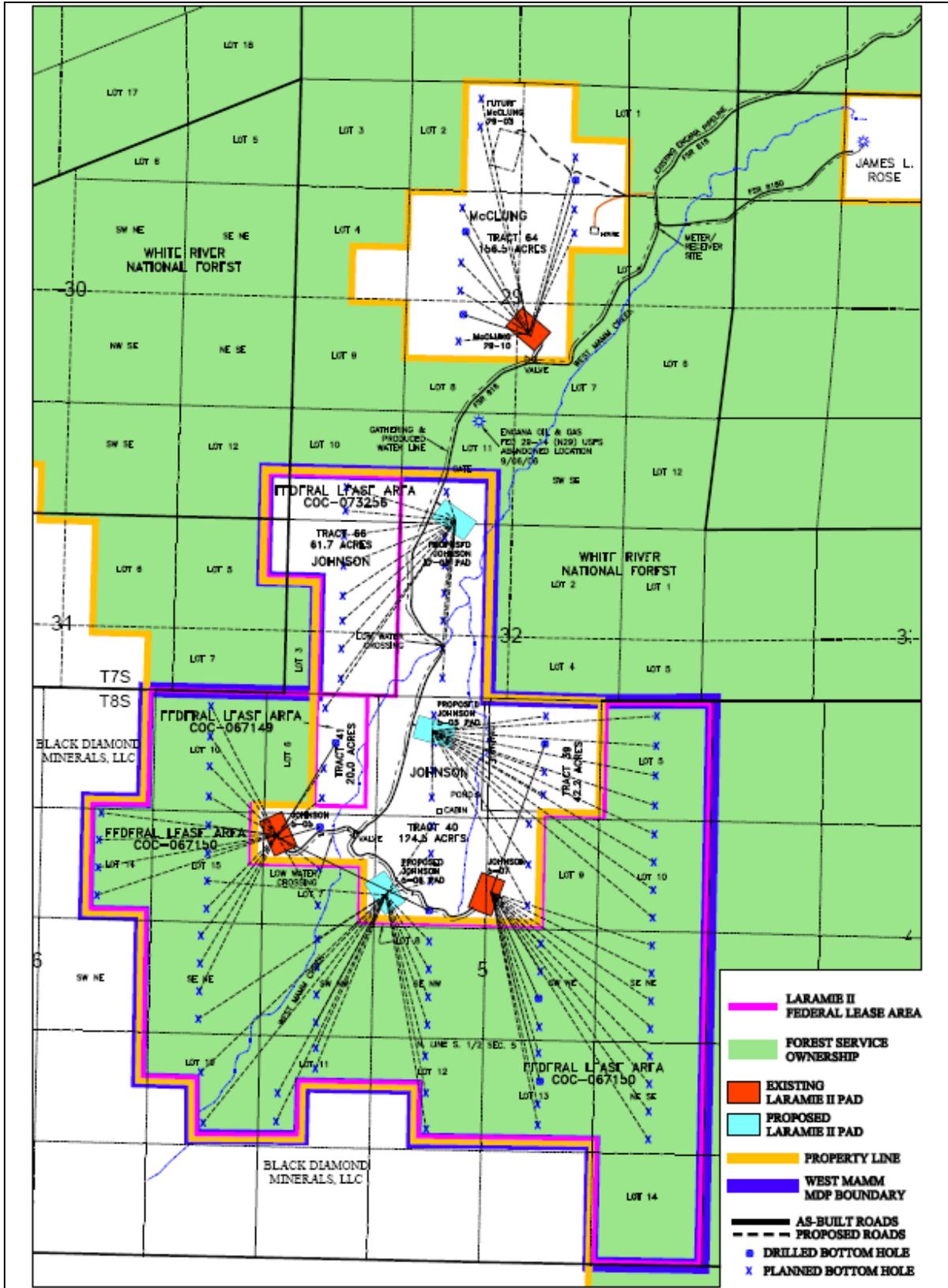


Figure 2. Project Components Relative to Surface Ownership

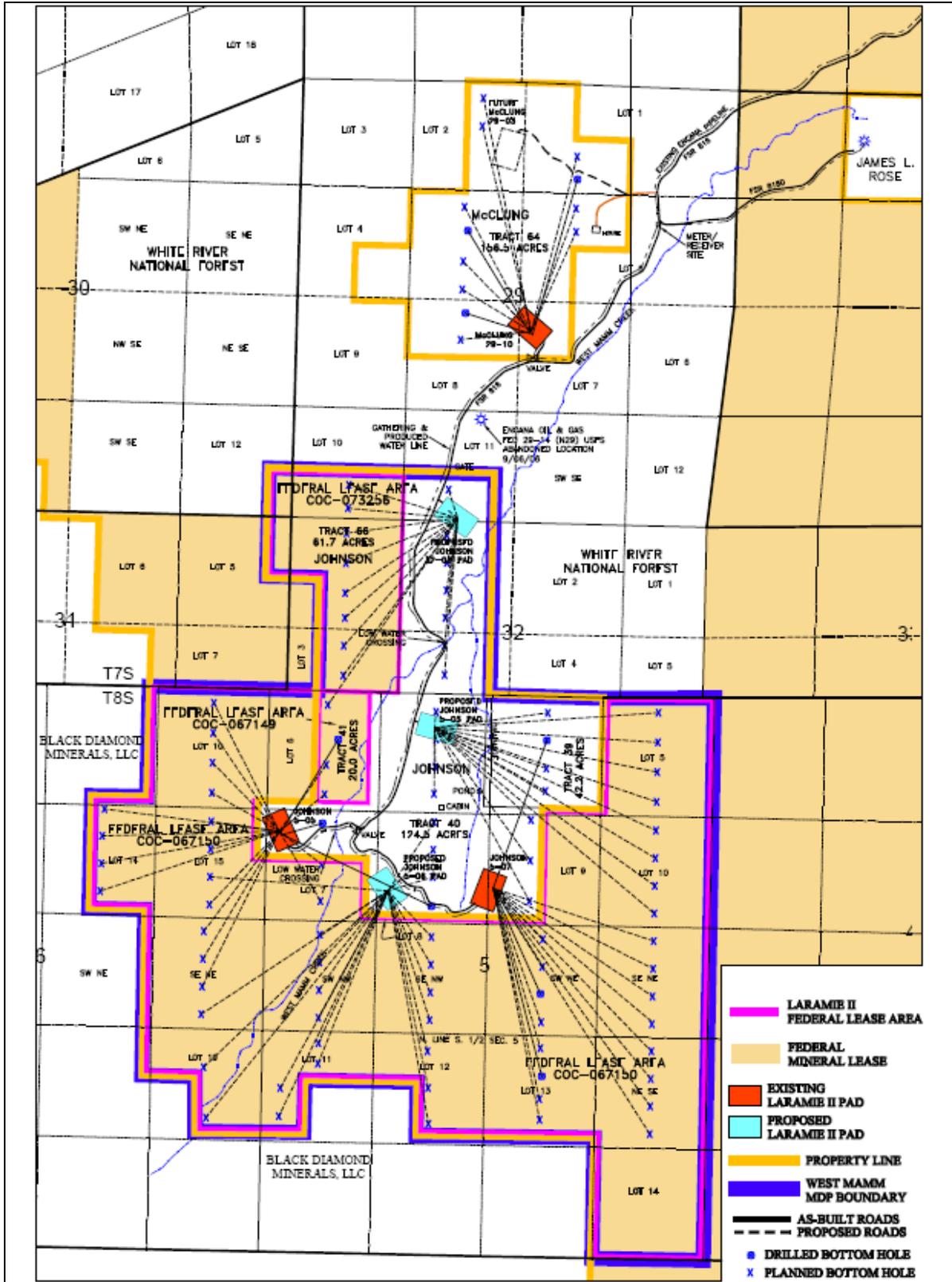


Figure 3. Project Components Relative to Mineral Ownership

Total length of new access spur roads and collocated pipelines associated with the new pads and wells would be 0.06 mile, located entirely on private surface. The 0.06 mile of new roads and pipelines would represent approximately 0.4 acre of initial disturbance, of which 0.2 acre (access road driving surfaces and drainage ditches) would remain over the life of the project. Up to 1 acre of new surface disturbance could occur in conjunction with road and drainage improvements along FSR818.

1.1 PURPOSE AND NEED

The purpose of the Proposed Action is to develop natural gas resources within Federal leases COC67149, COC67150, and COC73256 (underlying both NFS and private lands) consistent with existing Federal lease rights. The action is needed to increase the development of natural gas resources for commercial marketing to the public. An additional purpose of the Proposed Action on NFS lands is to provide vehicle and pipeline access to oil and gas development operations on private surface. The 68 proposed Federal wells under the WMMDP would be drilled directionally from the two existing and three proposed new pads on the private land. The Federal leases to be accessed by directional drilling underlie the NFS land that surrounds the private land.

Federal oil and gas lessees retain rights to drill, extract, remove, and market natural gas products, including a liquid fraction byproduct called condensate. National mineral leasing policies and the regulations by which they are enforced recognize the statutory right of Federal oil and gas lessees to develop Federal mineral resources to meet continuing national needs and economic demands so long as undue and unnecessary environmental degradation does not occur. Also included is the right of the lessee to build and maintain necessary improvements, subject to renewal or extension of the lease or leases in accordance with the appropriate authority.

1.2 DECISION FRAMEWORK

Because the Proposed Action includes activities on Federal mineral estate underlying NFS lands, the BLM and U.S. Forest Service (USFS) have cooperated in the preparation of this EA to ensure that mutual management goals and objectives for oil and gas exploration and development are achieved. Although the BLM issues and administers oil and gas leases underlying NFS lands, the USFS retains planning and decision authority over activities occurring on surface lands within the Forest boundary as described in a Surface Use Plan of Operations (SUPO). However, oil and gas activities associated with the WMMDP would occur solely on Fee lands, with the exception of continued use by LEII of FSR818 (West Mamm Creek Road). Implementation by LEII of the Proposed Action pursuant to this EA, if approved, would require the following actions by BLM and the WRNF responsible officials:

The BLM CRVFO would be responsible for:

- Reviewing and approving, as appropriate, the Applications for Permits to Drill (APDs) submitted by LEII for each Federal well. The APDs specify pad layout, surface facilities, spur roads, and pipelines, and the design, construction, and operation of the well.
- Enforcing applicable lease stipulations for Federal leases and Conditions of Approval (COAs) attached to the individual APDs for the protection of Federal surface and subsurface resources.

The WRNF Rifle District Ranger would be responsible for:

- Reviewing and approving, as appropriate, an application by LEII for a Special Use Authorization to allow travel on FSR818 for purpose related to construction, drilling, completion, and production of the new oil and gas wells. Any additional pipelines across NFS lands would

require a Special Use Permit. Other changes to the WMMDP resulting in additional surface disturbance on NFS lands will require consultation with the WRNF.

- Enforcing special terms and conditions attached to the Special Use Authorization, including any seasonal restrictions for the protection of elk, raptors, or other sensitive resources. The current Road Use Permit under which LEII is accessing the two existing pads and six existing wells expires on December 31, 2010.

1.3 SCOPING

The Proposed Action was made available to for public review and comment on January 20, 2010, including publication on the BLM website and publication in two newspapers, the *Glenwood Springs Post Independent* and the *Rifle Citizen Telegram*. Public comments and BLM responses are provided in Appendix B of this EA. The Proposed Action for BLM EAs is not immutable once made available for public review. Instead, BLM and USFS have the ability to modify the Proposed Action after considering the public comments and in working with the proponent (LEII) to refine project components to ensure an environmentally appropriate design and identify additional COAs and mitigation measures to be attached as terms and conditions to BLM and USFS authorizations.

1.4 LAND USE PLAN CONFORMANCE REVIEW

1.4.1 BLM Land Use Plan

The Proposed Action is subject to, and has been reviewed for conformance with, the following land use plan (43 CFR 1610.5, BLM 1617.3):

Name of Plan: Glenwood Springs Resource Management Plan (BLM 1984).

Relevant Amendments: November 1991 – Oil and Gas Plan Amendment; March 1999 – Oil & Gas Leasing & Development Final Supplemental Environmental Impact Statement.

Decision Number/Page: Record of Decision, Glenwood Springs Resource Management Plan Amendment, November 1991, page 3. Record of Decision and Resource Management Plan Amendment, March 1999, page 15.

Decision Language: “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.” This decision was carried forward unchanged in the 1999 RMP amendment (BLM 1999a). “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” (BLM 1999a).

Discussion: The Proposed Action is in conformance with the 1991 and 1999 RMP amendments because the Federal mineral estate lands to be accessed by the project were designated for oil and gas development and because those mineral estate lands are being evaluated in an MDP [GAP].

1.4.2 WRNF Forest Plan

The 2002 Revised White River National Forest Land and Resource Management Plan (Forest Plan) (USFS 2002) provides specific direction on how the USFS manages different land areas. As part of the

analysis process, the project has been reviewed to determine consistency with forest-wide goals and objectives as well as specific management area (MA) standards and guidelines. The Proposed Action and purpose and need meets forest-wide objective 2c.5: "...respond to requests for leasing, exploration, and development of mineral and energy resources in accordance with regulations and forest plan availability and specific lands decisions" (p. 1-12).

The portion of the access route that crosses NFS lands is located adjacent Deer and Elk Winter Range MA 5.41 and Elk Habitat MA 5.43, both of which contain important elk habitat and are managed for elk. "Deer and elk winter ranges are managed to provide adequate amounts of quality forage, cover and solitude for deer, elk and other species" characterize MA 5.41 (USFS 2002: p. 3-57). "Low road densities and optimum forage and cover ratios" characterize MA 5.43 (USFS 2002: p. 3-61). Elk have been found to use this particular area of the forest for both calving and winter range (in mild winters); therefore, human activities may be restricted during seasonal periods to minimize disturbance to elk (ibid., p. 3-62).

1.5 STANDARDS FOR PUBLIC LAND HEALTH

In January 1997, Colorado BLM approved the Standards for Public Land Health. The five standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. Environmental analyses of proposed projects on BLM land must address whether the Proposed Action or alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions identified in the applicable Land Health Assessment (LHA). However, because no component of the Proposed Action would involve BLM surface lands, an LHA does not apply, and conformance with the land health standards is not evaluated in this EA.

2. PROPOSED ACTION AND NO ACTION ALTERNATIVE

This EA analyzes two versions of the project as proposed by LEII, as well as a No Action Alternative (denial of Federal authorizations). The version of the Proposed Action published for public review during scoping assumed application of a winter timing limitation (winter seasonal restriction) for the protection of use of elk winter range along FSR818. The winter seasonal restriction would prohibit use of FSR818 to support construction of well pads, roads, and pipelines and the drilling and completion of Federal and Fee wells during the period December 1 through April 14. This WINTER SEASONAL RESTRICTION would be applied by the WRNF to the Special Use Authorization for use of FSR818 as the access route. BLM has no mechanism for attaching the WINTER SEASONAL RESTRICTION to Fee wells or to Federal wells drilled directionally into a Federal lease from Fee lands. However, application by the WRNF of the seasonal restriction on use of FSR818 to support construction, drilling, and completion activities would be tantamount to applying the WINTER SEASONAL RESTRICTION to activities on the Fee lands. The WRNF retains the right to provide reasonable access for the use of the land in an effort to minimize the impacts on Federal resources (36 CFR 251 Subpart D).

2.1 ALTERNATIVE A (PROPOSED ACTION) -- WINTER RESTRICTION ON FSR818

Both the Proposed Action published for public review and an identical version except lacking a seasonal restriction for use of FSR818 (Alternative B, Section 2.2) would result in drilling up to 68 Federal wells and 21 private wells. The new wells would be drilled from three new and two existing well pads located on private land (Figure 3 and Table 1). The total of 89 new wells would be in addition to six existing wells (three Federal and three Fee) on the two existing pads. The actual number of wells drilled would depend on the geologic success of initial drilling, engineering technologies, economic factors, and availability of commodity markets. The maximum number of drilling rigs that could be used is two due to logistics and the layout of the area. If two drilling rigs are used, the time required for development

could be reduced by up to 50% compared to the estimated duration of approximately 6 to 11 years (3 to 5 years with winter drilling; see Section 2.2).

Well Pad ¹	Surface	Well Pads (acres)		Roads and Pipelines (acres)		Total (acres) (rounded)	
		Initial ²	Long-term ²	Initial ²	Long-term ²	Initial ²	Long-term ²
Johnson 32-03	Private	3.2	1.2	0.07	0.04	3.3	1.2
Johnson 5-03		3.2	1.2	0.06	0.03	3.3	1.2
Johnson 5-05		Existing 4.2	1.2	Existing 1.12	0.67	Existing 5.3	1.9
Johnson 5-06		3.7	1.2	0.26	0.15	4.0	1.4
Johnson 5-07		Existing 4.7	1.2	Existing 7.86	4.71	Existing 9.4	5.7
Proposed		10.1	3.6	0.4 (0.06 mile)	0.2	10.5	3.8
Proposed + Existing		19.0	6.0	9.4 (1.55 miles)	5.6	28.4	11.4

¹ For well pads, initial disturbance includes pad surface plus adjacent cut-and-fill slopes; long-term disturbance includes portion of pad needed for production operations and maintenance and not reclaimed during interim reclamation. The long-term pad working area would be reclaimed upon plugging and abandonment of the last well on a pad.

² Access roads would be constructed with 50 feet of initial disturbance from top of cut to toe of fill and reclaimed to 30 feet, including running surface and borrow ditches. The long-term impact of 1 acre is for FSR818 improvements, if needed. Pipelines would be installed within the initial 50-foot disturbance width of roads.

If the WMMDP is approved, LEII may implement all or any combination of the following:

- Clearing and leveling three new well pads on private lands to support 89 new oil and gas wells.
- Moving in and rigging up drilling equipment.
- Conducting drilling and completion operations of approximately 40 to 50 days for each well.
- Installing production equipment, consisting primarily of gas meters, storage tanks, and multi-well separator and dehydration units.
- Reclaiming as much of each well pad as practicable following drilling and completion (“interim reclamation”) to accommodate long-term operations and maintenance.
- Installing buried pipelines from the three new pad locations to tie into existing pipelines.
- Hauling produced water and condensate offsite for disposal (if pipelines cannot be utilized).
- Conducting production operations, including routine maintenance and periodic workovers.

Included in the Proposed Action are a range of best management practices (BMPs) and mitigation measures to avoid, minimize, or offset adverse impacts to surface and subsurface resources. Appendix A lists the COAs that would be attached to APDs and other authorizations by BLM for the wells and associated development and production operations and to issuance by WRNF of a Special Use Authorization for use of FSR818 to access the project area.

Major components of the Proposed Action are described below under the headings, Development (Construction/Drilling/Completion), Production (Operation and Maintenance), and Abandonment and Reclamation. Associated with these developments are a standard 13-Point Surface Use Plan (Appendix C) and 10-Point Drilling Plan (Appendix D) prepared by LEII.

The locations of the three new Fee well pads reflect the results of onsite exams conducted by LEII, its contractors, and the private landowner to assess proposed pad and pit layout, cuts and fills, topsoil stockpiling, erosion control, and reclamation potential of each pad. The primary purpose of onsite inspections was to assess potential resource impacts associated with their construction. In some cases, multiple revisions to the proposed pad layouts and orientation as well as access were adjusted based on the landowner's requests. LEII has negotiated and recorded a Surface Use and Right of Way Agreement with the landowner.

2.1.1 Construction Phase

Proposed Well Pads

The proposed well pads would be constructed from the native soil and rock materials present using a bulldozer, grader, and excavator. The pads would be constructed by clearing vegetation, stripping and stockpiling topsoil, and leveling the pad area using cut-and-fill techniques. Trees would be logged and "decked" adjacent to the site for use by the private landowner or placed at the toe of the fill slopes to capture any fill materials carried down the slope and act as a filtration system for stormwater management. Any other woody vegetation would be mulched and used in reclamation. Cut slopes associated with pad construction would be left rough to provide a seed catchment surface and may require "step cutting" when heights exceed 15 feet. The tops of the cut banks and pad corners may be rounded to improve their appearance and reduce the volume of cut and fill.

Initially, the size of the newly constructed pads would range from 3.2 to 3.7 acres. The two existing pads have disturbed areas of 4.5 and 4.7 acres. After all wells are drilled and completed and production facilities installed at each pad, interim reclamation activities would begin. Cuts and fills would be recontoured to slopes of 2.5-3:1 (horizontal to vertical) and revegetated to blend with adjacent natural slopes as much as possible. Interim reclamation would result in an estimated 60% reduction in pad size over the life of the project (20 to 30 years). Table 1 lists the pad sizes during drilling and completion (initial disturbance) and during production following interim reclamation (long-term disturbance).

To prevent livestock from accessing any open cuttings pit, a fence would be constructed to BLM standards and remain until all wells are drilled and completed and the pit is closed. Any pits containing liquids would be fitted with measures to minimize contact with the fluids by birds and large mammals.

The sides of the well pads would be bermed to prevent stormwater from flowing off the pad and into nearby drainages. Stormwater would be directed through an opening in the berm that leads off the pad to a sediment trap. The channel from the opening to the sediment trap, and the overflow from the trap would be lined with riprap to dissipate energy and control erosion. LEII's stormwater management efforts may include additional engineering measures such as the installation of culverts to divert water flow away from surface locations as needed.

Within 30 days following completion of the last well drilled on a pad, LEII would implement and complete interim reclamation as identified in the surface use COAs (Appendix A). If drilling all of the wells on a pad cannot be completed in a continuous operation, LEII would request approval to leave the pad unreclaimed with fencing around the cuttings pit until the following drilling season. BLM would

allow no more than a 1-year hiatus in drilling without implementation of interim or, if approved by BLM, temporary reclamation to reduce erosion, weed infestations, visual impacts.

Proposed Access Roads

To access the proposed project area, vehicles would exit Interstate 70 at Exit 94 (east of Rifle), head south and turn right on Airport Road (County Road [CR] 346), travel approximately 1.8 miles until CR 346 intersects with West Mamm Creek Road (CR319), continue south on CR319 approximately 8.0 miles until it becomes FSR818, and continue approximately 3.7 miles farther to the gated private property where FSR818 ends. Vehicles may also access the area by exiting from I-70 at Rifle Exit 90, travel toward the airport to CR319, and continuing south to the project area via the same road system as above.

Heavy trucks would use the Garfield County haul routes identified on the County website to access the project area. All vehicles hauling materials and equipment for this project would abide by Garfield County's permit system of oversize, overweight vehicles. All vehicular travel on FSR818 and associated easements across private lands would be subject to requirements of a WRNF Special Use Authorization.

In 2008, LEII worked with the WRNF to obtain a Road Use Permit for FSR818 and also a Special Use Authorization for a gas gathering line and water line through NFS. Roads CR319 and FSR818 were designed, engineered, and constructed or reconstructed to USFS standards. LEII also worked with the private landowner to design and construct access roads and natural gas and water gathering lines through the private lands. The construction on the private land included two low-water crossings across West Mamm Creek that were designed, engineered, and constructed. This work put the infrastructure into place to develop the Federal and private mineral estates with minimal additional road construction.

Within the project area, the road network would be extended from existing roads to provide access to the proposed pad locations (see Figure 1). The extension of the road network would involve construction of approximately 0.06 mile of new road. Roads would be designed and maintained to an appropriate standard no higher than necessary to accommodate their intended functions, as described in the *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (BLM and USFS, 2006), BLM Handbook 9113-*Roads Manual*, and WRNF Road Use Permit requirements, including structural analysis and geometric design per AASHTO Low Volume Road Design Guidelines.

Running surfaces would be all-weather type with an aggregate surface and a width potentially varying from 16 to 24 feet throughout the project area. Safety, sight distance, grade, topography, anticipated traffic flow, and visual resource management concerns would be considered in determining the optimal road width of specific segments.

Road construction or reconstruction would include clearing and grubbing of brush and trees, windrowing of topsoil, construction of reinforced rolling dips and grade dips where feasible, installation of culverts in ditched sections and side drainages to provide ditch relief and sediment control, placement of slash and topsoil on cut and fill slopes, placement of erosion control matting on cut and fill slopes if needed, seeding of all disturbed areas outside of the travel way, and installation of cattleguards and road closure gates with proper signage where needed.

Revegetation of roads, drainage ditches, and cut-and-fill slopes would help stabilize exposed soil and reduce sediment loss, growth of noxious weeds, and maintenance costs while minimizing impacts to scenic quality, water quality, and wildlife forage and cover. To ensure successful growth of seeded plants, topsoil would be stripped and stockpiled during road construction and re-spread on cut slopes, fill slopes, and borrow ditches prior to seeding.

The road grade would be 10% or less, where possible. The 10% grade would be exceeded only where the terrain or unusual circumstances require steeper segments. Minimum horizontal curve radii would be 100 feet. Where terrain would not allow a 100-foot curve radius, the curve would be widened. New road construction (on private lands) would result in 0.4 acre of short-term ground disturbance. Following interim reclamation, the long-term disturbance for the new and existing access roads within the project area would be approximately 5.6 acres, all on Fee land. Road maintenance would be performed as needed to ensure safe travel. Short-term and long-term disturbance also includes the disturbance associated with the installation of the natural gas gathering and water pipelines in the road corridor.

Proposed Natural Gas Gathering Pipelines and Water Pipelines

LEII's policy is to install the natural gas gathering lines in the disturbed area of the new access road. The road would be the working side of the construction. Following construction, the permanent ROW would be approximately 30 feet wide, including the road and borrow ditches. The pipeline trench would be excavated mechanically, primarily in the uphill or cut side of the road corridor with an excavator (trackhoe) and would be approximately 3 feet wide and at least 4 feet deep. The natural gas pipeline and the water pipeline would be installed concurrently. Natural gas pipeline segments would be welded together and lowered into the trench.

The water line would then be placed into the ditch and separated from the gas line by sandbags or other means. Both lines would be covered with excavated material, and each pipeline would then be pressure tested with fresh water and/or nitrogen gas to locate any leaks. Fresh water or nitrogen used for testing would be obtained offsite and transported to the testing location by truck. After testing, the water would be disposed at an existing offsite evaporation facility or used by LEII for drilling or completion operations. Nitrogen would be vented to the atmosphere if used instead of water. Since the infrastructure for the natural gas and water pipelines is in place, only about 0.06 mile of new pipe would be needed.

Mitigation Common to All Construction Operations

As part of the WMMDP, LEII is submitting a Master Application for Permit to Drill (MAPD) that includes a 13-point surface use plan of operations (Appendix C) and 10-point drilling plan (Appendix D). These incorporate the drilling and mitigation measures common to all of the Federal well pads and, to a certain extent, the split-estate and Fee well pads within the WMMDP area. Mitigation for specific pads not incorporated by LEII into the MAPD would be attached as COAs to APDs submitted to BLM.

Trees within the required disturbance areas would be cut to a maximum stump height of 6 inches and placed back onto the cut-and-fill slopes with the root side down. Trees would not be dozed off the access road, except on private surface where trees may be scattered offsite or placed on fill slopes to help visually screen the slopes. On pads where boulder fields exist, reclamation would include the replacement of boulders to help restore a more natural appearance.

2.1.2 Drilling and Completion Phase

Proposed New Wells

Up to 68 Federal and 21 Fee wells would be drilled under the Proposed Action and Operator-Requested Alternative (Table 2).

Table 2. List of Proposed New Wells, with Surface and Bottomhole Locations				
Pad Name	Surface Location	Well No.	Lease	Bottomhole Location
T7S, R93W				
Proposed Johnson 32-03 17 wells (8 Fee, 9 Fed)	Sec. 32 Tract 66 (NENW)	Johnson 29-14C, 14D	Fee	Sec. 29, Tract 66
		Johnson 32-03A, 03B, 03C, 03D, 06A, 06B		Sec. 32, Tract 66
		Johnson Fed. 29-13C, 13D	COC73256	Sec. 29, Tract 66
		Johnson Fed. 32-04A, 04B, 04C, 04D, 05A, 05B		Sec. 32, Tract 66
		Johnson Fed. 05-04A	COC67149	Tract 39, Sec. 5 (T8S, R93W)
T8S, R93W				
Proposed Johnson 5-03 18 wells (10 Fee, 8 Fed)	Sec. 5 Tract 40 (NENW)	Johnson 5-02A, 02C, 02D	Fee	Sec. 5, Tract 39
		Johnson 5-03A, 03B, 03C, 03D, 07A, 07B, 5-07C		Sec. 5, Tract 40
		Johnson Fed. 5-01A, 01B, 01C, 01D	COC067150	Sec. 5, Lot 5
		Johnson Fed. 5-08A, 08B, 08C, 08D		Sec. 5, Lot 10
Existing Johnson 5-05 21 wells (All Fed) (+ 3 existing)	Sec. 5 Tract 40 (SWNE)	Johnson Fed. 5-04C, 04D	COC067149	Sec. 5, Tract 41
		Johnson Fed. 5-05C, 05D	COC067150	Sec. 5, Lot 7
		Johnson Fed. 6-01A, 01B, 01C, 01D		Sec. 6, Lot 10
		Johnson Fed. 6-07A, 07B, 07C, 07D		Sec. 6, Lot 14
		Johnson Fed. 6-08A, 08B, 08D		Sec. 6, Lot 15
		Johnson Fed. 6-09A, 09B, 09C		Sec. 6, SENE
Proposed Johnson 5-06 22 wells (3 Fee, 19 Fed)	Sec. 5 Tract 40 (SENW)	Johnson 5-06A, 06B, 06C	Fee	Sec. 6, Tract 40
		Johnson Fed. 6-08C	COC67150	Sec. 6, Lot 15
		Johnson Fed. 6-09D		Sec. 6, SENE
		Johnson Fed. 6-16A, 16D		Sec. 6, Lot 19
		Johnson Fed. 5-11A, 11B, 11C, 11D		Sec. 6, SENW
		Johnson Fed. 5-12A		Sec. 5, SWNW
		Johnson Fed. 5-12B		
		Johnson Fed. 5-12C		
		Johnson Fed. 5-12D		
		Johnson Fed. 5-13A, 13B, 13C, 13D		
		Johnson Fed. 5-14A, 14B, 5-14D		Sec. 5, Lot 11
Existing Johnson 5-07 17 wells (All Fed) (+ 3 existing)	Sec. 5 Tract 40 (SWNE)	Johnson Fed. 5-09A, 09B, 09C, 09D	COC067150	Sec. 5, SENE
		Johnson Fed. 5-10A, 10B, 10C		Sec. 5, SWNE
		Johnson Fed. 5-15A, 15C, 15D		Sec. 5, Lot 13
		Johnson Fed. 5-16A, 16B, 16C, 16D		Sec. 5, NESE
Note: Bottomhole location may deviate based on reservoir parameters but would remain within the same 10-acre spacing.				

LEII's drilling operations would be conducted in compliance with all Federal Onshore Oil and Gas Orders, all applicable rules and regulations, and conditions of approval (COAs) applied by the BLM (Appendix A). Drilling rigs in the WMDP area would target gas-producing horizons in the Williams Fork and Iles Formations of the Mesaverde Group at depths of 6,500 to 11,000 feet. Wells would require approximately 18 days to drill and 30 days to complete. Production results for wells drilled during the first year would be used to plan and design the remaining wells.

LEII intends to initially drill and complete four to six wells on a pad, requiring drilling operations to be conducted in more than one phase. Development would be sensitive to price of gas and cost of services. The BLM would be notified of scheduling changes in a timely manner. Because of geologic and market uncertainties, LEII may drill fewer wells than those described in this MDP. Prior to drilling below the surface casing, well control equipment (Blowout Preventer and Choke Manifold) would be installed on the surface casing, and both the well control equipment and surface casing would be tested to insure adequate well control. The well control equipment would meet the minimum standards of Onshore Oil and Gas Order Number 2 (Drilling Operations), and BLM would be notified in advance of all pressure tests in order to be present and witness the tests, if desired. Charts of the test are kept on location.

LEII would use a small, truck-mounted drilling rig to drill the conductor pipe and rat holes. Once the conductor pipe is set and cemented in place to the surface, a conventional drilling rig would be moved in and rigged up to spud (begin drilling) the surface hole and production holes to total depth. A downhole motor is used to directionally drill the well and to increase penetration rate. The motor is powered by drilling fluids that are used to drive the motor, cool the bit, and carry drill cuttings to the surface.

To maintain borehole stability, minimize possible damage to the formation, provide adequate carrying viscosity (thickness) to carry the drill cuttings out of the wellbore, and reduce downhole fluid losses, various chemicals and additives may need to be added to the mud system. Any additives to the mud system would conform to Subtitle C of the Resource Conservation and Recovery Act (RCRA) of 1976 as amended 1996. Material Safety and Data Sheets (MSDS) would be readily available at all times. For the directional wells, an S-shaped directional design would be used to reach the targeted well locations. In general, a target radius of 50 feet would be used. Specific directional plans for each well would be included with the APDs.

Dewatering systems would be used and drill cuttings for up to six wells would be buried on location in cuttings pits. The cuttings from the remaining wells would be stored on location or dried and hauled to the Garfield County landfill or other State-approved disposal facility. Drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) would be buried on location or transported to an approved disposal facility (Garfield County Landfill). Cuttings pits, containing the cuttings from the drilling process are planned for each new pad location in this MDP.

After drilling the hole to its total depth, logging tools would be run into the well to evaluate the potential hydrocarbon resource. If the evaluation indicates adequate hydrocarbon resources are present and recoverable, steel production casing would be run and cemented in place in accordance with the well design. The proposed casing and cementing program would be designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. BLM approval is necessary prior to use of any isolating medium other than cement. After production casing has been cemented in place, completion equipment is moved onto the location. Well completion consists of running a Cement Bond log to evaluate the cement integrity and to correlate the cased hole logs to the open hole logs, perforating the casing across the hydrocarbon producing zones, and stimulating the formation to enhance the production of oil and gas. The typical method used for stimulation consists of hydraulic fracture treatment of the reservoir, in which sand with non-toxic fluids is pumped into the producing formation with sufficient hydraulic pressure to fracture the rock formation. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the wellbore.

Water Management

During completion operations, all hydraulic fracturing (“frac”) flowback water would be contained in temporary tanks during completion operations and recycled for re-use or trucked offsite to an approved

commercial disposal facility. Currently, the two anticipated sites for disposal are the Danish Flats disposal facility in eastern Utah and the RNI (Dalbo) disposal facility in Rangely, Colorado.

Traffic Estimates

Traffic estimates for drilling and completion operations are shown in Table 3. The level of drilling and production activity may vary due to weather and other factors.

Table 3. LEII Traffic Estimates for Drilling and Completion Operations	
DRILLING OPERATIONS	
Drilling Rig Mobilization In	
Drilling Rig Move-In	30 Trips per Pad
Crane	1 Trip
Initial Water Hauling	11 Trips per Pad
For Each Well (15 to 20 days per well)	
Rig Crew	2 per Day
Mechanics per Welders	4 per Week
Drill Bit per Tool Delivery	6 per Biweekly
Supplies	4 per Week
Surface and Production Casing	3 Trips
Cement and Cementers	8 (2 pump trips, 4 cement trucks, 2 cementer pickups)
Water Trucks for Cement	4 Trips
Water Trucks for Replenishing Drilling Water	4 to 6 Trips per Week
Wireline Truck	2 Trips (wireline truck and support vehicle)
Fuel Trucks	1 to 2 Trips per Week
Trash Pickup	1 Trip per week per Week
Drilling Rig Mobilization Out to Next Pad	
Drilling Rig Move-Out	15 Trips per Pad
Crane	1 Trip
COMPLETION OPERATIONS	
Mobilization In	
Frac Tanks	80 Trips
Initial Load Water	150 Trips
Mountain Mover	2 Trips
Frac-Pumps and Equipment	15 Trips
Pulling Unit	1 Trip
For Each Well	
Sand Truck	6 Trips
Crew Truck – Consultant	4 Trips per Day
Wireline Unit	4 Trips
Tubing Delivery	2 Trips
Reload Frac Tanks	150 Trips
Mobilization Out	
Frac Tanks	80 Trips
Mountain Mover	2 Trip
Frac Pumps	15 Trips
Pulling Unit	1 Trip

During drilling, and completion), an estimated 20 to 30 vehicles per day could travel the access roads. After rig mobilization, traffic would be mainly pickup trucks and tractor-trailer vehicles, with an occasional oversize vehicle.

2.1.3 Production Phase

Surface Facilities

Surface facilities at each well pad location would consist of wellheads, separation units, gas metering units, and above-ground condensate and produced water tanks with approximately 300- to 400-barrel (bbl) capacities each or, when needed for visual mitigation, low-profile 250-bbl steel tanks would be installed. Multi-well locations would share production equipment, whenever feasible, to minimize surface occupancy and disturbance. All production equipment located on or associated within the development area would be painted to match the surrounding terrain and located to reasonably minimize visual impact. Colors recommended by the BLM would be used for these facilities, including containment barriers, at each site. The production equipment would be fenced to prevent contact with livestock. Telemetry equipment would be used to remotely monitor well conditions. The use of telemetry would minimize traffic to and from the well locations. Automated tank gauging would also be employed to minimize the risk of spills.

Tank batteries would be placed within secondary containment to prevent the offsite migration of accidentally spilled condensate or produced water. Secondary containment would consist of corrugated steel containment rings. Construction of the containment rings surrounding the tank batteries would be conducted to prevent lateral movement of fluids through an impermeable barrier attached to the rings and laid under the tanks. Secondary containment would be sized to contain a minimum of 110% of the storage capacity of the largest tank within the barrier. All loading lines would be placed inside the containment barrier.

Water Management

Permanent 300- to 400-bbl steel tanks or, where needed for visual mitigation, 250-bbl low-profile steel storage tank(s) would be installed on the well pad or offsite facilities to contain produced water. These tanks would be onsite for the life of the wells. Produced water contained in the storage tanks would be transferred to centralized tank batteries at LEII pads by one of two methods. Ultimately, LEII plans to use buried pipelines utilizing gravity flow assisted by natural gas-powered diaphragm pumps, if required, to convey the produced water to a future centralized treatment or disposal facility. In anticipation of this, LEII has installed water-gathering lines in conjunction with the gas gathering lines for the project area and is aggressively exploring alternate means of disposal in the area via pipeline conveyance. At present, however, LEII has been unable to identify a treatment or disposal facility that would accommodate this method. Therefore, the initial method for transport and disposal of produced water, and potentially the method throughout the life of the project, is to use tanker trucks to haul the produced water to the same sites identified above for the development phase, i.e., the Danish Flats disposal facility in eastern Utah and the RNI (Dalbo) disposal facility in Rangely, Colorado.

Traffic Estimates

During the production phase, it is estimated that up to 10 support vehicles, 5 condensate tanker trucks, and 20 water tanker trucks per day would travel the access route. Occasionally, an oversize vehicle such as a workover rig could be encountered on project roads. Note that the estimated traffic volumes (Table 4) assume that produced water and condensate would be removed from the pads by trucks instead of

through the use of pipelines. LEII asserts that they are actively pursuing a change to the project design to include piping of these fluids to reduce truck traffic.

Vehicle Type	Current ¹	Drilling/Completion ²		Initial Production ³		Long-term Production ⁴	
		Alt. A, B	Alt. C	Alt. A, B	Alt. C	Alt. A, B	Alt. C
Heavy Truck (Tractor-Trailer, Overweight)	0	19	19	0	0	0	0
Water/Condensate Haul Truck	1	0	0	15	7	4	2
LEII Pickup Truck/Light Truck	1	7	7	3	2	1	1
Total Average Daily Traffic ⁵	2	26	26	18	9	5	3

¹ Current based on six existing wells; proposed based six existing wells on 21 new Fee wells and 68 new Federal wells; no action based on six existing wells and 21 new Fee wells only (denial of new Federal wells). In all cases, numbers assume that produced water and condensate would be conveyed offsite in tanker trucks (LEII is pursuing the use of pipelines to convey these fluids). ADT = average daily traffic = trips. For roundtrips, divide the numbers in half.

² Drilling/completion estimates based on prior experience of LEII for existing wells in the WMMDP area. Under Alternative B, winter drilling and completion would enable LEII to complete this phase in about half the total duration required under Alternative A – i.e., approximately 3 to 5 years versus 6 to 11 years. Duration under Alternative C would be 2 to 3 years.

³ Assumes that LEII is unable to use pipelines for conveyance of produced water and condensate and are based on 130-barrel tanker trucks. While drilling and completion are ongoing, LEII would reuse the produced water within the project area.

⁴ Within 2 years following completion, produced water volumes are expected to decrease by 50% to 90%, reducing truck traffic, and to continue to decrease for the next several years before flattening out. This table uses a 75% reduction.

⁵ Totals are for project-related traffic and for one-way travel. Numbers do not include current and projected average daily traffic values of 4 trips per day for private vehicles (private landowners, etc).

Sources: LEII, COGCC, 2007 Traffic Count Data

The number of daily truck trips required for offsite transport and disposal of produced water and condensate, if pipeline conveyance does not become practicable, would be high initially but gradually decline during long-term production. New wells have high initial production of all fluids—natural gas, condensate, and produced water—that diminishes steeply for the first few years and then levels off at a much lower level for the remainder of a well’s life. The decline in produced water could be as high as 50% to 90%, based on LEII’s experience with other wells in the CRVFO. Using a moderate rate of decline of 75% from initial production to long-term production, average daily truck traffic for haulage of produced water and condensate would decline from 15 to 4 trips per day.

2.1.4 Interim Reclamation

Following completion activities, LEII would reduce the size of the well pads to the minimum working surface area needed for production facilities and future workovers while providing for reshaping and stabilization of cut-and-fill slopes. Interim reclamation would be accomplished by grading, leveling, and seeding, as recommended by the BLM. Interim reclamation would reduce the disturbed area at each pad to approximately 1.2 acres after full development. The areas that would undergo interim reclamation are presented in Table 1 as short-term surface disturbance.

The following is a summary of interim reclamation activities LEII would implement after all wells have been completed on a location:

- The well location and surrounding areas(s) would be cleared of all debris, materials, and trash not required for production. Other waste and spoil materials would be disposed of at a local landfill.

- All pits, cellars, rat holes, and other boreholes at drilling locations unnecessary for further lease operations would be backfilled to conform to surrounding terrain after the drilling rig is released.
- Areas not necessary for production and future workovers would be reshaped to resemble the original landscape contour. Stockpiled topsoil would be redistributed and disked on the area to be reclaimed and reseeded according to BLM recommendations.

Interim reclamation of that portion of the location and access roads not needed for production facilities/operations would be reclaimed within 30 days after well completion, season permitting.

Some locations would require special reclamation practices, including hydromulching, placing of straw mats on steeper slopes, contour furrowing, watering, terracing, water barring, importing topsoil, and fertilizing. All reclamation efforts would employ seed mixes as approved by the BLM. Pads would be fenced for the first two growing or until the seeded species are established sufficiently to withstand livestock use.

2.1.5 Workovers and Re Completions

Periodically, the workover or re completion of a well may be required to maintain production. Workovers can include repairs to the well bore equipment (casing, tubing, rods, or pump), the wellhead, or the production facilities. These repairs would usually be completed during the daylight hours. The frequency of this type of work cannot be accurately projected because workovers vary from well to well. In the case of multi-well pads, space for equipment would usually be limited to the “in-use” (i.e., disturbed) area of the surface location, although it is possible that interim reclamation could be delayed by workover operations. In the case of a well re completion, a water completion pit may have to be constructed.

2.1.6 Final Abandonment and Reclamation

Well and Pipeline Plugging and Abandonment

Upon abandonment, each well would be plugged with cement and its related surface equipment removed. Subsurface pipelines would be plugged at specific intervals and site contouring accomplished using appropriate heavy equipment. All disturbed surface soil would be reseeded with native species consistent with existing vegetation in nearby undisturbed areas, subject to the approval of the private landowner.

A Sundry Notice would be submitted by the operator to the BLM that describes the engineering, technical, and environmental aspects of final plugging and abandonment. This notice would describe final reclamation procedures and any mitigation measures associated with the final reclamation performed by the operator. BLM and Colorado Oil and Gas Conservation Commission (COGCC) standards for plugging would be followed. A configuration diagram, summary of plugging procedures, and job summary with techniques used to plug the well bore (e.g., cementation) would be included in the Sundry Notice.

Final Reclamation

All areas of surface disturbance would be reclaimed in accordance with the CRVFO reclamation policies, including the COAs in Appendix A and the CRVFO weed management plan for oil and gas projects (BLM 2007a). BLM, in conjunction with USFS, would determine at time of abandonment if continued use of the access road and/or pad is desirable for other resource uses. Reclamation objectives include the following:

- Recontour all disturbances to approximately the topography that existed prior to construction and re-spread topsoil.

- Restore primary productivity at each site and establish diverse native vegetation that provides for natural plant community succession.
- Establish native vegetation that is a vigorous and self-sustaining stand of desirable native plant species resistant to the invasion of noxious weeds and undesirable species.
- Over the long term, restore the reclaimed landscape to characteristics that approximate the original visual quality and plant species composition of the surrounding area.

2.1.7 Road Maintenance

The access roads on NFS lands would be inspected by the WRNF Rifle Ranger District and maintained by LEII on an as-needed or quarterly basis (at a minimum) to include such items as:

- road surface grading and graveling
- relief ditch, culvert and cattle guard cleaning, gate and sign maintenance
- erosion control measures for cut and fill slopes and other disturbed areas
- road closures in periods of excessive soil moisture to prevent rutting caused by vehicular traffic
- road and slope stabilization measures as required until final abandonment and reclamation
- weed control
- dust abatement (techniques and frequency as determined by the BLM and WRNF)

Access roads on private land would be inspected by LEII personnel and the landowner. Maintenance would be conducted in accordance with the items identified above.

2.3 ALTERNATIVE B (OPERATOR-REQUESTED) – NO WINTER RESTRICTION ON FSR818

This alternative is identical to the Proposed Action published for public review and described above in Section 2.2 except that it would not include application by WRNF of a big game winter range timing limitation (winter seasonal restriction) for use of FSR818 to support construction, drilling, and completion activities associated with development of the 89 proposed Fee and Federal wells. The winter seasonal restriction, which would apply to the period December 1 through April 14, was not attached by WRNF to the Road Use Permit under which LEII is currently operating. The current permit, which expires on December 31, 2010, would be replaced by a new Special Use Authorization from WRNF. LEII estimates that not being restricted from using FSR818 to support the development phase during the 5-month winter seasonal restriction period would reduce the duration of that phase by almost half, from approximately 11 years to 6 years using one drill rig and from approximately 5 years to 3 years using two drill rigs—assuming that LEII actually drills throughout the winter seasonal restriction period. With careful scheduling of activities, the minimum period cited above (3 years) could potentially be completed while involving only two complete winter seasons. However, a longer duration is more likely, even with two drill rigs.

2.4 ALTERNATIVE C (NO ACTION ALTERNATIVE)

Under the No Action Alternative, APDs for the 68 Federal wells associated with the Proposed Action would be denied. The Proposed Action involves Federal subsurface minerals that are encumbered with Federal oil and gas leases, which grant the lessee a right to explore and develop the lease. Although BLM cannot deny the right to drill and develop the leasehold, individual APDs can be denied to prevent

unnecessary and undue degradation of surface resources. The No Action Alternative constitutes denial of the Federal APDs associated with the Proposed Action.

Some elements of the Proposed Action do not require Federal approval. The 21 proposed Fee wells, three proposed new pads, and 0.06 mile of associated roads and pipelines—all located on private surface—could be developed under the authority of the COGCC without the involvement of BLM. However, LEII would still need to obtain a Special Use Authorization from WRNF, which would be subject to seasonal restrictions consistent with the Forest Plan for elk calving and winter range habitats. The new Special Use Authorization would replace the current Road Use Permit for use of FSR818, which expires on December 31, 2010.

Initially, LEII had suggested that the No Action Alternative could include approval of the 32 Federal wells to be drilled from the two existing pads through the Statutory Categorical Exclusion (SCX) process established by the Energy Policy Act of 2005. One of the SCXs allows BLM to authorize new wells on existing pads without an EA under certain circumstances. However, use by BLM of the SCX process is discretionary and not appropriate in all cases. Preparation of an EA instead of use the SCX process for the new wells on existing pads is indicated in this case by the magnitude of the project and the location on private land surrounded by NFS lands, the latter including an Inventoried Roadless Area.

2.5 LEASE STIPULATIONS AND CONDITIONS OF APPROVAL

Stipulations related to the protection of surface resources attached to Federal leases COC67149, COC67150, and COC73256 would not be binding on drilling operations for new Federal wells on all five locations, since the Federal leases do not underlie these pads and would be reached directionally. The pads would be located on private land with underlying private minerals, and operations would be subject to the terms of the Surface Use Agreement between the Fee landowner and LEII. Under its regulatory authority, BLM would attach and enforce the surface use and downhole COAs listed in Appendix A for the protection of Federal resources.

If the WRNF responsible official determines, in his/her discretion, that issuance of an updated permit is justified, the WRNF would also invoke terms and conditions in conjunction with a Special Use Authorization for use of FSR818 to support the proposed new Fee and Federal wells and associated facilities. In the meantime, LEII remains subject to the terms and conditions associated with the existing Road Use Permit, which expires on December 31, 2010.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides a description of the human and natural environmental resources that could be affected by the Proposed Action and No Action Alternative. In addition, the section presents comparative analyses of the direct and indirect consequences stemming from the implementation of the alternatives. A variety of laws, regulations, and policy directives mandate the evaluation of the effects of a Proposed Action and alternative(s) on certain Critical Environmental Elements (Section 3.1). Some of the critical elements that require inclusion in this EA are not present; others may be present but would not be affected by the Proposed Action and No Action Alternative (Table 5). Only the mandatory critical elements that are present and would be affected are described in the following subsections.

In addition to the mandatory critical elements listed in Table 5 are other resources that would be affected by the Proposed Action and the No Action Alternative. These are presented under Other Affected Resources (Section 3.2).

Table 5. Critical Elements of the Human Environment									
<i>Critical Element</i>	<i>Present</i>		<i>Affected</i>		<i>Critical Elements</i>	<i>Present</i>		<i>Affected</i>	
	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>		<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>
Air Quality	X		X		Prime or Unique Farmlands		X		X
Areas of Critical Environmental Concern (ACECs)		X		X	Special-status Species	X		X	
Cultural Resources	X			X	Wastes, Hazardous or Solid	X		X	
Environmental Justice	X			X	Water Quality, Surface and Ground	X		X	
Floodplains	X			X	Wetlands and Riparian Zones		X		X
Invasive, Non-native Species	X		X		Wild and Scenic Rivers (WSRs)		X		X
Migratory Birds	X		X		Wilderness and Wilderness Study Areas (WSAs)		X		X
Native American Religious Concerns		X		X					

3.1 CRITICAL ENVIRONMENTAL ELEMENTS

3.1.1 Air Quality

Affected Environment

The WMMDP is located in a semi-arid, mid-continental, and mid-latitude climate regime. The area is typical of the western high country with abundant sunshine, low humidity, low rainfall, and cold, snowy winters. The nearest meteorological measurements, collected at Rifle, Colorado, approximately 8 miles north of the WMMDP area, are summarized in Table 6 (for the period 1910-2005)(WRRRC 2006). Average annual precipitation is 11.61 inches and average snowfall is 38.6 inches. Precipitation is distributed relatively evenly throughout the year, with a slight peak in late summer/early fall and a lesser peak in early spring. The average frost-free period is mid-May to mid-September.

Table 6. Mean Temperature Ranges and Total Precipitation at Rifle, CO			
Month	Average Minimum/Maximum Temperatures (°F)	Average Precipitation (inches)	Average Snowfall (inches)
January	9.4 – 36.8	0.86	11.1
February	16.5 – 43.8	0.77	7.7
March	24.2 – 53.7	0.95	3.7
April	31.4 – 64.2	1.02	0.8
May	38.7 – 74.0	1.00	0.0
June	43.2 – 90.2	0.73	0.0
July	52.0 – 90.2	1.02	0.0
August	50.4 – 87.6	1.13	0.0
September	41.4 – 79.4	1.11	0.0
October	31.1 – 67.3	1.2	0.5
November	21.3 – 51.4	0.89	11.1
December	12.4 – 39.4	0.93	3.8
ANNUAL	31.2 – 64.3	11.61	38.6

Figure 4 (WRCC 2006) shows the relative frequency of winds in Rifle. Mean annual wind speed at Rifle is approximately 4 miles per hour. The frequency and strength of winds greatly affect the dispersion and transport of air pollutants. Atmospheric dispersion in the region is generally good during the day but less so at night when cooler temperatures and calm winds reduce atmospheric mixing and dispersion, especially along valley floors such as in the WMMDP area.

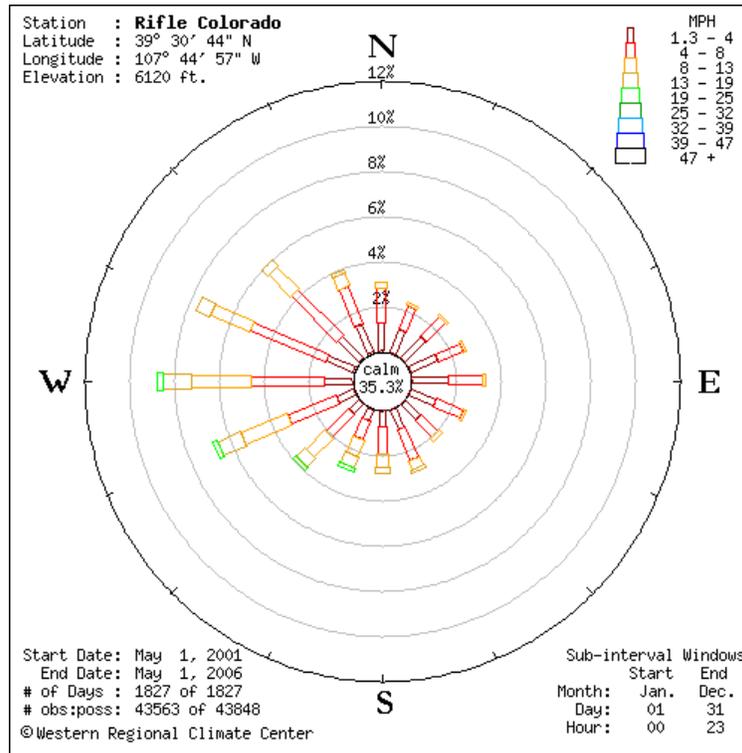


Figure 4. Wind Rose for Rifle, CO

The WMMPDA area lies within Garfield County, which has been described as an attainment area under Colorado Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). An attainment area is an area where ambient air pollution quantities are below (i.e., better than) NAAQS standards. These standards 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 WMMDP 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), ozone (O₃), particulate matter less than 10 microns (μ) in diameter (PM₁₀) and less than 2.5 μ in diameter (PM_{2.5}), and sulfur dioxide (SO₂).

Background pollutant concentrations for these pollutants are compared to the CAAQS and NAAQS in Table 7, where it can be seen that regional background values are well below established standards. Federal air quality regulations adopted and enforced by CDPHE limit incremental emissions increases to specific levels defined by the classification of air quality in an area. The Prevention of Significant Deterioration (PSD) Program is designed to limit the incremental increase of specific air pollutant

concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict.

Table 7. Air Pollutant Background Concentrations, Colorado and National Ambient Air Quality Standards, and Prevention of Significant Deterioration Increments ($\mu\text{g}/\text{m}^3$).					
Pollutant/Averaging Time		Measured Background Concentration	Ambient Air Quality Standards (AAQS)	Incremental Increase Above Legal Baseline PSD Class I/ II	
Carbon Monoxide (CO) ¹	1-hour	1,160 $\mu\text{g}/\text{m}^3$	40,000 $\mu\text{g}/\text{m}^3$ (35 ppm)	n/a	n/a
	8-hour	1,160 $\mu\text{g}/\text{m}^3$	10,000 $\mu\text{g}/\text{m}^3$ (9 ppm)	n/a	n/a
Nitrogen Dioxide (NO ₂) ²	Annual Arithmetic Mean	10 $\mu\text{g}/\text{m}^3$	100 $\mu\text{g}/\text{m}^3$ (0.053 ppm)	2.5 $\mu\text{g}/\text{m}^3$	25 $\mu\text{g}/\text{m}^3$
Ozone ³	8-hour	0.076 ppm (highest)	(0.075 ppm)	n/a	n/a
Particulate Matter (PM ₁₀) ¹	24-hour	114 $\mu\text{g}/\text{m}^3$ (highest)	150 $\mu\text{g}/\text{m}^3$	8 $\mu\text{g}/\text{m}^3$	30 $\mu\text{g}/\text{m}^3$
Particulate Matter (PM _{2.5}) ⁴	24-hour	40 $\mu\text{g}/\text{m}^3$ (highest)	35 $\mu\text{g}/\text{m}^3$	n/a	n/a
	Annual	11.2 $\mu\text{g}/\text{m}^3$	15 $\mu\text{g}/\text{m}^3$	n/a	n/a
Sulfur Dioxide (SO ₂) ⁵	3-hour	24 $\mu\text{g}/\text{m}^3$	1,300 $\mu\text{g}/\text{m}^3$ (0.5 ppm) ⁶	25 $\mu\text{g}/\text{m}^3$	512 $\mu\text{g}/\text{m}^3$
	24-hour	13 $\mu\text{g}/\text{m}^3$	365 $\mu\text{g}/\text{m}^3$ (0.14 ppm)	5 $\mu\text{g}/\text{m}^3$	91 $\mu\text{g}/\text{m}^3$
	Annual	5 $\mu\text{g}/\text{m}^3$	80 $\mu\text{g}/\text{m}^3$ (0.03 ppm)	2 $\mu\text{g}/\text{m}^3$	20 $\mu\text{g}/\text{m}^3$
¹ Background data collected in Rifle, 2008; highest levels recorded in April (Air Resource Specialists 2009). ² Background data collected by EnCana at site north of Parachute, 2007 (CDPHE 2008a). ³ Background data collected in Rifle, 2008; highest levels recorded in July (Air Resource Specialists 2009). ⁴ Background data collected in Rifle, September - December 2008; highest levels recorded in December (Air Resource Specialists 2009). ⁵ Background data collected at Unocal site, 1983-1984 (CDPHE 2008a). ⁶ Colorado AAQS = 700 $\mu\text{g}/\text{m}^3$ (0.27 ppm)					

The project area and surrounding areas are classified as PSD Class II. The PSD Class I areas located within 75 miles of the project area are Flat Tops Wilderness (25 miles northeast), Maroon Bells – Snowmass Wilderness (35 miles southeast), West Elk Wilderness (50 miles southeast), Black Canyon of the Gunnison National Park (60 miles South), and Eagles Nest Wilderness (70 miles east). These sensitive areas have the potential to be impacted by cumulative project source emissions. Regional background pollutant concentrations, as well as NAAQS, CAAQS, and PSD Class I and II Increments, are also presented in Table 7.

CDPHE, under their EPA approved State Implementation Plan, is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made, and those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. Therefore, CDPHE has ultimate responsibility for reviewing and permitting the project prior to its operation.

Environmental Consequences

Proposed Action

Air quality would decrease during construction of the WMMDP roads, pads, pipelines, and wells. Pollutants generated during these activities would include combustion emissions and fugitive dust associated with operation of construction equipment and vehicles. Construction activities would occur between 7:00 a.m. and 6:00 p.m. daily for a period of approximately 2 weeks per pad. Construction of

roads and pipelines would take approximately 1 to 2 weeks per pad. Much of this construction would occur concurrently. Construction activities described in the Proposed Action would result in localized short-term increases in tailpipe emissions from vehicles and fugitive dust from surface-disturbing activities and travel on the unpaved access roads. To control fugitive dust emissions, LEII would be required to implement dust abatement strategies as needed by watering the access road and construction areas and/or by applying a surfactant approved by the WRNF responsible official.

Once construction activities are complete, associated air quality impacts would also cease. However, emissions from diesel drill rig engines, tailpipe emissions from vehicles, and fugitive dust from travel on unpaved roads would continue throughout the drilling and completion phase. LEII anticipates using one or two drilling rigs, each with three 1,500-horsepower (hp) engines operating at 40% utilization. Approximately 15 to 20 days would be required to drill and complete each well. The total timeframe of 40 to 50 days per well mentioned elsewhere in this EA includes pad, road, and pipeline construction, placing of separators and tank facilities, and other operations. These periods could vary depending on the actual number of wells, number of drilling rigs, and drilling rate, all of which are subject to economic and technological factors.

Emissions of volatile organic compounds (VOCs) from condensate tanks would continue throughout the production phase. Although VOC emissions vary depending on the characteristics of the condensate, tank operations, and production volumes, air-quality impacts associated with condensate tanks are anticipated to be minor. The COGCC requires installation of capture and thermal destruction equipment for VOC emissions at condensate tanks, which reduces VOC emissions by approximately 95%.

The Roan Plateau RMPA/EIS (BLM 2006) describes potential effects from oil and gas development (BLM 2006:4-26 to 4-37). Analysis was completed with regard to greenhouse gas emissions, a near-field and far-field analysis for “criteria pollutants” (PM₁₀, PM_{2.5}, CO, SO₂, and NO₂), and hazardous air pollutants (benzene, ethylbenzene, formaldehyde, hydrogen sulfide, toluene, and xylenes). Sulfur and nitrogen deposition, acid neutralizing capacity, and a visibility screening analysis were also completed in the Roan Plateau RMPA/EIS.

Because the visibility screening analysis for the Roan Plateau RMPA/EIS showed potential visibility impacts at one or more Class I areas, a refined visibility analysis was also completed. The refined visibility analysis indicated a “just noticeable” incremental impact on visibility for one day each at two Class I areas (Black Canyon of the Gunnison National Park and the Mt. Zirkel Wilderness). For the other pollutants analyzed, BLM concluded that implementation of oil and gas development at the level anticipated in the Roan Plateau RMPA/EIS would have no or negligible long-term adverse impacts on air quality. Since the number of wells under the Proposed Action is within the level of development anticipated in the Roan Plateau analysis it is not expected to have adverse effects on air quality beyond those previously disclosed in the Roan Plateau RMPA/EIS.

Since the current land use plan was approved, 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 some to cause a net warming effect of the atmosphere primarily by decreasing the amount of heat energy re-radiated by the Earth 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 (2007) supports these predictions but has acknowledged uncertainties regarding how climate change may affect different regions. In 2007, the IPCC also concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average

temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations” (National Academy of Sciences 2007). Other theories about the effect of GHGs on global climate change exist.

The assessment of the effects of GHG emissions on climate change remains in its formative phase; therefore, it is not yet possible to know with certainty the net impact to climate from GHGs produced globally over the last century or from those produced today. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of climate change on the specific area of the Proposed Action. In addition, while any oil and gas leasing or development projects may contribute GHGs to the atmosphere, these contributions would not have a significant effect on a phenomenon occurring at the global scale believed by experts to be due to more than a century of human activities.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction on FSR818, would have similar impacts on air quality, except that emissions associated with construction, drilling, and completion activities—and particularly the higher traffic levels during these periods—would be reduced due to a shorter duration of the development phase. Additionally, a greater percentage of the traffic associated with the development phase would occur during periods when the access route is either frozen or snowpacked, reducing fugitive dust emissions off the roadway.

No Action Alternative

Under the No Action Alternative, the Federal wells included in the Proposed Action would not be approved, resulting in 21 instead of 89 new wells. Therefore, emissions of pollutants from vehicle and equipment engines would be reduced proportionately. However, all three of the proposed new pads would be built, as would the 0.06 mile of accompanying new roads and pipelines, resulting in no reduction in fugitive dust from disturbed surfaces.

3.1.2 Cultural Resources

Affected Environment

Eleven cultural resource investigations have been conducted in the West Mamm Master Development Plan (WMMDP) project vicinity, with the three most recently conducted inventories completed within the WMMDP project area itself. These investigations have resulted in the archaeological survey of approximately 200 acres (over 20% of the 983-acre lease area and 100% of the proposed areas of disturbance) and documentation of one historic period homestead site in the project area. The homestead was evaluated as not eligible for inclusion on the National Register of Historic Properties (NRHP), as it did not meet the National Register criteria.

Environmental Consequences

Proposed Action

Implementation of the Proposed Action would have no direct impacts to historic properties, as there are no known cultural resources eligible to the NRHP in the project area. Formal consultation with the Colorado State Historic Preservation Officer (SHPO) for the three most recent inventories conducted within the project area (CRVFO #1108-17, 1110-11, and FS #R2003021508043) was conducted by the

White River National Forest, as the Federal lands (surface) within the WMMDP are administered by the United States USFS (USFS) while the Federal minerals are administered by the Bureau of Land Management. The SHPO concurred with the findings and recommendations of the WRNF, and the BLM therefore made a determination of “**No Historic Properties Affected.**” This determination was made in accordance with the 2001 revised regulations [36CFR 800.4(d)(1)] for Section 106 of the National Historic Preservation Act (16U.S.C 470f), the BLM/SHPO Programmatic Agreement (1997) and Colorado Protocol (1998)].

Indirect, long-term cumulative impacts from increased access and the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the vicinity of the location. These impacts could range from accidental damage or vandalism to illegal collection and excavation. A standard Education/Discovery Condition of Approval (COA) for cultural resource protection would be attached to the APD(s)(Appendix A). The importance of this COA should be stressed to the operator and its contractors, including informing them of their responsibilities to protect and report any cultural resources encountered during construction, drilling, completion, and maintenance operations.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have similar impacts on cultural resources. However, because the duration of the development phase would be shortened by close to half, the potential for adverse impacts associated with increased human presence would be reduced somewhat.

No Action Alternative

Under the No Action Alternative, the new APDs for the 68 Federal wells associated with the Proposed Action would be denied. However, the 21 proposed Fee wells, three new well pads, and construction of 0.06 mile of associated access roads and pipelines would continue under the authority of the COGCC. Therefore, potential impacts to cultural resources would still occur under this alternative because development activities would take place, access would be increased, and the presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the project vicinity. These impacts could range from illegal collection and excavation to vandalism. The No Action Alternative would also not include attachment of the standard Education/Discovery COA designed to protect cultural resources (Appendix A).

3.1.3 Invasive Non-native Species

Affected Environment

The WMMDP development area is located within a forest spruce-fir forest mixed with aspen. The access route along FSR818 passes through a broad valley with sideslopes dominated by upland shrublands ranging from sagebrush to serviceberry to oakbrush, depending on elevation. The lowest elevations of the valley sideslopes also support pinyon-juniper woodland. Conifers are also present within the oakbrush and along the West Mamm Creek riparian corridor, which is generally dominated by cottonwoods, aspen, willows, and other tall shrubs. Both the FSR818 roadside and the adjacent valley floor and sideslopes consist primarily of native trees, shrubs, grasses, and forbs, with few invasive non-native species.

The only State-listed noxious weed found during an inventory of the site was a small amount of houndstongue (*Cynoglossum officinale*). This is a common invader of moist lands—such as subalpine forests and riparian corridors—that are grazed by livestock. The plant is not consumed by livestock, but the seeds contain burs that adhere to hair around the feet, snout, and tails of the cattle, providing a

mechanism for dispersal. Less aggressive species of annual or biennial forbs are present along roadways and where cattle congregate.

Environmental Consequences

Proposed Action

Surface-disturbing activities provide a niche for the invasion and establishment of invasive non-native species, particularly when these species are already present in the surrounding area. Because the project area contains mostly native vegetation, the potential for weed invasion following construction activities is low. Mitigation measures designed to minimize the spread of invasive non-native species would be attached to well APDs as conditions of approval (Appendix A).

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have similar impacts on vegetation resources in terms of direct surface disturbance. However, the duration of the development phased would be shortened by close to half, reducing the potential for weed invasions, since interim reclamation would be undertaken sooner. Additionally, since more of the traffic during the development phase would occur when the access route is frozen or snowpacked, impacts to native vegetation from aerial deposition of fugitive dust would be reduced. Stressing of native vegetation by dust deposition could increase the potential for colonization by weeds.

No Action Alternative

Under the No Action Alternative, the 68 new Federal wells would not be approved, but the 21 new Fee wells and associated three new pads and 0.06 mile of new access roads and pipelines would be constructed. Therefore, the risk of weed invasion and spread would be essentially the same as under the Proposed Action. Existing weed infestations are likely to spread if not treated.

3.1.4 Migratory Birds

Affected Environment

For the purpose of this EA, the term “migratory birds” applies generally to native bird species protected by the Migratory Bird Treaty Act (MBTA). This includes native passerines (flycatchers and songbirds) as well as birds of prey, migratory waterbirds (waterfowl, wading birds, and shorebirds), and other species such as doves, hummingbirds, swifts, and woodpeckers. The term “migratory” is a misnomer and should be interpreted broadly to include native species that remain in the same area throughout the year as well as species that exhibit patterns of latitudinal or elevational migration to avoid winter conditions of cold or a shortage of food. For most migrant and native resident species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of both nesting sites and food. In addition, because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality of the territory occupied. During non-breeding seasons, birds are generally non-territorial and able to feed across a larger area and wider range of habitats.

Among the wide variety of species protected by the MBTA, special concern is usually given to the following groups:

- Species that migrate across long distances, particularly Neotropical migrant passerines that winter in tropical or Southern Hemisphere temperate zones.
- Birds of prey, which require large areas of suitable habitat for finding sufficient prey.
- Species that have narrow habitat tolerances and hence are vulnerable to extirpation from an area as a result of a relatively minor habitat loss.
- Species that nest colonially and hence are vulnerable to extirpation from an area as a result of minor habitat loss.

Because of the many species that fall within one or more of these groups, BLM focuses on species identified by the USFWS as Birds of Conservation Concern (BCC). The current BCC list (USFWS 2008a) for Region 16 (Southern Rockies/Colorado Plateau) includes 10 species potentially present in or near the WMMDP area: the bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), flammulated owl (*Otus flammeolus*), yellow-billed cuckoo (*Coccyzus americanus*), Lewis's woodpecker (*Melanerpes lewis*), willow flycatcher (*Empidonax traillii*), gray vireo (*Vireo vicinior*), pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus griseus*), Brewer's sparrow (*Spizella breweri*), and Cassin's finch (*Carpodacus cassinii*). Of these, the bald eagle, flammulated owl, yellow-billed cuckoo, and Lewis's woodpecker also have special-status as BLM or USFS sensitive species or candidate threatened or endangered species and hence are discussed in the section of this EA titled Special-status Species.

Included in the BCC list are three pinyon-juniper obligates (pinyon jay, gray vireo, and juniper titmouse), a sagebrush obligate (Brewer's sparrow), a near-obligate in tall-willow shrublands (willow flycatcher), and a species of montane and subalpine coniferous forests (Cassin's finch). Pinyon-juniper and sagebrush habitats are minor components of the WMMDP area and immediate vicinity and not sufficiently extensive to support the species associated with those types. Although some riparian habitat occurs along West Mamm Creek, the habitat is probably not of sufficient extent or quality to support the willow flycatcher.

The area within and adjacent to the private land where the existing and proposed well pads are shown on Figures 2 and 3 is dominated a spruce-fir forest that supports a variety of subalpine species, including Neotropical migrants such as the broad-tailed hummingbird (*Selasphorus platycercus*), olive-sided flycatcher (*Contopus cooperi*), Hammond's flycatcher (*Empidonax hammondii*), plumbeous vireo (*Vireo plumbeus*), ruby-crowned kinglet (*Regulus calendula*), hermit thrush (*Catharus guttatus*), western tanager (*Piranga ludoviciana*), yellow-rumped warbler (*Dendroica coronata*), chipping sparrow (*Spizella passerina*), dark-eyed junco (*Junco hyemalis*), and pine siskin (*Carduelis pinus*), in addition to Cassin's finch. Birds of prey in the higher elevations habitats, besides the flammulated owl mentioned above, include the northern goshawk (*Accipiter gentilis*) and northern saw-whet owl (*Aegolius acadicus*). The northern goshawk is addressed in the section on Special Status Species. The northern saw-whet owl, which was documented as present during project-specific surveys in May 2010, is addressed in the section on Terrestrial Wildlife.

Stands and clumps of aspen within the coniferous forest attract additional Neotropical migrants such as the cordilleran flycatcher (*Empidonax difficilis*), western wood-pewee (*Contopus sordidulus*), tree swallow (*Tachycineta bicolor*), violet-green swallow (*Tachycineta thalassina*), house wren (*Troglodytes aedon*), warbling vireo (*Vireo gilvus*), and orange-crowned warbler (*Vermivora celata*).

The riparian corridor along West Mamm Creek supports a linear community dominated by cottonwoods, except where they are replaced by aspen at the higher elevations, including the private land. Aspen are also present in middle reaches of the corridor, as are conifers and tall shrubs (willows, serviceberry, and

chokecherry. Besides many of the birds listed above for spruce-fir and aspen forests, the riparian corridor is suitable for additional Neotropical migrants such as Wilson's warbler (*Wilsonia pusilla*) at higher elevations, and the Bullock's oriole (*Icterus bullockii*), yellow warbler (*Dendroica petechia*), MacGillivray's warbler (*Oporornis tolmiei*), and Virginia's warbler (*Vermivora virginiae*) at middle and lower elevations. Birds of prey likely to nest and/or roost in trees along the corridor include the great horned owl (*Bubo virginiana*), Cooper's hawk (*Accipiter cooperi*), sharp-shinned hawk (*A. striatus*), and potentially the northern pygmy-owl (*Glaucidium gnoma*).

Migratory birds that are commonly associated with the type of oakbrush-dominated mountain shrub habitat in the middle elevations of the access route along FSR818 but not on the BCC list or the BLM and USFS sensitive species lists include Neotropical migrants such as the dusky flycatcher (*Empidonax oberholseri*), Virginia's warbler, MacGillivray's warbler, and orange-crowned warbler. At lower elevations along the access route, additional species in the oak-serviceberry shrubland include the lazuli bunting (*Passerina amoena*), lesser goldfinch (*Carduelis psaltria*), black-headed grosbeak (*Pheucticus melanocephalus*), and spotted towhee (*Pipilo maculatus*). Raptors hunting within or above these habitats and nesting in associated or nearby trees include the Cooper's hawk, sharp-shinned hawk, and red-tailed hawk (*Buteo jamaicensis*).

Management Indicator Species – Virginia's Warbler. Of the migratory birds listed above, one species (Virginia's warbler) is classified by the WRNF as a Management Indicator Species (MIS). In 2006, the WRNF developed a rigorous monitoring protocol (Potter 2006) to evaluate the habitats and population trend of the Virginia's warbler, chosen as an MIS to represent species occupying the mountain shrub habitat type (USFS 2002, USFS 2006). It is the intent of the WRNF Forest Plan that habitat quality and quantity be maintained and distributed in a manner that provides for interactive, viable populations of wildlife species.

Overall breeding range of Virginia's warbler extends from north-central New Mexico and northeastern Arizona to southwestern Wyoming and southeastern Utah and westward through Utah and into Nevada (Kingery 1998, Olson and Martin 1999). In Colorado, Virginia's warbler breeds in foothills communities, including pinyon-juniper woodlands, ponderosa pine forests, oak-dominated shrublands, and riparian areas, generally between 5,000 and 9,000 feet in elevation. Breeding is initiated in early May and can continue through late July. Diet of Virginia's warbler is exclusively insects, with probing and gleaning, hovering and gleaning, and sallying for flying insects being the predominant foraging strategies employed. Partners in Flight estimated that the total population of Virginia's warbler in Colorado (approximately 100,000) represents slightly over 25% of the global population of the species (RMBO 2007). No definitive population trends for Virginia's warbler have been determined, but populations in Colorado appear to be stable.

Virginia's warbler was not detected in earlier project-related surveys for the WRNF in 2008 and 2009. However, a survey by BLM biologist in May 2010 found the species to be rather common in the tall (tree-form) oaks and cottonwoods along lower reaches of West Mamm Creek. This species is addressed in the MIS report prepared in conjunction with this project (BLM 2010c).

Environmental Consequences

Proposed Action

The Proposed Action would result in initial long-term loss of approximately 10.5 acres of habitat in the mixed aspen/conifer forest areas of the Fee land where the well pads and new access roads and pipelines would be developed. Much of this impact would occur along habitat edges rather than in contiguous blocks of habitat, and the three new pads are interior to the two existing pads. Direct habitat loss would

be expected to reduce the number of available nesting and feeding sites for the BCC or other migratory and resident birds associated with these habitat types. However, reductions in breeding populations would be negligible.

Indirect habitat loss due to avoidance (meaning reduced use, not necessarily a lack of use) is likely to contribute to additional decreases in suitable nesting and feeding sites for migratory and resident birds. In general, however, small birds are less vulnerable to indirect habitat loss from human activity and operation of noisy equipment than are some other wildlife species. Nonetheless, a zone of reduced use or lack of use by BCC and Neotropical migrant species is likely to occur along the newly created habitat edges and extending a distance of perhaps 50 to 100 meters into the adjacent habitat blocks. The extent of a zone of effective habitat loss is minimized by the dense cover of the dominant vegetation types. Feeding activities would be less affected by disturbance than nesting activities and could include use of habitat adjacent to pads and roads when the disturbing activities are temporarily halted.

Another potential impact is that some birds may select a nest site in an area that is prone to a disturbance that has not yet begun. Once the disturbance begins, the birds may either abandon the nest, resulting in loss of the eggs or young, or remain on the nest but have reduced success due to stress or interference with the ability to find sufficient food for the young. This type of impact would be ameliorated by the dense vegetation screening of the project area.

The greatest potential for disturbance-related impacts is during the construction, drilling, and completion phases, when operation of heavy equipment, vehicular traffic, and the presence of a drill rig and hydrofracturing equipment generate the most noise and human activity. During periods of less intensive human activity as the project moves into the production phase, the zone of reduced use would become smaller, particularly for edge rather than habitat-interior species.

BLM would apply a Migratory Bird timing limitation (winter seasonal restriction) to preclude vegetation removal for the construction of pads, roads, pipelines, or other surface facilities associated with Federal wells during the 60-day period from May 1 to June 30 (Appendix A) unless a survey conducted by a qualified biologist demonstrates no BCC species nesting adjacent to the area to be disturbed. Additionally, the WRNF would attach a winter seasonal restriction for elk calving (see section on Wildlife, Terrestrial) as a condition for issuance of a Special Use Authorization for FSR818.

BLM requires measures to protect migratory birds from injury or mortality resulting from exposure to harmful fluids stored or disposed in pits on the well pads (Appendix A). This COA applies to all pads with Federal wells, regardless of surface ownership.

Management Indicator Species – Virginia’s Warbler. As note previously, Virginia’s warbler is an MIS migratory bird in the WRNF. The minor amount of habitat loss under the Proposed Action (10.5 acres of new disturbance for pads, roads, and pipelines) is negligible. More important, the area where this habitat loss would occur is not in the area of suitable habitat for this species—i.e., Virginia’s warbler is limited to the tall oak corridor along West Mamm Creek and some adjacent parts of the valley floor and sideslopes. Effective habitat loss could occur in relation to disturbance associated with project-related traffic on FSR818 and upper portions of CR319. However, the road is mostly farther from the highest quality habitat than is likely to affect feeding, and probably even nesting. The dense screening and noise attenuation provided by the dense foliage of the tall shrubs and trees would be particularly effective during the portion of the year when the species is present.

Based on the above, and as discussed in the MIS report prepared for the project (BLM 2010c), it is unlikely that populations of Virginia’s warbler would be affected at a discernible level, although a small number of individuals could be prevented from nesting or feeding in otherwise suitable habitat and forced

to relocate to less suitable habitat. Consequently, any impacts would be limited to the small fraction of the population adjacent to the access route, and probably only during years in which traffic on the road is supporting active construction, drilling, and completion activities.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have similar impacts on migratory birds in terms of direct habitat loss. However, the duration of the development phase would be shortened by close to half, reducing the duration of effective habitat loss associated with the high level of human activity and traffic. Additionally, a higher percentage of the disturbance associated with development activity at the well pads and heavy traffic on the access route would occur outside the nesting season, including that of Virginia's warbler, an MIS songbird.

No Action Alternative

Impacts to migratory birds under the No Action Alternative would be less than under the Proposed Action because only the 21 Fee wells and none of the 68 Federal wells would be developed. However, the three proposed Fee pads and associated roads and pipelines, all on private lands, would be constructed. Therefore, the amount of habitat loss would be similar, although the duration of drilling and associated indirect impacts from disturbance would be reduced proportionately.

3.1.5 Native American Religious Concerns

Affected Environment

The proposed WMMDP project area is located within a larger area identified by the Ute Tribes as part of their ancestral homeland. Cultural resource inventories (see section on Cultural Resources) were conducted to determine if there were any areas that might be culturally sensitive to Native Americans. No sensitive areas were identified during the inventories, and none is currently known in the project area.

Environmental Consequences

Proposed Action

The Ute tribes claim this area as part of their ancestral homeland. Cultural resource inventories (see Cultural Resources) were conducted to determine if there were any areas that might be culturally sensitive to Native Americans. No areas were identified during the inventories and none is currently known by the CRVFO within the project area. Additionally, the Ute Tribe (Northern Ute), Southern Ute, and Ute Mountain Ute Tribes were notified of the Proposed Action (including project description and location map) on March 2, 2010. No responses, questions, or requests for additional information were received by April 2, 2010.

Although the Proposed Action would have no direct impacts on Native American religious concerns, indirect impacts from increased access and personnel in the vicinity of the proposed project could result in impacts to unknown Native American resources ranging from accidental damage or vandalism to illegal collection and excavation.

A standard Education/Discovery Condition of Approval Native (COA) for the protection of Native American values would be attached to the APDs (Appendix A). The importance of these COAs should 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 subcontractors should also be aware of requirements under the American Graves Protection and Repatriation Act (NAGPRA).

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 BLM Authorized Officer, as well as the appropriate Native American group(s)(IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act. LEII would be required to notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have similar impacts on Native American religious concerns. However, because the duration of the development phase would be shortened by close to half, the potential for adverse impacts associated with human presence would be reduced.

No Action Alternative

Under the No Action Alternative, the APDs for the proposed 68 Federal wells associated with the Proposed Action would be denied. However, as previously mentioned (see Cultural Resources section), elements of the Proposed Action that do not require Federal approval prior to implementation. The proposed and existing pads are located on private surface and the 21 proposed Fee wells that could be developed on those pads could be authorized by the COGCC.

Impacts under this alternative would still increase compared to current conditions because the additional oil and gas activities, increased access, presence of project personnel could result in a range of impacts to known and undiscovered cultural resources in the vicinity of the location. These impacts could range from accidental damage or vandalism to illegal collection and excavation. The No Action Alternative would also not include the Education/Discovery COA (Appendix A).

3.1.6 Special-Status Species

Affected Environment

Listed, Proposed, or Candidate Threatened or Endangered Plant Species

According to the latest species list from the USFWS (<http://mountain-prairie.fws.gov/endspp/CountyLists/COLORADO.pdf>), the following Federally listed, proposed, or candidate plant species may occur within or be impacted by actions occurring in Garfield County: Colorado hookless cactus (*Sclerocactus glaucus*), DeBeque phacelia (*Phacelia submutica*), Parachute penstemon (*Penstemon debilis*), and Ute ladies' - tresses orchid (*Spiranthes diluvialis*). The results of an October 2009 plant survey indicate the project area does not include occurrences or suitable habitat for these species.

Listed, Proposed, or Candidate Threatened or Endangered Animal Species

According to the current species list available online from the USFWS (<http://mountain-prairie.fws.gov/endspp/CountyLists/COLORADO.pdf>), the following Federally listed, proposed, or candidate threatened or endangered animal species may occur within or be impacted by actions occurring in Garfield County: Canada lynx (*Lynx canadensis*), Mexican spotted owl (*Strix occidentalis*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), razorback sucker (*Xyrauchen texanus*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). Suitable habitats for the Mexican spotted owl do not occur in or near the project area. The other species are addressed below. Note that the Biological Assessment (BA) submitted to the USFWS for the WMMDP (BLM 2010a) addressed only the Canada lynx.

Canada Lynx. Portions of the WMMDP lie within the area of the Battlement Lynx Analysis Unit (LAU) (Figure 5) and contain mapped habitat for the Canada lynx, a species Federally listed as threatened. The Battlement LAU encompasses 55,926 acres of land, of which 8,717 acres are in private ownership. Within the LAU, a total of 8,770 acres are mapped as denning habitat; 4,376 acres are mapped as winter habitat; and 2,403 are mapped as “other” habitat. The WMMDP project area consists of 938 total acres with 325 acres located on private land surrounded by USFS land. The LAU currently has approximately 24.1 miles of road, with a road density of 0.28 mile per square mile. The majority of roads are on the periphery of the LAU or on private lands within the LAU. Eight existing well pads within the LAU are estimated to have caused approximately 40 acres of direct disturbance. Of these eight existing pads, two are within the WMMDP boundary. These pads were constructed in 2008 and are currently in the drilling and production phases (Figure 2).

The Battlement LAU provides contiguous shrub and forest cover of scattered spruce/fir and aspen on north facing slopes and at higher elevations. Canada lynx have been documented by CDOW to have used the Battlement LAU since 1999. Although the last known occurrence was in 2005, this does not necessarily indicate that potentially suitable habitat within the LAU is less favored than suitable habitat in other areas. Because CDOW spends most of the survey effort in other areas of Colorado where lynx have been released, and because many of the known lynx do not have radiocollars, the species could be more common in this area than generally recognized. Adding to this situation is the tendency for lynx to travel along areas of dense cover, such as shrubby riparian habitats within coniferous forests, greatly reducing the likelihood of incidental observations.

Within the Battlement LAU, shrubby drainages and dense oakbrush in uplands provide areas of protective cover that serve as landscape linkages to the Grand Mesa as well as to wintering and denning habitats. No movement barriers exist between Battlement Mesa and Grand Mesa and suitable habitats to the south and east. The I-70 corridor is probably at a partial barrier to Canada lynx movement north of the LAU.

The USFS has analyzed the Battlement LAU and has identified it as predominantly a habitat linkage area between the Battlement and Grand Mesas, with approximately 35% of the area considered suitable foraging and denning habitat. The limited value of the LAU for foraging and denning is related primarily to elevation, with most of the area being below the elevation of subalpine forests that characterize high-quality habitat. This includes a general lack of the preferred prey species, the snowshoe hare (*Lepus americanus*), in most of the LAU. Although the LAU is predominantly a habitat linkage area, by definition it is capable of supporting Canada lynx, with all necessary habitat components to fulfill ecological and life-cycle needs. Although snowshoe hares are limited in distribution and abundance in the LAU, suitable secondary prey species are present and abundant. Moreover, even unsuitable habitats they can function as linkages, depending on their proximity to suitable habitats.

Western Yellow-billed Cuckoo. This species is associated with mature cottonwood or other deciduous woodlands long streams, primarily in woodlands with an understory of tall deciduous shrubs. Although not known to nest in the CRVFO area, portions of the habitat along the Colorado River and major

tributaries are potentially suitable. The cottonwood/aspen/willow riparian corridor along West Mamm Creek adjacent to FSR818 and upper portions of CR319 appear suitable for the yellow-billed cuckoo in terms of composition and structure. However, the species is not known to nest in the CRVFO area, and the corridor along West Mamm Creek is above its typical elevational range.

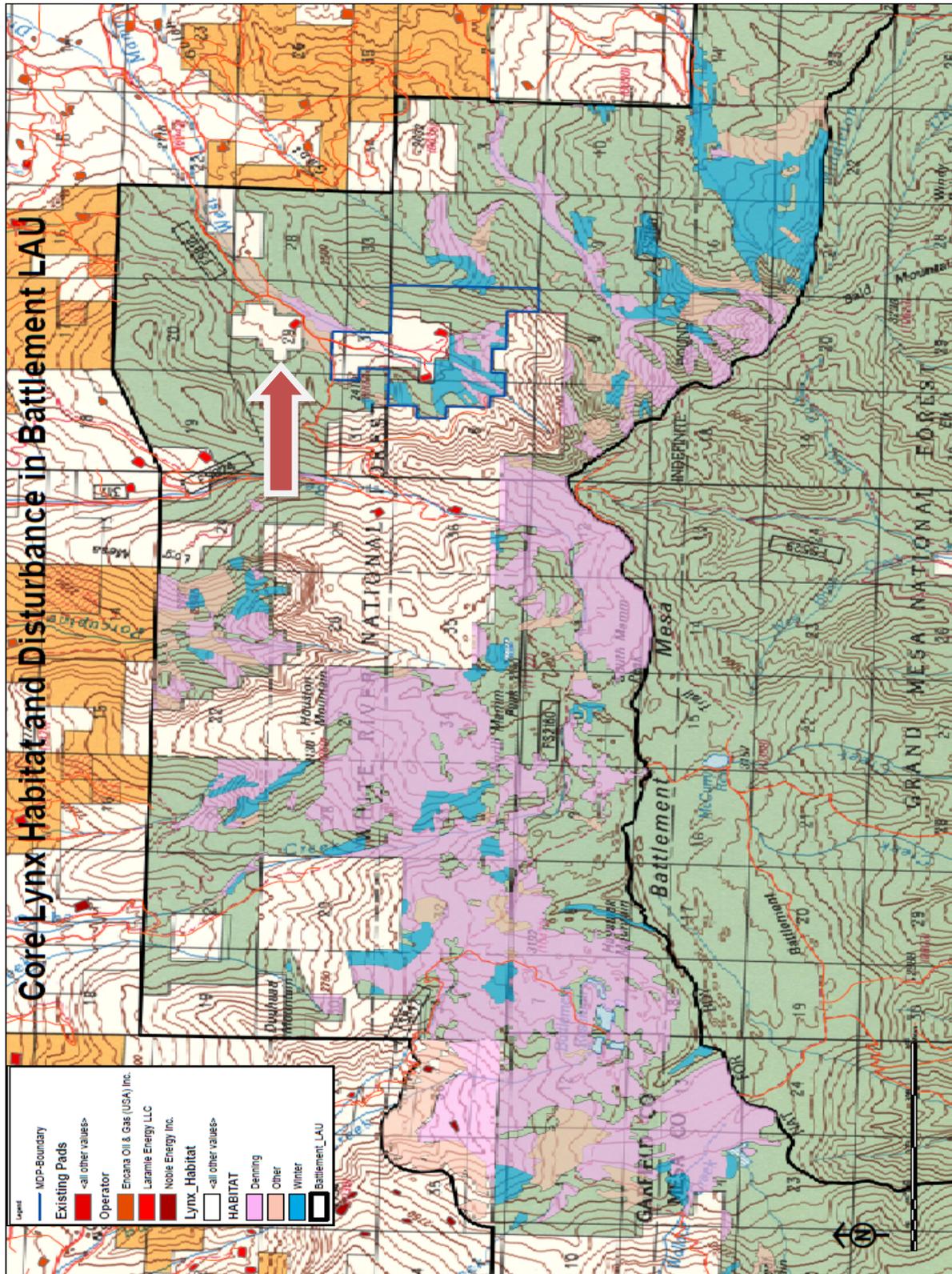


Figure 5. Project Area (Red Arrow) in Relation to Battlement LAU Habitats

Endangered Colorado River Fishes. Four species of big-river fishes that are Federally listed as endangered occur within the Colorado River drainage basin downstream from the WMMDP area. These species are the razorback sucker, Colorado pikeminnow, humpback chub, and bonytail (a species of chub). 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 approximately 8 miles north and 5 miles west of the WMMDP area. The nearest known habitat for the humpback chub and bonytail is within the Colorado River approximately 75 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.

BLM and USFS Sensitive Plant Species

BLM and USFS sensitive plant species with habitat and/or occurrence records in Garfield County include adobe thistle (*Cirsium perplexans*), DeBeque milkvetch (*Astragalus debequaeus*), Harrington's penstemon (*Penstemon harringtonii*), Naturita milkvetch (*Astragalus naturitensis*), Piceance bladderpod (*Lesquerella parviflora*), and Roan Cliffs blazing-star (*Mentzelia rhizomata*). Results of an October 2009 inventory indicate the project area contains no sensitive plant species or suitable habitat for these species.

BLM and USFS Sensitive Animal Species

Animal species designated as sensitive by Colorado BLM and Region 2 USFS and with geographic and elevational ranges and habitat requirements consistent with the project vicinity are listed in Table 8. Several of the BLM or USFS sensitive animal species potentially present in the WMMDP area or vicinity are unlikely to occur due to marginal habitat conditions or geographic location (e.g., below the typical elevation). Species listed in the table are discussed below. WRNF sensitive species are also addressed in the Biological Assessment/Biological Evaluation (BA/BE) for the project (BLM 2010b).

Fringed Myotis (*Myotis thysanodes*) and Townsend's Big-eared Bat (*Corynorhinus townsendii*). These species hunt at night for aerial insects over pinyon-juniper woodlands, montane conifer woodlands, and semi-desert shrublands. These bats sometimes roost in tree cavities, and the mixed conifer and aspen could support minimal use.

Northern Goshawk (*Accipiter gentilis*), Flammulated Owl (*Otus flammeolus*), and Boreal Owl (*Glaucidium gnoma*). Habitat types in the WMMDP area are most suitable for the flammulated owl, which is known to nest in the vicinity of the proposed and existing well pad locations. Flammulated owls hunt in foothills and montane woodlands for nocturnal insect and small-mammal prey and nest primarily in cavities in trees. Northern goshawks occur primarily in montane and subalpine conifer/aspen forests, where they nest and hunt for diurnal prey such as birds and squirrels or chipmunks. During winter, goshawks may move to lower elevation habitats. For this reason, northern goshawks are considered likely to occur, at least as transients. Boreal owls are less likely than the other two species because of their stronger affinity to high-elevation, old-growth spruce-fir forest.

Bald Eagle (*Haliaeetus leucocephalus*). Removed from the Federal list of threatened or endangered species in August 2007, the bald eagle is now considered a sensitive species. Bald eagles both nest and roost along the Colorado River a few miles north of the site. However, the dense shrubs and mixed conifers along FSR818 are not the type of upland habitats used for perching or hunting by this species.

American Three-toed Woodpecker (*Picoides dorsalis*) and Olive-sided Flycatcher (*Contopus borealis*). These species occur in montane or subalpine coniferous forests. The mixed conifer and aspen habitats within and adjacent to portions of the project area are potentially suitable for these species although below

the typical elevational ranges for both. The flycatcher tends to occur in lower elevation, more marginal spruce-fir forest than the woodpecker.

Table 8. BLM and USFS Sensitive Animal Species Potentially Present in the WMMDP Area			
Common Name	Agency	Habitat	Potential for Occurrence
Fringed myotis	BLM, USFS	Breeds and roosts in caves, trees, mines, and buildings; hunts over pinyon-juniper, montane conifers, and semi-desert shrubland habitats.	Possible
Townsend's big-eared bat	BLM, USFS	Breeds and roosts in caves, trees, mines, and buildings; hunts over pinyon-juniper, montane conifers, and semi-desert shrubland habitats.	Possible
Northern goshawk	BLM, USFS	Nests in montane and subalpine coniferous and aspen forests; may move to pinyon-juniper in winter.	Likely – Habitat marginal
Bald eagle	BLM, USFS	Nests and roosts in mature cottonwood forests along rivers, large streams, and lakes.	Present along Colorado River
Boreal owl	USFS	Nests in subalpine spruce-fir forests.	Possible – Below typical elevation
Flammulated owl	USFS	Depends on cavities for nesting, open forests for catching insects, and brush or dense foliage for roosting at elevations of 6,000 – 10,000 feet.	Possible – Habitat suitable, not found during nesting surveys
American three-toed woodpecker	USFS	Nests and feeds in upper montane and subalpine coniferous forests and interspersed aspen	Possible – Habitat marginal, below typical elevation
Olive-sided flycatcher	USFS	Mature subalpine spruce/fir and montane Douglas-fir forests, especially on steep slopes.	Likely – Habitat marginal
Purple martin	USFS	Nests at the edges of old-growth aspen stands, usually near a stream, spring, or pond.	Unlikely – Habitat marginal, aspen stands limited in size
Loggerhead shrike	USFS	Nests and hunts for insects and small vertebrates in grasslands, shrub steppes, and savannahs at low elevations.	Unlikely – Habitat marginal, limited open terrain
Boreal toad	USFS	Seasonal ponds and beaver ponds, subalpine.	Habitat unsuitable, below elevation range
Northern leopard frog	BLM, USFS	Wet meadows and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches.	Habitat unsuitable; not found during surveys
Bluehead sucker	BLM, USFS	Variety of areas from headwater streams to large rivers.	Habitat unsuitable; not found during surveys. Occurs in Colorado River
Flannelmouth sucker	BLM, USFS	Generally restricted to rivers and major tributaries.	
Roundtail chub	BLM, USFS	Generally restricted to rivers and major tributaries.	
Colorado River cutthroat trout	BLM, USFS	Clear, cold water, low levels of fine sediment in channel bottoms, well-distributed pools, stable streambanks, and abundant stream cover.	Habitat unsuitable; not found during surveys

Purple Martin (*Progne subis*) and Loggerhead Shrike (*Lanius ludovicianus*). Although the project area is within the geographic ranges of these two species, the habitat is marginal for both. Purple martins are associated with old-growth aspen on the edge of open terrain, while loggerhead shrikes nest in low shrubs or in scattered trees in grasslands. Mature aspen are present in the area of the proposed new well pads. Habitats suitable for the loggerhead shrike occur primarily outside the WMMDP boundary along CR319.

Boreal Toad (*Bufo boreas*) and Northern Leopard Frog (*Rana pipiens*). The northern leopard frog occurs in ponds and slow-flowing streams that persist year-round—unlike toads and salamanders, which may occupy seasonal pools. West Mamm Creek is unsuitable for the leopard frog due to periods without flow or subject to fast, turbid flows. Boreal toads occupy seasonal pools or beaver ponds in subalpine areas,

often in open areas adjacent to coniferous forests. The project area is below the typical elevation range of this species, and no suitable habitats are present along West Mamm Creek.

Bluehead Sucker (*Catostomus discobolus*), Flannemouth Sucker (*C. latipinnis*), and Roundtail Chub (*Gila robusta*). These native nongame fishes inhabit the Colorado River and major tributaries of extreme western Colorado. Of these, the bluehead sucker is the species most likely to occur in small streams. The flannemouth sucker and roundtail chub are known to occur in the Colorado River a few miles from the site, but neither species is associated with headwater streams. Electrofishing surveys of West Mamm Creek have not revealed the presence of any fish species due to flashy flows, seasonally very low flows, and high sediment loads.

Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*). This subspecies of cutthroat trout occupies headwater lakes and streams in the region, particularly in waters that have not been subject to, and are isolated from, areas where non-native trout have been introduced for sport fishing. Electrofishing surveys have not found the Colorado River cutthroat trout—or any other fish species—in West Mamm Creek, which is unsuitable for this species due to flashy flows and high sediment loads.

Environmental Consequences

Proposed Action

Listed, Proposed, or Candidate Threatened or Endangered Plant Species

The project area contains no Federally listed, proposed, or candidate plant species or suitable habitat for these species. Therefore, the Proposed Action would have “**No Effect**” on these species.

Listed, Proposed, or Candidate Threatened or Endangered Animal Species

Canada Lynx. Direct impacts would occur in areas mapped as Canada lynx winter and denning habitat on private surface. No direct impacts would occur within mapped denning, winter or other habitat on Federal lands. Mapped habitat also borders the private land to the south, east, and west. This private land consists mainly of mixed conifer and aspen. These stands of aspen and mixed conifer are connected from larger, more continuous lynx habitat, though the proposed pad locations are on the edge of the LAU. The dense vegetation provides a visual screen from project areas and attenuates sounds associated with vehicular traffic and equipment.

Moreover, the WMMDP would remove only 1.5 acres (<0.1%) of mapped denning habitat within the Battlement LAU, and only 5.7 acres (<0.1%) of mapped winter and other habitat in the LAU—all within private lands.

Based on the information summarized above, a Biological Assessment (BA) for the Canada lynx, prepared by BLM and submitted to the USFWS on April 23, 2010, pursuant to Section 7 of the ESA (BLM 2010a), reached an effects determination of “**May Affect, Not Likely to Adversely Affect**” for the Canada lynx as a result of the development of the WMMDP. The USFWS issued a letter on May 12, 2010, concurring with this determination.

Western Yellow-billed Cuckoo. If this species were to occur in the project vicinity, increased traffic along the FSR818 access route under the Proposed Action could reduce the potential for using otherwise suitable nesting sites, if any, along West Mamm Creek. However, most of the riparian corridor is far enough from the road to reduce this potential impact—particularly in the lower reaches where the habitat is more suitable in terms of dominance by cottonwoods.

Colorado River Endangered Fishes. Construction activities would increase the potential for soil erosion and sedimentation. A minor, temporary increase in sediment transport to the Colorado River is possible, but the existing sediment contribution from West Mamm Creek is so great that any additional amount would be negligible and unlikely to be detectable above current background levels. In any case, the Federally listed endangered fish species associated with the Colorado River are adapted to naturally high sediment loads and would not be affected.

Additional potential impacts to the endangered Colorado River fishes could result from depletions in flows due to use of water from the Colorado River Basin in drilling, hydrostatic testing of pipelines, and dust abatement of unpaved access roads. Reductions in flows in the Colorado River and major tributaries have resulted from evaporative loss from reservoirs, withdrawals for irrigation, and other consumptive uses. These depletions have affected minimum flows, as well as peak “flushing” flows needed to maintain suitable substrates for spawning.

In May 2008, BLM prepared a Programmatic Biological Assessment (PBA) addressing water-depleting activities associated with oil and gas activities in the Colorado River Basin in Colorado. On December 19, 2008, the USFWS issued a Programmatic Biological Opinion (PBO) (USFWS 2008b), which determined that BLM water depletions from the Colorado River Basin support an effects determination of “**May Affect, Likely to Adversely Affect**” for the four endangered Colorado River fishes. Because of this PBO for BLM-authorized oil and gas projects, the BA submitted to USFWS on April 23, 2010, for the WMMDP did not address the endangered Colorado River fishes. Pursuant to the 2008 PBO, the WMMDP project would be entered into the CRVFO Fluid Minerals Water Depletion Log, which is submitted to the Colorado State Office, and thence to the USFWS, at the end of the Fiscal Year.

BLM and USFS Sensitive Plant Species

The project area contains no sensitive plants or suitable habitat. Therefore, the project would result in “**No Impact**” to any BLM or USFS sensitive plant species.

BLM Sensitive Animal Species

Fringed Myotis and Townsend’s Big-eared Bat. No caves occur in the project vicinity, although the areas of mixed conifer and aspen could receive some use for roosting. The lower elevation habitats along the FSR818 access road, adjacent to the West Mamm Creek riparian corridor, probably have the greatest potential for use, as feeding sites. Loss of suitably large trees for roosting would be negligible, as would loss of potential feeding habitats along FSR818. Additionally, disturbance due to construction activities would not occur at night when the bats are feeding.

Based on the above, the Biological Evaluation/Biological Assessment (BA/BE) prepared by BLM for USFS sensitive species (BLM 2010b) reached the following effects determination for these species: “**May adversely impact individuals but unlikely to result in a loss of viability on the Planning Area or cause a trend to Federal listing or a loss of species viability rangewide.**”

Northern Goshawk, Flammulated Owl, and Boreal Owl. As discussed previously, these USFS sensitive raptor species are potentially present in the WMMDP area, although the boreal owl less so because of stronger affiliation with high-elevation forests. Flammulated owls are known to have nested on NFS land in the general vicinity but have not been detected within 0.25 of the WMMDP boundary in 2008, 2009, or 2010. Nonetheless, the winter seasonal restriction for migratory birds to be attached to the well permits by BLM would prevent removal of vegetation during the period May 1 to June 30 without a prior survey for these species, and the winter seasonal restriction for elk calving to be attached to the Special Use Authorization by WRNF would prohibit initiation of construction, drilling, and completion activities from

May 15 to June 20 (see Appendix A for both COAs). Disturbance during non-breeding seasons is less of a concern because of the larger home ranges and lower sensitivity to disturbance exhibited by the birds when not nesting.

Based on the above, the BA/BE prepared by BLM for USFS sensitive species (BLM 2010b) reached the following effects determination for these species: “***May adversely impact individuals but unlikely to result in a loss of viability on the Planning Area or cause a trend to Federal listing or a loss of species viability rangewide.***”

Bald Eagle. Because the project area does not include open habitats across which the bald eagle could hunt for prey and because of the distance from occupied or suitable habitat along the Colorado River, the Proposed Action would have “***No Impact***” on this species (see BA/BE, BLM 2010b).

Three-toed Woodpecker and Olive-sided Flycatcher. Although potentially suitable conifer and aspen habitat is present within and near the project area, minimal impacts are expected due to the small area to be disturbed. If either species were to occur, construction and drilling/completion activities could cause them to avoid the project area, particularly during the nesting season. An avoidance buffer for either species would probably be no greater than 200 meters, leaving ample available habitat. The winter seasonal restriction for elk calving from May 15 to June 20 to be attached by USFS to a Special Use Authorization for FSR818 would preclude direct habitat loss during the nesting seasons of both species in the first year of construction. Disturbance is less of a concern during non-breeding seasons because the olive-sided flycatcher is not present and the three-toed woodpecker feeds over much larger home ranges when not confined to a breeding territory.

Based on the above, the BA/BE prepared by BLM for USFS sensitive species (BLM 2010b) reached the following effects determination for these species: “***May adversely impact individuals but unlikely to result in a loss of viability on the Planning Area or cause a trend to Federal listing or a loss of species viability rangewide.***”

Purple Martin and Loggerhead Shrike. Because of the low potential for occurrence of these species within or adjacent to the project area, the risk of adverse impacts is negligible. In the unlikely event that either species were to occur, use of the area would probably be transitory by vagrant or migrant individuals. The purple martin is the less likely of the two species based on overall distribution and abundance in the CRVFO area, but some mature aspen trees would be removed for pad construction. Habitat for the loggerhead shrike is more widespread, although only at the lowest elevations of the project area along CR319 where impacts would be due to disturbance and not habitat loss. Although adverse impacts to either species are unlikely, the BA/BE prepared for USFS sensitive species (BLM 2010b) reached an effects determination of “***May adversely impact individuals but unlikely to result in a loss of viability on the Planning Area or cause a trend to Federal listing or a loss of species viability rangewide.***”

Boreal Toad and Northern Leopard Frog. Neither of these species was found during surveys of West Mamm Creek for fish, and the creek appears unsuitable for both in terms of physical habitat, streamflow regime, and high sediment loads. Based on the above, the BA/BE prepared by BLM for USFS sensitive species (BLM 2010b) reached an effects determination of “***No Impact***” for the boreal toad and northern leopard frog.

Bluehead Sucker, Flannelmouth Sucker, and Roundtail Chub. None of these species was found during surveys of West Mamm Creek for fish, and the creek appears unsuitable in terms of physical habitat, flow regime, and high sediment loads. Based on the above, the BA/BE prepared by BLM for USFS sensitive

species (BLM 2010b) reached an effects determination of “**No Impact**” for the boreal toad and northern leopard frog.

Colorado River Cutthroat Trout. This subspecies has not been found in West Mamm Creek during fish surveys, and the habitat appears unsuitable in terms of physical habitat, flow regime, and high sediment loads. Based on the above, the BA/BE prepared by BLM for USFS sensitive species (BLM 2010b) reached an effects determination of “**No Impact**” for the Colorado River cutthroat trout.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have similar impacts on special-status species. However, the duration of the development phased would be shortened by close to half, reducing the duration of effective habitat loss associated with the high level of human activity and traffic. Additionally, a higher percentage of the disturbance associated with development activity at the well pads and heavy traffic on the access route would occur outside the nesting season of the special-status birds. Therefore, the flammulated owl, northern goshawk, three-toed woodpecker, and olive-sided flycatcher would be affected less.

For the Canada lynx, use of FSR818 during the 5-month period December 1 through April 14 in support of construction, drilling, and completion activities under this alternative would increase the potential for disturbance during that season—although the road would be used by heavy trucks anyway in conjunction with production and periodic maintenance operations. Additionally, the potential impact of more disturbance to lynx during winter would probably be offset by the much shorter duration of development activities. Use of FSR818 to support development during the winter would not increase snow compaction, because the road would be plowed during winter anyway to support production. Therefore, the effects determination “**May Affect, Not Likely to Adversely Affect**” would also apply to this alternative.

The potential for occurrence of the western yellow-billed cuckoo is very low, but a shorter duration of development would benefit this species, if present.

The four endangered Colorado River fishes would be affected in the same way and to the same degree as under the Proposed Action. Therefore, the determination of “**May Affect, Likely to Adversely Affect**” would also apply to this alternative, as covered under an existing PBO issued by USFWS.

No Action Alternative

Listed, Proposed, or Candidate Threatened or Endangered Plant Species

The No Action Alternative would not cause impacts to any Federally listed, proposed, or candidate plants because these species do not occur in the area to be affected. Therefore, the same effects determination of “**No Effect**” would apply.

Listed, Proposed, or Candidate Threatened or Endangered Animal Species

Impacts to threatened or endangered animal species under the No Action Alternative would be less than those under the Proposed Action because the smaller number of wells would result in a shorter duration of development and less truck traffic. However, direct habitat loss would be similar. Therefore, the same determinations of “**May Affect, Not Likely to Adversely Affect**” for the Canada lynx and “**May Affect**

Likely to Adversely Affect” for the four endangered Colorado River fishes would—the latter covered under a existing PBO issued by USFWS—apply to this alternative.

The shorter duration and reduced truck traffic would also benefit the western yellow-billed cuckoo, if present.

BLM and USFS Sensitive Plant Species

The No Action Alternative would not cause impacts to any BLM sensitive plants because these species do not occur in the area to be affected.

BLM Sensitive Animal Species

Impacts to BLM and USFS sensitive animal species under the No Action Alternative would be less than those under the Proposed Action because the 68 Federal wells would not be developed, reducing the duration of drilling and completion activities and the amount of vehicular traffic, especially of water/condensate haul truck. These would in turn result in lesser disturbance-related direct or indirect impacts. However, the total amount of habitat loss would be essentially the same, because the three new Fee pads would be developed to accommodate the 21 Fee wells.

3.1.7 Wastes, Hazardous or Solid

Affected Environment

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

- The Oil Pollution Act (Public Law 101-380, August 18, 1990) prohibits discharge of pollutants into waters of the US, which by definition would include any tributary, including any dry wash that eventually connects with the Colorado River.
- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)(Public Law 96-510 of 1980) provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. It also provides national, regional, and local contingency plans. Applicable emergency operations plans in place include the National Contingency Plan (40 CFR 300, required by section 105 of CERCLA), the Region VIII Regional Contingency Plan, the Colorado River Sub-Area Contingency Plan (these three are Environmental Protection Agency produced plans), the Mesa County Emergency Operations Plan (developed by the Mesa County Office of Emergency Management), and the BLM Grand Junction Field Office Hazardous Materials Contingency Plan.

- Hazardous spill cleanup activities that fall outside the criteria set forth in CERCLA still require the submission of a Preconstruction Notice to the US Army Corps of Engineers, and may be subject to Nationwide Permit Number 38.
- The Resource Conservation and Recovery Act (RCRA)(Public Law 94-580, October 21, 1976) regulates the use of hazardous substances and disposal of hazardous wastes. Note: While oil and gas lessees are exempt from RCRA, right-of-way holders are not. RCRA strictly regulates the management and disposal of hazardous wastes.

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

Environmental Consequences

Proposed Action

Possible pollutants that could be released during the construction phase of this project would include diesel fuel, hydraulic fluid, and lubricants. These materials would be used during construction of the road, pad, and pipeline and for refueling and maintaining equipment and vehicles. Potentially harmful substances used in the construction and operation 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.

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

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have a similar potential for adverse impacts associated hazardous or solid wastes. However, the duration of the development phased would be shortened by close to half, possibly reducing somewhat the potential for adverse impacts.

No Action Alternative

Impacts resulting from releases or spills of hazardous or solid wastes into the environment under the No Action Alternative would be less than those under the two alternatives described above because the 68 Federal wells would not be developed, reducing the duration of drilling and completion activities and the amount of vehicular traffic, especially of water/condensate haul truck. However, construction of the Johnson 32-03, the Johnson 5-03 and the Johnson 5-06 well pads on private surface and drilling of the proposed 21 new Fee wells could be authorized by the COGCC. Impacts would be reduced due to the lower number of wells proposed to be drilled.

3.1.8 Water Quality, Surface and Ground

Surface Water and Waters of the U.S.

Affected Environment

The Proposed Action area is located approximately 8 miles south of the City of Rifle, the Colorado River, and Interstate 70 within the 9,762-acre West Mamm Creek 6th field watershed. Flowing through the project area is the perennial West Mamm Creek and its intermittent tributaries. These drainages contain small riparian corridors in areas consisting primarily of cottonwoods. The area is generally dominated by spruce/fir, aspen, and Gambel oak. These drainages occur in well-drained, loosely consolidated alluvium and could be described as incised in the project area.

According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission [WQCC] Regulation No. 37)(CDPHE 2007), West Mamm Creek and its tributaries could be classified within segment 4a, which includes all 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.

The CDPHE WQCC *Section 303(d) List of Water-Quality-Limited Segments Requiring Total Maximum Daily Loads (TMDLs)*(Regulation No. 93) fulfills Section 303(d) of the Federal Clean Water Act (CWA), which requires that states submit to the EPA a list of those waters for which technology-based effluent limitations and other required controls are not stringent enough to achieve water quality standards. The creeks passing through or receiving runoff from the WMMDP area are all on the CDPHE 303(d) list, based on the concern that streams within Segment 4a may contain excessive amounts of selenium (CDPHE 2006a).

Colorado's Monitoring and Evaluation List (Regulation No. 94, CDPHE 2006b) identifies water bodies where there is reason to suspect water quality problems, but uncertainty also exists regarding one or more factors. The creeks passing through or receiving runoff from the WMMDP area are all on the CDPHE Monitoring and Evaluation list, based on the concern that streams within Segment 4a may contribute excessive amounts of sediment to the Colorado River (CDPHE 2006b).

The existing access road parallels West Mamm Creek and then crosses its western tributary before heading south between this tributary to the west and West Mamm Creek to the east. New activities or maintenance activities at this crossing would require a USACE 404 permit. Section 404 of the Clean Water Act requires a Department of the Army permit from the USACE prior to discharging dredged or fill material into waters of the United States as defined by 33 CFR Part 328. A "404" permit is required for both permanent and temporary discharges into waters of the United States; larger discharges require an individual permit, while smaller discharges may be granted a nationwide permit (NWP). Utility line crossings of Waters of the U.S. and associated wetlands fall under USACE NWP 12, while road crossings are covered under NWP 14; small discharges into Waters of the US that are not associated with either of the above (e.g., for pad construction) may instead fall under NWP 18.

Environmental Consequences

Proposed Action

Potential impacts to surface water associated with the Proposed Action include increased erosion and sedimentation of streams due to ground-disturbing activities associated with constructed the three new pads and associated 0.06 mile of new access roads and pipelines. However, no new crossings of streams would be required, reducing this potential substantially. Best Management Practices (BMPs) and other preventive measures would include limiting cut slope steepness along road segments, limiting road grades to 11% or less, crowning road surfaces, and installing culverts and drainage systems where needed to convey runoff from roads and well pads.

To minimize discharge of sediment into stream channels, all construction would occur outside the spring runoff season. Through the use of BMPs and other COAs associated with construction activities, prompt interim reclamation, and the implementation of the preventative measures associated with the treatment of fluids, impacts to surface waters would be minimized and should be minor.

Tanks used to store produced water and condensate would be placed in secondary containment to prevent offsite release. In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area 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.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have a similar potential for adverse impacts to surface water resources. However, the duration of the development phased would be shortened by close to half, possibly reducing somewhat the risks associated with spills of toxic chemicals into West Mamm Creek.

No Action Alternative

The No Action Alternative would result in approval of the 21 new Fee wells but not the 68 new Federal wells. Therefore, potential risks to surface waters in relation to natural gas wells and the associated condensate and produced water would be reduced proportionately, both on the pads and during haulage in tanker trucks. However, potential impacts on surface water related to the construction of three new pads and 0.06 mile of new access roads and pipelines would not differ among the alternatives, because this new infrastructure would be needed to accommodate the 21 new Fee wells.

Groundwater

Groundwater within the WMMDP area occurs in both alluvial and sedimentary aquifers. Alluvial fresh water wells are the most productive, and consist of boulders, cobbles, gravel, sand, silt, and clay. Alluvial well depths are usually less than 200 feet and water levels typically range between 100 to 150 feet. Most fresh water wells are drilled in support of rural residences and the numerous agricultural operations found throughout the Piceance Basin.

Two bedrock aquifer units are identified within the Piceance Basin. The Upper and Lower Piceance Basin aquifers are separated by two confining units. The upper unit is found within the Uinta Formation and the upper part of the Parachute Creek Member of the Green River Formation (Robson and Saulnier 1981). The lower Piceance Basin aquifer unit is found within the lower part of the Parachute Creek

Member, separated from the upper unit by the Mahogany oil shale interval. South of the Colorado River, these upper Tertiary-aged aquifers have largely been eroded off, leaving isolated remnants of these formations lacking connectivity.

Beneath the Upper and Lower Piceance Basin aquifer systems is a confining unit consisting of the lower two members of the Green River Formation, and the Wasatch Formation, both of which are present in surface exposure within the project area. Although considered a confining unit, some fresh water wells are completed in the discontinuous water bearing sands of the Wasatch Formation. These water bearing intervals are considered to be localized, due to the lenticular nature of the strata.

Below the Wasatch Formation is the Cretaceous aged Mesaverde aquifer. This aquifer consists of sandstone with interbedded shales and coal of the Williams Fork Formation and the marine sands and shales of the Iles Formation. The depth to the top of this aquifer beneath the project area is more than 6,000 feet below ground surface (bgs), far too deep to be considered for production. The water quality of the Mesaverde aquifer is considered poor as well, due to the minerals nahcolite (NaHCO_3 , sodium bicarbonate), dawsonite ($\text{NaAl}(\text{OH})_2\text{CO}_3$), and halite (NaCl), with total dissolved solids (TDS) ranging in excess of 10,000 mg/L at that depth in that portion of the basin (EPA 2004).

According to the Colorado Division of Water Resources (CDWR), two fresh water wells are found within the WMMDP project area boundary. Both are domestic use wells located north of the proposed Johnson 5-06 well pad. The closer of the two is listed as a 2-foot-deep well, presumably a stock pond, and is found within 200 feet of the northeast corner of the pad. Approximately 750 feet north of the same corner of the pad is a 108-foot-deep well, with a water level of 34 feet. Well yield is listed at 14 gallons per minute (gpm). A 2-mile buffer extending from the center of the project area only found one additional well located in Section 29, T7S, R93W. Accompanying quantitative data lists a 75-foot-deep domestic well with a water level of 16 feet, and a water yield of 10 gpm. The depths of these identified wells are indicative of wells completed in shallow alluvial aquifers.

Environmental Consequences

Proposed Action

Potential impacts to groundwater resources from the development plan would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents. Hydraulic fracturing would be incorporated to complete the wells, which would include both fresh and produced water mixed with proppants, or propping agents. Typical proppants include sand, aluminum, glass, or plastic beads, mixed with water and minor amounts, less than 1%, of other compounds such as corrosion, friction, and scale inhibitors (EnerMax, Inc. 2007).

Propping agents are used to keep open the fractures created near the borehole during the hydrofracturing process, allowing the gas trapped within the formation to move freely into and up the borehole, where it is captured. Hydrofracturing would be conducted greater than 6,000 feet bgs, and is unlikely to cause impacts to groundwater found near the surface. Drilling scenarios are developed to prevent fluids and produced hydrocarbons from migrating upward into fresh water zones. Geologic and engineering reviews are conducted to ensure that the cementing and casing programs are adequate to protect all downhole resources. The interbedded and impermeable nature of the Williams Fork Formation also creates a series of confining units inhibiting fluids at depth from migrating into near surface zones, as well as preventing shallow groundwater sources from migrating into deeper water zones.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have a similar potential for adverse impacts to groundwater.

No Action Alternative

Although drilling, completion, and production of the 68 Federal wells would not occur under the No Action Alternative, construction of the Johnson 32-03, the Johnson 5-03, and the Johnson 5-06 well pads on private surface, and drilling of the proposed 21 new Fee wells could be authorized by the COGCC. Therefore, groundwater resources would be identified and associated mitigation for the protection of these resources would occur in conjunction with the State’s oil and gas permitting process. Proper casing and cementing procedures would be implemented in order to protect these resources.

3.2 OTHER AFFECTED RESOURCES

In addition to the critical elements, the resources presented in Table 9 were considered for impact analysis relative to the Proposed Action and No Action Alternative. Resources that would be affected by the Proposed Action and No Action Alternative are discussed following Table 9.

Table 9. Other Resources Considered in the Analysis			
Resource	NA or Not Present	Present and Not Affected	Present and Affected
Access and Transportation			X
Cadastral Survey	X		
Fire/Fuels Management		X	
Forest Management		X	
Geology and Minerals			X
Inventoried Roadless Area (USFS)		X	
Law Enforcement	X		
Paleontology			X
Noise			X
Range Management		X	
Realty Authorizations			X
Recreation			X
Socio-Economics			X
Soils*			X
Vegetation*			X
Visual Resources			X
Wildlife, Aquatic*			X
Wildlife, Terrestrial*			X
* Element is a Public Land Health Standard. Because no BLM lands would be affected by the project, the Public Land Health Standard component of the element was not analyzed.			

3.2.1 Access and Transportation

Affected Environment

Access to the West Mamm Creek Master Development project area is available from two directions. Vehicles may access the area by departing I-70 at Exit 94 (Garfield County Airport exit, east of Rifle), heading south and then turning west on Airport Road (CR 346), continuing approximately 1.8 miles to where CR 346 intersects West Mamm Creek Road (CR319), south on CR319 approximately 8.0 miles until it becomes FSR818, and 3.7 miles farther to the gated private property.

Due to roads associated with oil and gas activities, the area is easily accessed. All of the County roads from Silt and Rifle that could provide access to the West Mamm Creek area are open to the public year-round. Public use of the access road on private lands (Johnson property – beginning at the gate) is not allowed.

Local residents, ranchers, outfitter guide clients, oil and gas operators, and recreational visitors use the USFS portion of the West Mamm Creek Road (FSR818). Oil and gas operators are the primary users of the road. Recreational uses include hunting, camping, horseback riding, hiking, wildlife observation, gathering of forest products, and pleasure driving. Little non-motorized recreational use occurs within the analysis area, except during hunting seasons. All-terrain vehicle (ATV) use seldom occurs. Winter use is predominantly snowmobile but could include cross-country skiing, snowshoeing, and dog sledding.

From Mile Post (MP) 0.0 (Rose Ranch) to MP 1.4 (Forest Boundary), FSR818 is a surfaced 1½- to 2-lane road, with irregularly spaced natural turnouts. Drainage includes ditches and culverts. The USFS has purchased the right-of-way through private lands from MP 0.0 to MP 0.8 and maintains jurisdiction. There is some question about right-of-way ownership from MP 0.8 to MP 1.4 (land status records do not indicate that USFS has easement or right-of-way across these lands). From MP 1.4 (Forest Boundary) to MP 3.8 (Johnson gate) the road is a ditched and piped, surfaced single lane to 1½- lane road with naturally occurring and constructed turnouts.

To prepare for oil and gas traffic, geometric and structural analysis of the road has been performed. The road alignment has been designed by a professional Civil Engineer licensed in the State of Colorado and according to AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (average daily traffic 400 or fewer vehicle trips). The structural section of the roadway was determined through ESAL calculations and an extensive geotechnical analysis. The structural features of the road have been designed to accommodate traffic associated with oil and gas drilling under most weather and ground conditions. In its current state, this road can adequately handle commercial traffic; however, sub-grade failures may occur during extended periods of wet weather conditions. Such failure is most likely to occur in early summer and late fall.

The road may be closed for short periods of time to accommodate oversized or overweight vehicles, or to accommodate traffic volumes safely. Traffic jams have occurred on several occasions, especially when completion and gravel haul occurred simultaneously. No traffic accidents have been reported. The estimated current and projected future traffic levels on FSR818 during different phases of development and production are estimated in Table 4 (page 16 of this EA). Note in Table 4 that these estimates assume use of tanker trucks rather than pipelines to convey produced water and condensate to offsite treatment or disposal facilities. LEII is actively pursuing options that would allow it to use pipelines in lieu of trucking as the standard method for conveying produced water, and potentially condensate, as a means of reducing the cost and impacts associated with such frequent truck trips. Note also that the project-related estimates are in addition to an average of one pickup truck daily and one tanker truck weekly on CR319 (but not on FSR818) to service wells in the area that are operated by EnCana Oil and Gas (USA) Inc.

FSR818 is an aggregate-surfaced road maintained primarily by LEII as a component of their current WRNF Road Use Permit (MP 0.0 to MP 3.8) and by Garfield County Road and Bridge under their Schedule A Maintenance Agreement with the USFS (MP 0.0 to MP 2.0). In 2005, after installing a pipeline in the ditch and to accommodate oil and gas traffic, EnCana surfaced the road and improved drainage between MP 1.4 and MP 2.8 (upper cattle guard) and has some maintenance responsibility from MP 0.0 to MP 2.8. In 2008, LEII installed more culverts and added safety measures such as turnouts between MP 0.0 (Rose Ranch) and MP 2.8. The road was reconstructed and realigned between MP 2.8 and MP 3.7 (Johnson property gate). AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads ($ADT \leq 400$) and structural design based on vehicle volume, vehicle weight, and season of use were adhered to during the 2008 road reconstruction project. On private lands, the road was reconstructed and realigned to allow for gas field traffic to well pads.

Historically, Garfield County plowed to the turnaround at MP 1.6, and winter access to the south and west was by snowmobile or other types of winter transportation. Since 2008, FSR818 has been open to public use year round due to oil and gas activity in the project area.

FSR818 passes through two Resource Management Areas as defined by the White River National Forest Land and Resource Management Plan (2002). These areas and management direction are as follows:

Per Standards and Guidelines - Management Area Prescription 5.41 - Infrastructure

Standards

1. Over-the-snow vehicle use is restricted to designated routes and play areas unless authorized by special use permit or for emergency use.
2. All new roads passing through this area would avoid important forage, cover, and birthing areas.

Guidelines

1. Roads and trails needed to implement management in the area should be “low – standard – single-purpose” roads.
2. Avoid crossing these areas with new arterial and collector roads.

Per Standards and Guidelines - Management Area Prescription 5.43 - Infrastructure

Guideline

1. Travelways open to motorized travel would not exceed an average travelway density of 0.5 mile per square mile during seasonal periods when the area is designated for calving, migration, winter, or summer habitat (see Wildlife Guideline 2, below). The existing travelway density is 0.2 mile/sq mile.

Per Standards and Guidelines - Management Area Prescription 5.43 - Wildlife

Guidelines

1. Provide adequate forage to sustain elk populations.
2. The following dates may be used for restrictions on activities, depending upon the objectives for which the area was designated:

Calving – May 15 through June 20. Drilling, completion, and development activities, including access to Federal wells, are subject to a Timing Limitation (winter seasonal restriction) stipulation attached to Federal lease COC67150. The winter seasonal restriction states the following: “No surface use is allowed during the following time period(s); this

stipulation does not apply to operation and maintenance of production facilities: (1) Exploration, drilling and development activity would not be allowed during the period from December 1 through April 14, and (2) new oil and gas roads on public lands would be closed yearlong to the public.”

Environmental Consequences

Proposed Action

Under the Proposed Action, up to 89 new wells could be drilled on two existing and three new pads. Approximately 0.06 mile of new road would be constructed on private lands; no new roads would be constructed on Federal lands. Public access on FSR818 (West Mamm Creek Road) would be affected by increased development and production traffic (Table 4, page 16), resulting in temporary conflicts with normal traffic. These could include travel delays and, potentially, increased vehicle collision rates in addition to increased degradation of public roads due to heavy equipment travel and generation of fugitive dust and noise. Public access would be prohibited on private lands.

An updated geometric and structural analysis has been performed by LEI on FSR818. A professional civil engineer licensed in the State of Colorado has determined that the current roadway design and alignment meets AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT \leq 400) for this project. Conflicts during high traffic periods would be addressed by mitigation measures such as curve widening, turnout modifications, constructing additional turnouts, sight distance clearing, signage, radio communications, and safety instructions. The engineer has also determined that the structural integrity of the design roadway section should not be significantly affected by heavy truck traffic over the life of the project. Within WRNF boundaries, up to 1 acre of land adjacent to the existing roadway could be affected by road improvements. Any work would occur within disturbance limits as determined during the exploratory phase of development (USFS Categorical Exclusion – Laramie II West Mamm Pipeline and Road Improvement Project – 2008). Approximately 0.4 acre of disturbance is proposed on private lands for construction of 0.06 mile of new access roads and pipelines.

After all wells are brought into production, average daily traffic would increase from the current estimate of two project-related vehicle trips per day to 26 per day during drilling and completion (excluding rig mobilization) and 18 per day during initial production (Table 4, page 16). Note in Table 4 that the most noticeable increase would be in truck traffic related to haulage of produced water and condensate. This traffic is expected to decline during the life of the project, because produced water—the major source of the required truck traffic—decreases sharply during the first few years of production of a well.

Over the long term, produced water volumes are expected to drop off significantly, because produced water volumes diminish rapidly for the first few years before leveling off at a much lower rate for the remainder of the project life. Table 4, which uses a 75% reduction in amount of produced water and condensate over the long-term (the actual reduction could be 90% or more), projects an average of 5 vehicle trips per day for both water/condensate haulage and routine visits by the operator.

Besides the water and condensate tanker trucks, a variety of other heavy trucks would use the Garfield County haul routes identified on the County website to access the project area. All vehicles hauling materials and equipment for this project would abide by Garfield County’s oversize/overweight permit system. All vehicle use on FSR818 and associated easements across private lands would be subject to requirements of the Special Use Authorization that LEI would be required to obtain from the WRNF.

BLM would attach a 60-day Timing Limitation (winter seasonal restriction) as a condition of approval (COA) for the proposed Federal wells. The winter seasonal restriction would prohibit the initiation of

construction, drilling, and completion activities during the period May 1 to June 30 annually (Appendix A). The COA is aimed at protecting the flammulated owl, a BLM and USFS sensitive species and listed by the USFWS as a Bird of Conservation Concern (BCC) known to nest in the project vicinity. Compliance with the Migratory Bird Treaty Act would not require that LEII halt construction, drilling, or completion activities already underway as of the start of this COA period. Any flammulated owl (or other bird of prey) that chooses to nest within 0.25 mile of a well pad or access road while development activities are ongoing is presumed to be tolerant of those activities. An exception to the winter seasonal restriction would be granted to allow initiation of construction, drilling, or completion activities in any year in which no flammulated owl nest is active within a 0.25-mile buffer.

Under the Proposed Action, the WRNF would attach a winter seasonal restriction to the Special Use Authorization for travel on FSR818 in conjunction with construction, drilling, and completion activities of Fee and Federal wells during the period December 1 through April 14 to reduce impacts to wintering big game. The WRNF would attach an additional winter seasonal restriction to prohibit use of the FSR818 to support construction of well pads, access roads, and pipelines from May 15 through June 20 to reduce impacts to use of elk calving habitat in the vicinity of the well pads and FSR818. The elk calving seasonal restriction would not apply after one new well has been drilled or one new pad has been constructed outside the restriction period..

Terms and conditions of approval would include the following measures associated with transportation:

- Construction and drilling crews that commute to the site would be encouraged to carpool to reduce the number of vehicle trips on local roads.
- Development and production personnel would be encouraged to comply with posted speed limits on public roads and 20 mph on more primitive roads to reduce traffic-related noise and the risk of vehicle collisions.
- Road standards outlined in the “Gold Book” (*Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*)(USDI and USDA 2007) would apply to Fee lands.
- On FSR818, road reconstruction and maintenance would be per requirement of the *Special Use Authorization and USFS Design Criteria and Maintenance Requirements*.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action, except travel on FSR 818 would not be restricted during the elk winter range seasonal restriction or the elk calving seasonal restriction would have a substantially different impacts associated with vehicular travel on FSR818 and CR319. Specifically, allowing winter drilling and completion would reduce the maximum duration of the development phase from about 11 years to about 6 years (and from 5 years to 3 years using two drill rigs). This would reduce the total timeframe for use of the road by development traffic but would eliminate the 5-month winter and late spring hiatus in development traffic under the Proposed Action.

Overall, any adverse impacts to other road users from eliminating the 5-month hiatus in development traffic are made less significant because the road already receives regular oil and gas traffic during the winter to support the six existing wells, and production-related traffic in winter would increase throughout the project anyway as new wells are brought online.

Because of uncertainties in the exact rate of development of the proposed 89 new Fee and Federal wells under this alternative and the Proposed Action (owing to uncertainties in gas production and gas prices), it is impossible to predict exactly the development phase and production phase traffic through time. The

shorter project duration associated with this alternative could result in heavier traffic volumes as new wells are brought online more quickly than under the Proposed Action, but a more rapid decline in traffic thereafter as the new wells move past their initial period of high produced water volumes. Therefore, Table 4 (page 16) assumes the same average daily traffic for development and production traffic under both the Proposed Action (Alternative A) and the Operator-Requested Alternative (Alternative B).

No Action Alternative

Under the No Action Alternative, new APDs for the 68 proposed Federal wells associated with the three proposed pads would be denied. However, a total of 21 new Fee wells could potentially be drilled from the two existing pads.

In general, impacts associated with vehicular travel on West Mamm Creek Road (CR319 and FSR818) during drilling and completion would be similar to those under the Proposed Action but would be reduced in duration because of the smaller number of wells. Traffic during initial production, including haulage and produced water and condensate and additional trips by the operator, would be approximately 9 trips per day, compared to 18 trips under the Proposed Action and Operator-Requested Alternative. During long-term production, routine truck traffic would be approximately 3 trips per day (Table 4, page 16).

The smaller number of wells under the No Action Alternative would reduce the frequency of user conflicts, including travel delays and vehicle collisions, as well as degradation of public roadways and the generation of fugitive dust and noise. However, even the reduced impacts would still represent a substantial increase over current traffic levels associated with the existing pads and wells.

3.2.2 Geology and Minerals

Affected Environment

The project area is located near the eastern margin of the southern Piceance Basin, an elongated structural depression and sedimentary basin that formed during the Late Cretaceous through the Eocene Laramide Orogeny. This timeframe was marked by a period of mountain building in western North America that lasted approximately 30 million years. Located within the Colorado Plateau physiographic province, the area is characterized by a series of high plateaus and deep valleys. The Colorado River divides the basin into a northern and southern province. The project area is found within the southern province, along the western side of an unnamed synclinal trough west of the Divide Creek Anticline. Elevations within the WMMDP area range from approximately 7,800 feet on the northern edge of the study area boundary (W $\frac{1}{2}$, Sec. 32, T7S, R93W) to 9,200 feet at the extreme southeastern corner (SE $\frac{1}{4}$, Sec. 5, T8S, R93W). Total relief is approximately 1,400 feet, with slopes ranging from less than 1% to 50%.

Surface exposures consist of sedimentary unconsolidated alluvial and colluvial deposits in the form of stream, terrace, and pediment gravels along West Mamm Creek and its tributaries, with surrounding bedrock exposures of the Tertiary Wasatch and Lower Green River Formations. The drilling plan would target the Williams Fork and Iles Formations of the Mesaverde Group, which lies unconformably below the Wasatch Formation. Table 10 lists these and other formations found within the area.

The proposed WMMDP area is within the existing Mamm Creek gas field, one of four fields clustered in a 35-mile by 15-mile “fairway” (a zone of increased favorability for hydrocarbon production) located between Silt and now Parachute (Hemborg 2000). Production is derived from three reservoir intervals, which include the Wasatch Formation along with the Williams Fork and Iles Formations of the Mesaverde Group. Reservoirs in the Mesaverde Group are tight throughout most of the Piceance Basin and generally become tighter with depth of burial (Spencer 1983). Tight reservoirs—defined as having

low permeability (less than 0.1 millidarcy [md])—are subdivided into those having high porosity (HP) or low porosity (LP) characteristics. Mesaverde Group reservoirs of the southern Piceance Basin are LP gas reservoirs (Spencer 1989). Substantial reserves within the tight sands of these reservoirs have been known 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 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.

Table 10. Geologic Formations within the WMMDP Area

<i>Map Symbol</i>	<i>Formation Name</i>	<i>Age</i>	<i>Characteristics</i>	<i>Location</i>
Qg	gravels	Pleistocene	Young gravels (Bull Lake and younger) stream, terrace, and outwash gravels	drainage valleys & terraces
Qgo	gravels and alluvium	Pleistocene	Old gravels and alluvium (pre-Bull Lake) terrace, outwash, and pediment gravels	lower slopes above drainage valleys
Ql	landslide deposits	Pleistocene, Holocene	Large slump blocks of basalt irregularly veneered with young (Pinedale) glacial drift	On Battlement Mesa and smaller mesa tops to the north
Tgp	Parachute Creek Member of Green River Formation	Eocene	Oil shale and marlstone	Flanks of Battlement Mesa
Tgl	Lower part of Green River Formation	Eocene	Shale, sandstone, and marlstone	Flanks of Battlement Mesa
Two	Wasatch and Ohio Creek Formations	Paleocene, Eocene	Variegated claystone, siltstone, sandstone, and conglomerate; carbonaceous shale and lignite near base	Valley floors
Kw	Williams Fork Formation	Upper Cretaceous	Light brown to white sandstone, gray to black shale, and coal beds.	subsurface
Ki	Iles Formation	Upper Cretaceous	Massive beds of light brown to white sandstone and interbedded shale and coal.	subsurface

Source: Ellis and Freeman 1984, Shroba and Scott 1997, Tweto 1979

The proposed WMMDP drilling program would target the massively stacked lenticular sandstone sequences of the Upper Williams Fork Formation, which provides the majority of the natural gas production volumes (Lorenz 1989). The upper portions of the Williams Fork were deposited in a fluvial setting and include fluvial point bar, floodplain, and swamp deposits. The Lower Williams Fork Formation includes delta front, distributary channel, strandplain, lacustrine (lake), and palustral (swamp) environments (Hemborg 2000), while the sandstones and coalbeds of the Iles Formation were deposited in a wave-dominated coastal setting (Johnson 1989, Lorenz 1989).

The source rocks are interbedded and thermally mature gas-prone shales, mudstones, siltstones, and coals. The reservoir rocks are fine- to medium-grained Williams Fork sandstones, varying in thickness from less than 10 feet to more than 50 feet (Spencer 1988), creating an interbedded relationship between source and reservoir. The trapping mechanism of the tight gas is both stratigraphic (resulting from the juxtaposition of rock layers with differing textures and origins) and diagenetic (resulting from post-depositional alteration of the rocks, such as through compaction or cementing).

Environmental Consequences

Proposed Action

If the 68 proposed new Federal wells are successful, natural gas and associated water would be produced from the reservoir sands of the Mesaverde Group. The amount of natural gas potentially produced can only be estimated based on production rates from nearby wells and adjacent fields. Reserves have been

estimated to approach 2 billion cubic feet (bcf) of natural gas per well (Vargas 2006). Initial production rates are expected to be higher during the first few years of production and steadily decline during the remainder of the economic life of the wells.

Casing programs are designed to specifically prevent hydrocarbon migration from the target strata into other stratigraphic intervals. Isolation of the target zone(s) protects other potentially usable productive zones. Identification of potential water-bearing zones, aquifers, gas producing zones, and under- and over-pressured formations are incorporated into drilling scenarios for each well. Drilling fluids, fluid densities, surface casing, and production planning are analyzed to ensure that these specific areas are protected and isolated.

Specific casing depths would vary depending on well location and drilling conditions. Surface casing is utilized to protect and isolate usable water zones, and would be set at depths well below the depth of known fresh-water aquifers in the area. If a water-bearing, gas-producing, lost-circulation, or pressurized zone is encountered below the surface casing, cement volumes would be adjusted to protect and further isolate those zones. This configuration is designed to prevent accidental contamination or leakage of hydrocarbons or drilling fluids from reaching usable water or productive zones within the wellbore.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. Although the total duration of the development phase would be reduced by close to half as a result of allowing winter drilling and completion, this would not affect geologic and mineral resources differently.

No Action Alternative

Under the No Action Alternative, none of the Federal wells would be approved. Therefore, no new impacts to the geology and mineral resources would occur.

3.2.3 Inventoried Roadless Area (USFS Designation)

Affected Environment

No Inventoried Roadless Area (IRA) would be directly affected by the proposed project. The main access road, FSR818, is located within a corridor bordered on both sides by the Mamm Peak Roadless Area (Figure 6). The three proposed new pads would be located on private lands mostly surrounded by the Mamm Peak RA. Although lying very close to the boundary of the Mamm Peak RA, the new pads are no closer to the boundary than two of the existing pads.

Environmental Consequences

Proposed Action

Although no direct impacts to the Mamm Peak RA would result from the project, the increased level of human activity and operation of heavy equipment would lead to a more “industrial” setting than normally associated with IRAs. However, the area already contains producing oil and gas wells with associated traffic and noise, and the addition of three new pads would increase this type of activity only incrementally under the Proposed Action compared to the No Action Alternative (see below). The surrounding terrain receives little or no primitive recreational use that would be adversely affected.

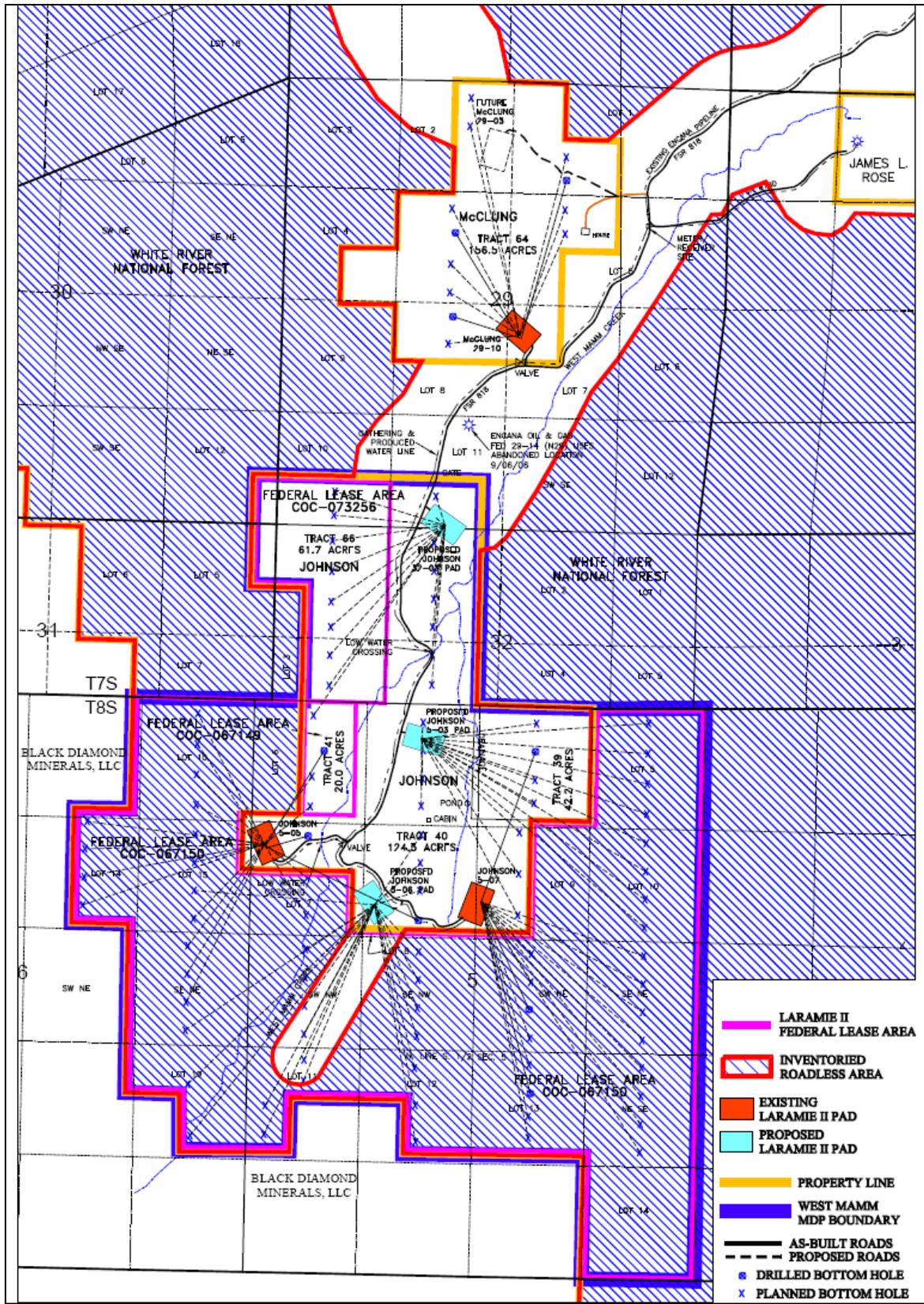


Figure 6. Project Components in Relation to Mamm Peak Roadless Area.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. Reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would not affect the Mamm Peak IRA significantly differently. On one hand, offsite impacts from noise, dust, and oil and gas activities would have a much shorter duration. On the other hand, the 5-month hiatus in development traffic on FSR818 under the Proposed Action would be eliminated. Any benefits of the last point are made less significant because the road already receives winter traffic to support production operations and would be subject to increasing production traffic under any alternative.

No Action Alternative

Indirect impacts to the Mamm Peak IRA from increased industrialization of the non-IRA valley floor along FSR818 would be comparable to those under the Proposed Action, because the three new Fee pads and 21 new Fee wells would be approved by COGCC. However, the more intensive activities associated with drilling and completion would be substantially shorter in duration than under the Proposed Action, which would include a total of 89 new wells.

Additionally, the smaller number of wells under this alternative would require substantially less traffic on FSR818 and the access roads on private lands. The greatest reduction in vehicle trips would be for water/condensate haul trucks, which are larger and louder than the smaller vehicles associated with routine production operations and, being heavier, would generate more fugitive dust along the road.

3.2.4 Noise

Affected Environment

Noise is generally defined as unwanted sound. Noise intensity (or loudness) is measured as sound pressure, expressed as decibels (dB). When assessing impacts of noise on humans, sound level is reported as dBA, the “A” referring to the portion of sound pressure within the range of human hearing. The decibel scale is logarithmic (non-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. Therefore, each 20-dBA increase on the scale represents a 10-fold increase in loudness.

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), while the noise level during normal conversation of two people 5 feet apart is 60 dBA.

The Proposed Action would be located in a rural, unpopulated area with existing noise sources associated with previous oil and gas drilling and ongoing production and maintenance activities. Noise levels from human activity are mostly mechanical, including widely dispersed ranching/farming operation as well as localized oil and gas activity.

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 well pads.

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 and the use of a drilling rig, completion rig, workover rig, or hydraulic fracture 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 11) at a distance of 350 feet.

Table 11. Colorado Noise Standards for Light Industrial and Residential/Agriculture/Rural Areas		
Zone	7:00 A.M. to 7:00 P.M	7:00 P.M. to 7:00 A.M
Light Industrial	70 dBA	65 dBA
Residential/Agricultural/Rural	55 dBA	50 dBA

Given 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 2006).

Short-term (7- to 14-day) increases in nearby noise levels would characterize road and well pad construction. Elevated noise levels during drilling and completion activities would extend throughout the 3- to 5-year development timeframe, with quieter periods during the application of any seasonal timing limitations (see Appendix A and section on Wildlife, Terrestrial). In comparison, production-related noise impacts along the access road (CR319 and FSR818) would extend throughout the long-term production phase of the project, anticipated to last approximately 30 years. In terms of vehicle trips (Table 4, page 16) and loudness, the greatest impacts would be associated with produced water/condensate haul trucks (Table 12). Less noise would be created by smaller trucks and passenger vehicles. Although the duration of increased noise from this source would be short, it would occur throughout the drilling and completion activities.

Table 12. Noise Levels at Typical Construction Sites and along Access Roads			
Equipment	Noise Level (dBA)		
	50 feet	500 feet	1,000 feet
Air Compressor, Concrete Pump	82	62	56
Backhoe	85	65	59
Bulldozer	89	69	63
Crane	88	68	62
Front End Loader	83	83	57
Heavy Truck	88	68	62
Motor Grader	85	65	59
Road Scraper	87	67	61
Tractor, Vibrator/Roller	80	60	54
Sources: BLM (1999a), La Plata County (2002)			

For the well pad sites and the access road, noise levels are expected to comply with the COGCC standard for a light-industrial area. Although noise along the access route would occur intermittently instead of continuously as at the well pads, the road passes closer to residences. Noise impacts would decrease during long-term maintenance and production operations. These levels would be less than during drilling and completion but greater than background noise levels. During maintenance and workovers, noise

levels would temporarily increase above those associated with routine well production. Traffic noise would affect residences along County roads that would provide primary access to the area. While exposure to these noise levels would not be harmful, it is likely to be annoying to residents. Since no residences occur within 0.5 mile of the WMMDP area or its access road, noise impacts associated with the Proposed Action would be negligible.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. However, reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would reduce the total duration of development-related noise. Offsetting this benefit somewhat would be the elimination of the 5-month hiatus in development traffic under the Proposed Action. Any benefits of the last point are made less significant because the road already receives winter traffic to support production operations and would be subject to increasing production traffic under any alternative.

No Action Alternative

This alternative would have a shorter duration of noise impacts associated with construction, drilling, and completion activities at the proposed new pads because only 21 Fee wells would be developed. During both the development and production phases, noise related to vehicular traffic would be reduced in comparison to the Proposed Action because of the fewer total wells (27 versus 95, including existing wells). Most of the reduction in traffic volume would be in the category of water/condensate haul trucks (Table 4, page 16), which are a louder source than the other types of vehicles expected during production.

3.2.5 Paleontology

Affected Environment

Two predominant surface formations are found within the boundaries of the WMMDP. All of the proposed pads are underlain by the Wasatch Formation. South of the Johnson 5-05, 5-06, and 5-07 well pads is the contact at the surface between the Wasatch and Lower Green River Formations.

The Potential Fossil Yield Classification (PFYC) system used to rank geologic formations by fossil potential rates the Lower Green River Formation as a Class 3 formation. Class 3 formations are defined as having moderate or unknown potential to produce fossil resources. Fossils ranked in this class usually occur only sporadically and with low predictability. The Lower Green River Formation within the CRVFO has produced only minor fossil insects and plants, unlike the upper Parachute Creek Member, which has yielded more than 100 species of fossil insects, plants, gars and other fishes, turtles, and crocodilians. The Parachute Creek Member is not mapped as cropping out within the WMMDP area but is exposed farther west and southwest in T8S, R93W.

The Wasatch Formation, also known as the DeBeque Formation within this part of the Piceance Basin, is ranked under the PFYC system as a Class 4/5 formation, indicating that the probability of finding fossils is high (Class 4) to very high (Class 5). In Class 4 units, vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur but may vary in occurrence and predictability. In Class 5 units, these types of fossils occur consistently and predictably. Although the Wasatch Formation is ranked as Class 4/5, the extensive vegetation cover and lack of bedrock outcrops lowers the risk of human-caused adverse impacts and natural degradation on paleontological resources.

The onsite investigation of the proposed new well pads confirmed the lack of bedrock exposures. The area is heavily forested with thick ground cover and mature stands of aspen and spruce. The dense forest vegetation made ground inspection difficult. All of the pads have been staked on a narrow but relatively flat-lying valley floor with a gentle grade (approximately 1%).

According to Murphy and Daitch (2007), all members of the Wasatch Formation contain vertebrate fossils in varying abundances. Identified fossils include 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. Birds, lizards, turtles, crocodylians, gars and other fishes, freshwater clams, gastropods, and other invertebrates have also be identified (BLM 1999a).

Environmental Consequences

Proposed Action

Construction activities have the potential to uncover fossils that may be present under the forest soil cover, and the amount of soil that would have to be removed to expose Wasatch bedrock is unknown. In general, the accumulation of reworked sediments that can support forest growth does not produce large specimens of significant fossil remains.

The BLM paleontology database indicates that no fossils have previously been identified within the WMMDP area. The closest discovery sites are found in Section 33, T7S, R93W, where two such sites are clustered approximately 3,000 feet northeast of the northeastern corner of the boundary. Additional sites have been identified farther east in T7S, R92W and T8S, 92W, but all are more than 2.5 miles away. Paleontological resources are not expected to be significantly affected by construction activities of this development plan. In the unlikely event that discovery sites are encountered, a standard paleontological condition of approval would be attached to the APDs for the planned Federal wells (Appendix A).

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action.

No Action Alternative

Under the No Action Alternative, the 68 proposed Federal wells on the three new well pads would not be drilled. However, the three new pads and 0.06 mile of new access roads and pipelines would be constructed in conjunction with drilling the 21 new Fee wells. Therefore, the amount of surface disturbance and the potential for impacts to paleontological resources would be the same.

3.2.6 Range Management

Affected Environment

None of the proposed well pads, roads, or pipelines would be located within a BLM-administered grazing allotment. All of the proposed well pads would be located on private surface owned by the Johnson Family. Livestock grazing does not occur on this piece of private land. It is fenced on all sides, keeping cattle drifting into the area from utilizing the private property.

The area along the access road, FSR818, is part of the Hunter Creek Allotment. The permittees holding that permit have been in non-use for the last two years and reached their limit of allowable non-use this year. The permit was turned back to the WRNF. During the last years of non-use, WRNF permitted some livestock from neighboring Mamm Creek Allotment to drift over into the Hunter Creek Allotment. The future of grazing the Hunter Creek Allotment is unclear at this time. If grazing were to return to the allotment, the permittees must consider and follow guidelines, in coordination with the WRNF range specialist, as specified in the National Forest grazing permit issued.

Environmental Consequences

Proposed Action

Oil and gas development within the proposed WMMDP would result in 28.4 acres of initial surface disturbance, including 1 acre of NFS land in conjunction with improvements to FSR818 (Table 1). Reclamation of temporarily disturbed areas of roads and pipelines and interim reclamation of pads would reduce the long-term impact to about 11.4 acres (Table 1). The long-term impacts would be expected to last 20 to 30 years until the wells are no longer productive. With final reclamation of the wells sites and access roads, the productivity of the rangeland would be reestablished.

Effects from increased human activity could include the introduction and spread of noxious weeds and the subsequent degradation of rangeland health. The section on Invasive Non-native Species describes the effects of invasive species and lists mitigation measures related to the Proposed Action.

The private landowner has not used the land for livestock grazing in the past and currently does not anticipate future grazing on the Fee property. The Proposed Action is unlikely to necessitate adjustment of the livestock stocking rate on the surrounding Federal allotment. The level of forage utilization in the Federal allotment would be monitored if a grazing permit is issued in the future. If necessary, adjustments in livestock use would be made to protect land health.

Any range improvements (fences, gates, stock ponds, pipelines, etc.) on Federal lands along the access road would be avoided by oil and gas operations to the extent possible. This includes adjusting road segments to be widened or to have turnouts added, if such range improvements are present. If ensuring safe travel would require doing so, existing range improvements that cannot be avoided when making the road improvements would be relocated or reestablished in a different but suitable location. If range improvements are inadvertently damaged during oil and gas activities, LEII would be responsible for repairing or replacing the damaged improvements.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. However, reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would reduce the total duration of development-related noise. This could reduce somewhat the potential for adverse impacts to grazing and range improvement.

No Action Alternative

Under the No Action Alternative, as under the Proposed Action, no developments would occur on public land that would affect the Federal grazing program. The 21 Fee wells proposed on two new pads and three existing pads, located entirely on private surface, would be permitted under COGCC authority. These activities would have no effect to the Federal grazing program.

3.2.7 Realty Authorizations

Affected Environment

Garfield County maintains West Mamm Creek Road (CR319) until it reaches the WRNF boundary and becomes FSR818. LEII currently has a Road Use Permit issued by WRNF to cross NFS land in Section 21 and 29 to access the private property owned by the Johnson Family. This permit is scheduled to expire on December 31, 2010. Depending on the results of this EA, WRNF is expected to issue a Special Use Authorization for future use of FSR818 to support oil and gas activities.

EnCana currently operates the natural gas gathering line from the private property through the WRNF along FSR818. In the summer of 2010, ETC Canyon Pipeline, LLC (ETC) is planning to start construction of a new 24-inch pipeline that would begin on NFS land in Section 29, T7S, R93W, for the specific purpose of conveying natural gas produced from the LEII wells.

Environmental Consequences

Proposed Action

As noted above, the Proposed Action would include up to 1 acre of new disturbance for improvements to FSR818. New pipelines for the conveyance of natural gas and produced water would also be needed and would require approximately 0.06 mile of surface disturbance to tie into the new pipeline corridor being built by ETC (approved by BLM and USFS in 2009). Since the new pipeline segments would be located entirely on private property, a Special Use Permit would not be needed.

The road through the WWMDP area would be closed to the public and used only for oil and gas activities. Vegetation removed during construction of the roads and pipelines would be restored in accordance with BLM reclamation requirements (Appendix A) within 30 days following completion of construction.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. However, reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would reduce the total duration of development-related noise. This could reduce somewhat the potential for adverse impacts to grazing and range improvement.

No Action Alternative

Since the well pads and all of the new access roads and pipelines would be developed on private lands, all of the proposed disturbances would occur without approval of the proposed new Federal wells.

3.2.8 Recreation

Affected Environment

The Proposed Action would occur on private lands. The access road (FSR818) leading to the private land is located within a corridor bordered on both sides by the Mamm Creek Inventoried Roadless Area. Since the Proposed Action would occur on private lands that have are not open to the general public, the recreational opportunities afforded to the general public with the WMMDP boundary are limited, if any. The primary physical access points to the area are available to the general public on West Mamm Creek

Road (CR319) as it turns into USFS Road 818. Once the road reaches the private property boundary, the general public can walk or hike around the private property and access the public lands that way.

NFS lands to be crossed by the proposed route are on the border of management areas 5.41 and 5.43 in the Forest Plan. The Recreation Opportunity Spectrum (ROS) for the 5.41 management area is semi-private non-motorized winter and summer. Most of the use in this area is dispersed camping, hiking, wildlife viewing, and hunting. Dispersed recreation has increased over the past few years because of improved access due to oil and gas development.

The ROS for the 5.43 management area is semi-private non-motorized or semi-private motorized year-round. Recreational opportunities include hiking, mountain biking, horseback riding, hunting, and cross-country skiing. Motorized opportunities are limited. Travel closures may exist based on elk habitat objectives. Scenery within this area is managed to provide a range of scenic integrity objectives from low to moderate.

One commercial big game outfitter—Mamm Peak Outfitters (Jeff Mead, 2220 Rosewood Lane, Grand Junction, CO 81505)—holds a special recreation use permit (managed by the USFS Rifle Ranger District) that includes NFS lands within the WMMDP boundary.

Environmental Consequences

Proposed Action

Construction and well-drilling activities would likely displace big game to other locations outside the Project Area. The result would be indirect impact to big game hunters who have booked hunts with Mamm Peaks Outfitters on public lands in the WMMDP area. Such impacts could lead the outfitter to locate the hunting camps differently during construction, drilling, and completion activities.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. However, reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would reduce the total duration of development-related disruption to recreation. Although this alternative would eliminate the 5-month hiatus in development-related traffic under the Proposed Action, the road already receives substantial use to support oil and gas production and would be subject to increasing production-related traffic under any alternative.

No Action Alternative

Under the No Action Alternative, permits for the 68 Federal wells would be denied. However, the construction of the three proposed pads on private surface, and the drilling and completion of the 21 Fee wells on those pads and the two existing pads on private surface, would continue under COGCC authority. Therefore, the potential impact to recreation would be reduced from a total of 95 producing wells in the Proposed Action to 27 producing Fee or Federal wells (both numbers include the six existing wells).

Recreation would still be subject to the adverse impacts associated with the Proposed Action, but for a shorter period of time in relation to drilling and completion activities on the pads. However, increased road use would continue throughout the producing lives of the 27 Fee wells, representing potential conflicts with recreationists using the access road. Traffic under the No Action alternative would be 50%

of that under the Proposed Action during initial production and 60% during long-term production (Table 4, page 16).

3.2.9 Socio-Economics

Affected Environment

The project is located within Garfield County, Colorado. The population of Garfield County has grown by approximately 2.7% per year from 2000 to 2005, resulting in an increase from 44,000 to 51,000 residents (DOLA 2007). Population growth in Garfield County is expected to more than double over the next 20 years from over 50,000 in 2005 to 116,000 in 2025 (DOLA 2007).

In the year 2000, industry groups in Garfield County with the highest percentage of total employment were construction (20.4%), tourism (10.7%), retail trade (13.7%), and education and health (15.4%). An estimated 13.3% of the population was retired in the year 2000 and did not earn wages. Employment in agriculture, forestry, hunting, and mining accounted for 2.4% of total employment.

Personal income in Garfield County has also risen, growing 120% from \$513 million in 1990 to \$1.1 billion in 2000. Annual per capita income has grown by 50% during the same period, from about \$10,000 to \$26,000 (BLM 2006), and the average earnings per job in 2005 was approximately \$37,500 (Garfield County). The communities of Parachute, Silt, and Rifle are considered the most affordable for housing; the communities of Battlement Mesa, New Castle and Glenwood Springs the least affordable where the cost to rent or own similar housing may be 50% or more (BLM 2006).

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

The growth of the oil and gas industry in the past 10 years has been increasingly important to local economies (BLM 2006). Gas production in Garfield County has increased tremendously during the past eight years from 70 billion cubic feet (BCF) in 2000 to more than 376 BCF in 2008 (COGCC 2009). In addition, Garfield County is experiencing the fastest oil and gas development in Colorado with 3,000 drilling permits currently approved (COGCC 2009). While numbers of workers employed in the mining and extraction industry in Garfield County has been shown to be only 1.7%, this number is considered misleading because some oil and gas employment has been incorporated as part of the construction sector statistics instead (BLM 2006). For example, in 2005, an estimated 4000 persons were directly employed by gas development companies and their subcontractors in Garfield County (Garfield County 2007).

The Federal government makes "Payments in Lieu of Taxes" (PILT) to County governments to help offset property tax revenue lost of nontaxable Federal lands within County boundaries (BLM 2006). Payments are based on Federal acreage in the County for all land management agencies, including BLM, USFS, USFWS, and the national Park Service (NPS). The amount may also be adjusted based on population. By formula, payments are decreased as other Federal funds, such as mineral royalty payments, increase. PILT received by Garfield County in the last four years has been as follows: \$1,170,205 in 2004; \$808,348 in 2005; \$1,065,158 in 2006; and \$1,078,087 in 2007 (USDI 2008).

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

Property tax revenue from oil and gas development has also become the largest source of public revenue in Garfield County (BLM 2006). In the year 2007, oil and gas assessed valuation in Garfield County amounted to approximately \$1.9 billion, or about 65% of total assessed value. Total tax revenues from property taxes and special district levies were \$130 million. Tax dollar distributions in 2007 were Schools 37%, County 30%, Special Districts 13%, Fire Districts 10%, Colleges 8%, and Towns 2%.

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 Latino community is the only minority population of note in the vicinity of the WMMDP area. In 2000, 16.7% of the residents of Garfield County identified themselves as Hispanic or Latino, and this is consistent across the State (17.1%). African Americans, American Indians, and Pacific Islanders account for less than 1% of the Garfield County population, which is below the State levels.

Environmental Consequences

Proposed Action

The Proposed Action would positively impact the local economies of Garfield County through the creation of additional job opportunities in the oil and gas industry and in supporting trades and services. In addition, local governments in Garfield County would experience an increase in tax and royalty revenues. Some minor economic loss to private landowners or guides may result from the potential displacement of big game and resulting reduction in big game hunting within the project area. Most of these economic losses—likely to be much less substantial than the positive economic impacts—would occur during the construction and drilling/completion phases and would subside during production.

The Proposed Action could result in negative social impacts, including a decrease in the recreational character of the area, reduced scenic quality, increased dust levels, and increased traffic—particularly during the development and initial production phases.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. However, reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would reduce the total duration of adverse impacts and hasten the positive impacts to local communities associated with increased income and revenues.

No Action Alternative

Under the No Action Alternative, permits for the 68 Federal wells would be denied. The construction of all three proposed pads on private surface and drilling of the 21 Fee wells on those pads and the two

existing pads would continue under COGCC authority. Therefore, the potential impact to the economy would be reduced from 89 new producing wells (95 total) for the Proposed Action to 21 new producing wells (27 total). Therefore, the negative social impacts, including increased dust levels, increased traffic, and reduced scenic quality, would be reduced under this alternative. However, the positive social impacts of direct and indirect employment and tax and royalty revenues would also be reduced.

3.2.10 Soils

Affected Environment

According to the *Soil and Ecological Land Unit Survey, Holy Cross Area, Colorado* (USDA 1995), the Proposed Action area would occur on three primary soil map units that can be identified by a four-digit alpha numeric code assigned by the USDA during the completion of the soil survey. The northernmost proposed pad (Johnson 32-03) would occur primarily on the Fughes-Godding complex (333B), with the eastern portion occurring on the Pachic Argiborolls (111A) soil type. The next proposed pad to the south (Johnson 5-03) would occur entirely on the Pachic Argiborolls (111A) soil type, while the southernmost proposed pad (Johnson 5-06) would occur entirely on the Wetopa-Doughspon-Echemoor complex (338B). The area is generally characterized as north-facing aspects with elevations ranging from 7,800 to 8,200 feet and gradients ranging from gentle in the valleys to steep along mountainsides.

- Pachic Argiborolls (111A) – This soil type is found predominantly in valleys at elevations ranging from 6,500 to 8,500 feet and on slopes of 0 to 15%. The parent material is alluvium. The surface layer is silt loam up to 10 inches in depth, the subsurface layer is silty clay loam from 10 to 18 inches in depth, and the subsoil layer is silty clay loam or clay loam from 18 to 60 inches in depth. The permeability of this soil is moderate, surface runoff is moderate, and the mass movement potential is low. Primary uses for this soil include livestock grazing, wildlife habitat, and watershed uses.
- Fughes-Godding complex (333B) – This soil complex is found on slumps and landslides at elevations ranging from 7,000 to 9,000 feet and on slopes of 5 to 40%. The parent material is primarily residuum and till. Approximately 60% of the complex is Fughes soil and approximately 30% Godding soil with 10% being composed of other soil types. The surface layer is silt loam to cobbly silty clay up to 45 inches thick. The upper subsoil is clay to very cobbly silty clay loam up to 60 inches thick. Permeability is slow, surface runoff is moderate, mass movement potential is low, cut-and-fill slope stability hazard is slight to moderate, and revegetation limitations are slight. These soils are used for livestock grazing, wildlife habitat, recreation, and watershed management.
- Wetopa-Doughspon-Echemoor complex (338B) – This soil complex is found on mountain sideslopes with landslide areas at elevations ranging from 8,000 to 10,000 feet and on slopes of 5 to 40%. The parent material is primarily residuum and colluvium. Approximately 40% of the complex is Wetopa soil, 30% Doughspon, 20% Echemoor, and 10% other soil types. The surface layer is silty clay loam to cobbly silt loam up to 45 inches thick. The upper subsoil is clay loam to very cobbly silty clay loam up to 28 inches thick. Permeability is slow to moderately slow, surface runoff is moderate, mass movement potential is low, cut and fill slope stability hazard is moderate, and revegetation limitations are slight. These soils are used for timber harvest, livestock grazing, recreation, wildlife habitat, and watershed management.

Environmental Consequences

Proposed Action

The Proposed Action would involve vegetation and soil removal for three new proposed well pads. In general, the area that would be affected by the Proposed Action contains adequate vegetation buffers and low to moderate slopes that would reduce the potential for sediment transport to West Mamm Creek. However, construction activities would cause slight to moderate 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.

Throughout the affected area, the potential would also exist for accidental spills or leaks of petroleum products and hazardous materials during construction. These events would cause soil contamination and an associated decrease in soil fertility and revegetation potential. Such impacts should be adequately mitigated by proper utilization of the standard and site-specific COAs. Following interim reclamation, it would be the responsibility of the operator to continue revegetation/reclamation efforts until vegetative communities on disturbed surfaces are composed of seeded or other desirable vegetation, as determined by the BLM. Appropriate revegetation is important to prevent or minimize soil erosion and infestation of weeds.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action.

No Action Alternative

Under the No Action Alternative, the 68 Federal wells would be denied. However, the three proposed well pads and associated 0.06 mile of new access roads and pipelines would be constructed to support drilling of the 21 Fee wells, which do not need BLM approval. Therefore, impacts to soils under this alternative would be the same as under the Proposed Action.

3.2.11 Vegetation

Affected Environment

The portion of the WMMDP area where new well pads and existing associated roads and pipelines are located on private land lies within a mature spruce-fir forest interspersed with stands of quaking aspen throughout. The understory includes low-growing common juniper (*Juniperus communis*), Woods' rose (*Rosa woodsii*), roundleaf snowberry (*Symphoricarpos rotundifolius*), and Oregon holly-grape (*Mahonia repens*). Native perennial grasses include Idaho fescue (*Festuca idahoensis*), mountain brome (*Bromopsis marginatus*), and blue wildrye (*Elymus glaucus*). Common forbs include showy daisy (*Erigeron speciosus*), silvery lupine (*Lupinus argenteus*), woodland strawberry (*Fragaria vesca*), western yarrow (*Achillea millefolium*), and northern bedstraw (*Galium boreale*).

The riparian corridor along West Mann Creek is mostly blue spruce, aspen, and tall willows (*Salix* spp.) in the portion of the project area on private land where the well development would occur. In middle reaches of the stream adjacent to the FSR818 access road, the community is dominated by narrowleaf cottonwoods and blue spruces mixed with aspen, tall willows, tall Gambel oak, Saskatoon serviceberry

(*Amelanchier alnifolia*), common chokecherry (*Padus virginiana* ssp. *melanocarpa*), and mountain maple (*Acer glabrum*). Minor amounts of western river birch (*Betula fontinalis*) also occur along the creek, as do low-growing shrubs such as roundleaf snowberry. Native perennial grasses include mountain brome (*Bromopsis marginatus*).

On the opposite side of FSR818 from West Mamm Creek, hillside slopes support mixed mountain shrubland habitat variously including Gambel oak, Saskatoon serviceberry, common chokecherry, roundleaf snowberry, wax currant (*Ribes cereum*), and mountain sagebrush (*Seriphidium vaseyanum*). Associated native perennial grasses include mountain brome, muttongrass (*Poa fendleriana*), big bluegrass (*Poa ampla*), and slender wheatgrass (*Elymus trachycaulus*). Native perennial forbs include silvery lupine, Drummond rockcress (*Boechera drummondii*), Nuttall larkspur (*Delphinium nuttallianum*), small-leaf pussytoes (*Antennaria parviflora*), lambs-tongue groundsel (*Senecio integerrimus*), lobeleaf groundsel (*Packera multilobata*), longleaf phlox (*Phlox longifolia*), mariposa lily (*Calochortus nuttallii*), death-camas (*Toxicoscordion venenosum*), double-bladderpod (*Physaria* sp.), fleabane (*Erigeron* cf. *vetensis*), and arrowleaf balsam-root (*Balsamorhiza sagittata*).

Environmental Consequences

Proposed Action

Total initial surface disturbance for new and existing project components would be approximately 28.4 acres, all on Fee land. Of this total area, 10.5 acres would be for proposed new pads, roads, and pipelines. Long-term impacts would include 3.8 acres for the new components and 10.6 acres for existing components. With implementation of reclamation practices identified in Appendix A, establishment of desirable herbaceous vegetation on the unused portions of the pads and temporarily disturbed areas for the roads and pipelines could be restored within 2 to 3 years. The establishment of mature shrubs in these areas would take from 5 to 25 years, and the establishment of trees would take even longer.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts similar to those under the Proposed Action. However, reducing the duration of the development phase by close to half as a result of allowing winter drilling and completion would reduce the total duration of development-related adverse impacts. This could reduce somewhat the impacts of from aerial deposition of fugitive dust emissions on plants, since a higher proportion of the elevated traffic would occur when the roads are frozen or snowpacked.

No Action Alternative

Under the No Action Alternative, the three proposed new pads and 0.06 mile of new access roads and pipelines, all on private land, would be constructed to accommodate drilling and production of 21 new Fee wells. Therefore, the amount of surface disturbance—the primary source of impacts to vegetation—would be the same as under the Proposed Action. The only substantial difference between the alternatives is that the No Action Alternative, with a total of 27 new and existing wells versus 95 under the Proposed Action, would require less vehicular traffic for long-term support, resulting in less deposition of fugitive dust on plant surfaces.

3.2.12 Visual Resources

Affected Environment

The project area is in a valley below North and South Mamm Peaks. The WMMDP is located within a spruce-fir forest with stands of aspen interspersed throughout. The understory includes Woods' rose, snowberry, Oregon holly-grape, mountain brome, blue wildrye, woodland strawberry, and a variety of less common herbaceous species. Open grassy meadows are dispersed within the mountain brush community, creating contrast and a color mosaic across the landscape.

The project area has existing oil and gas development operated by LEII and EnCana, with associated well pads, pipelines, and access roads. EnCana operates an existing pipeline system within the project area that gathers and transmits natural gas from the West Mamm Creek gas field to Rifle and points beyond. Ranching operations have historically occurred around the project boundary area (see Range Management section). Garfield CR319 (West Mamm Creek Road), which turns into FSR818 as it nears the WRNF boundary, provides a historical link between the project vicinity and the City of Rifle for recreational and agricultural users. CR319 was upgraded for oil and gas traffic in 2000s when EnCana was developing the field on Hunter Mesa.

The WMMDP boundary includes public land and private lands (some with underlying Fee minerals and other with underlying Federal minerals). Because the proposed construction would occur on private property owned by the Johnson Family (with underlying Fee minerals) the BLM's visual resource management objectives do not apply. However, visual values can be protected at the private landowner's discretion through the surface-use agreement with the oil and gas operator. Siting of pads, access roads, and pipelines underwent BLM and landowner consultation during the field review process, and landowner concerns were directly incorporated into the overall project design.

Environmental Consequences

Proposed Action

The Proposed Action would not directly impact any of the key viewing areas or viewsheds described in the FSEIS since the WMMDP is not within the viewshed of the I-70 corridor. The WMMDP project is not visible from CR319/FSR818, except at the WRNF boundary line. One pad, Johnson 32-03, would be visible at the Forest boundary.

An existing pipeline runs along the access road. Proposed connector pipelines from the pads to the existing pipeline would be buried within the new access road widths. Disturbance would be fully reclaimed to help establish desirable vegetation and blend the disturbance with the surrounding mountain brush landscape.

Construction of three new well pads with 0.06 mile of associated access roads and gathering pipelines would alter the landscape by removing vegetation, trees and exposing bare ground. The straight lines of the disturbance would create contrast with the natural forms of the surrounding landscape. The alteration would be most noticeable in the short term (approximately 3 to 5 years) until interim reclamation was established and able to reduce the contrast between the areas of disturbance and the surrounding vegetation. In the long term (20 to 30 years), the well pads would remain visible in the direct foreground from several points along the private road and at the WRNF boundary line but would not be visible from CR319.

Overall, the project alterations would mostly be adsorbed within the scale of the existing West Mamm Creek landscape. Visual impacts would be diminished to the extent that reclamation was timely and successful. Additional reductions in contrast would be realized by painting production facilities the non-reflective color selected from the BLM's Color Chart (Yuma Green) to reduce the visual contrast of the facilities with the surrounding landscape. In addition, implementing BMPs such as roughening the slopes, undulating the edge of the cut and fill slopes, reducing straight lines when clearing vegetation, and maintaining upright woody vegetation along the toe of the fill slopes, where possible would further reduce the visual impact. With these mitigation measures, the long-term visual impacts associated with the Federal and Fee well pads would be reduced. Visual resource COAs are listed in Appendix A.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts on visual resources similar to the Proposed Action.

No Action Alternative

The No Action Alternative would result in the construction of three new well pads and 0.06 mile of new access roads and pipelines on private land and the drilling of 21 Fee wells, altering the nearby scenic qualities and landscape characteristics of the private lands and, to some extent, the adjacent NFS land. None of the new pads and associated roads and pipelines would be visible from I-70 but would be visible where CR319 meets the Forest boundary.

3.2.13 Wildlife, Aquatic

Affected Environment

Aquatic habitat within the WMMDP area consists of one perennial stream (West Mamm Creek) that runs through the project area and extends along West Mamm Creek Road (CR319 and FSR818). This stream flows into Mamm Creek approximately 6 miles from the project boundary. Mamm Creek flows into the Colorado River approximately 4 miles farther north.

In terms of aquatic life, West Mamm Creek has not been shown to support any fish species during surveys conducted by BLM (Tom Fresques, pers. Com.) or by CDOW and USFS (Hirsch et al.2006). The stream is sourced both directly and indirectly from snowpack at higher elevations on the flanks of South Mamm Peak. Much of the recharge from snowpack enters the streams as groundwater inflow from the thick colluvium and shallow bedrock, as well as via surface inflow in tributary channels. Substrates vary longitudinally along both streams and include reaches dominated by cobbles, finer sediments, and plant detritus. West Mamm Creek is characterized by flashy flows, including periods of very low flows, as well as heavy sediment loads and steeply incised banks.

Management Indicator Species – Aquatic Invertebrates and All Trouts. The WRNF classifies all aquatic macroinvertebrate species and all species of trout, including non-native species, as Management Indicator Species relative to physical and chemical water quality of streams. Different taxa of macroinvertebrates have different habitat requirements, but all species, and all species of trouts, are sensitive to changes in water quality, particularly changes in water chemistry, including the presence of pollutants at concentrations that could cause acute effects.

As noted above, previous surveys of West Mamm Creek in the project vicinity indicate that the stream does not support fish, including nongame minnows and suckers as well as native or introduced trout. For

the same reasons, the stream is not suitable as habitat for the taxa of aquatic insect larvae most commonly associated with clean, cool streams. These taxa—the mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera), collectively called “EPT” taxa—are important not only as indicators of water quality but also are the primary prey of trout in streams. The main limiting factor of West Mamm Creek to the presence or abundance of EPT taxa is the high sediment load, which reduces the amount of oxygen in the water column, chokes the substrate with fines (the EPT taxa mostly require a cobble substrate) and interferes with their ability to feed.

Aquatic insects associated with West Mamm Creek in the project area are expected to consist primarily of the larvae of various Dipterans (flies, midges, etc.). These taxa are adapted to fine substrates and have a shorter breeding cycle, making them better suited to seasonally variable flow regimes. They also are more tolerant of waters with fine-grained substrates and low oxygen content.

Because West Mamm Creek does not support fishes, including native or introduced trouts, and because the macroinvertebrate fauna of the creek does not include the taxa representative of high-quality streams or important as prey for trout, these organisms are not addressed in the MIS Report for the project (BLM 2010c).

Environmental Consequences

Proposed Action

Because the poor aquatic habitat quality of West Mamm Creek supports no fish and a limited aquatic macroinvertebrate fauna, impacts to aquatic species would be negligible. Potential impacts to the limited aquatic fauna could include accidental releases of produced water and chemical pollutants from the pads, pipelines, or haul trucks and the inflow of sediments from disturbed surfaces. Additional inflows of sediments are expected to be avoided by the protective measures included in Appendix A. However, should that result, it would be unlikely to affect the existing aquatic fauna, which is already adapted to high sediment loads and flashy flows.

Operator-Requested Alternative

This alternative, being identical to the Proposed Action except for not including a 5-month winter seasonal restriction for elk winter range on FSR818, would have impacts on visual resources similar to the Proposed Action.

No Action Alternative

Impacts would be the same as under the Proposed Action, due to the poor quality of the habitat and the depauperate aquatic fauna. The already minimal potential for adverse impacts would be reduced further by the smaller number of wells to be in production over the long term (27 versus 97), resulting in less potential for accidental releases of produced water and chemical pollutants.

3.2.14 Wildlife, Terrestrial

Affected Environment

Current use by terrestrial vertebrates of the WMMDP area is mostly by species associated with coniferous and aspen forest, which and dominate the area. Riparian shrublands and oakbrush shrublands at lower elevations along the FSR818 access route add to the habitat and species diversity of the areas. Prevalent terrestrial vertebrate species in the WMMPD area are discussed below, by taxonomic group.

Mammals

Small mammals associated with habitats that dominate the WMMDP area include the rock squirrel (*Spermophilus variegatus*), golden-mantled ground squirrel (*S. lateralis*), least chipmunk (*Tamias minimus*), and mountain cottontail (*Sylvilagus nuttallii*) in addition to the snowshoe hare and a variety of native Cricetine and Microtine rodents, including the bushy-tailed woodrat (packrat) (*Neotoma cinereus*) and deer mouse (*Peromyscus montanus*) throughout the area, the southern red-backed vole (*Clethrionomys gapperi*) in spruce-fir habitat at higher elevations, and the long-tailed vole (*Microtus longicaudus*) along West Mamm Creek at the lower elevations. The areas of mixed conifer may also support small populations of the red squirrel (*Sciurus hudsonicus*). Another rodent, the porcupine (*Erethizon dorsatum*) occurs throughout the coniferous forest habitats, and some rocky areas are capable of supporting the yellow-bellied marmot (*Marmota flaviventris*).

Small carnivores potentially present in the area include the long-tailed weasel (*Mustela frenata*) in conifer/aspen habitat at the higher elevations; the western spotted skunk (*Spilogale gracilis*) and ringtail cat (*Bassariscus astutus*) in oak/conifer and pinyon-juniper habitats at intermediate elevations along FSR818, and the striped skunk (*Mephitis mephitis*) and raccoon (*Procyon lotor*) in the West Mamm Creek riparian corridor at lower elevations along CR319.

Larger carnivores expected to occur include the bobcat (*Lynx rufus*) in areas of dense cover and the coyote (*Canis latrans*) along edges and openings. Also present in the project area or vicinity are the black bear (*Ursus americanus*), mountain lion (*Felis concolor*), and the previously discussed Canada lynx. Black bears are attracted to stands of oak, serviceberry, and chokecherry to feed on the acorns and fruit, particularly during fall when putting on fat for the coming winter. Consequently, CDOW has mapped a black bear fall concentration area covering approximately 25 square miles in the oakbrush habitats on north-facing slopes south of I-70 in the Rulison area, including the WMMDP area. Mountain lions are found throughout the region in areas that support populations of deer and elk.

Three ungulates (hoofed mammals) in the area are the mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus nelsonii*), and, less commonly, moose (*Alces alces*). The Rocky Mountain elk is a WRNF Management Indicator Species and is discussed separately, below, and in a separate MIS report prepared for the WMMDP (BLM 2010c). Mule deer are common throughout suitable habitats in the region and are recreationally important as a big game species. CDOW has mapped the WMMDP area as including summer range for deer, although some animals also use the area in winter, particularly during mild winters. In general, however, the portion of the project area within the WMMDP boundary is not suitable for mule deer winter use due to its elevation and north-facing aspect. Lower elevation portions of the project vicinity along the FSR818 access route on the West Mamm Creek valley floor probably represent transitional habitat for deer as they move between summer and winter ranges. Moose generally inhabit forested areas near lakes and marshes. During the winter, they browse primarily on willows, which also serve as hiding cover in the summer as they graze on grasses, forbs, and aquatic vegetation. Moose also feed on conifer needles and deciduous leaves in the summer. The CDOW has mapped the WMMDP as overall moose habitat.

Management Indicator Species – Rocky Mountain Elk. The Rocky Mountain elk, like the mule deer, is common in suitable habitats throughout the region and is a recreationally important big-game species. Elk are generalist herbivores, consuming both herbaceous plants (grazing) and the tissue of woody plants (browsing). In the northern and central Rocky Mountains, grasses and shrubs compose most of their winter diet, with grasses becoming of primary importance in spring and again in fall. Forbs become increasingly important during summer, when the cool-season grasses that dominate in elk habitat grow less actively (Fitzgerald et al. 1994).

For the Data Analysis Unit (DAU) that includes the project area, recent post-hunt population estimates by CDOW show an increase, from 15,237 in 2007 to about 18,100 in 2009. This trend is a reversal from a downward trend that occurred over the previous several years. Much of the earlier decline is attributable to active management by CDOW, through recreational hunting, to bring the population in line with the population objective of 9,000 to 11,000. Levels above that objective were believed by CDOW to be unsustainable for maintaining habitat quality and a healthy population. The recent increasing trend is in line with the proposed population objective for DAU E-14 of 15,000 to 19,000 animals.

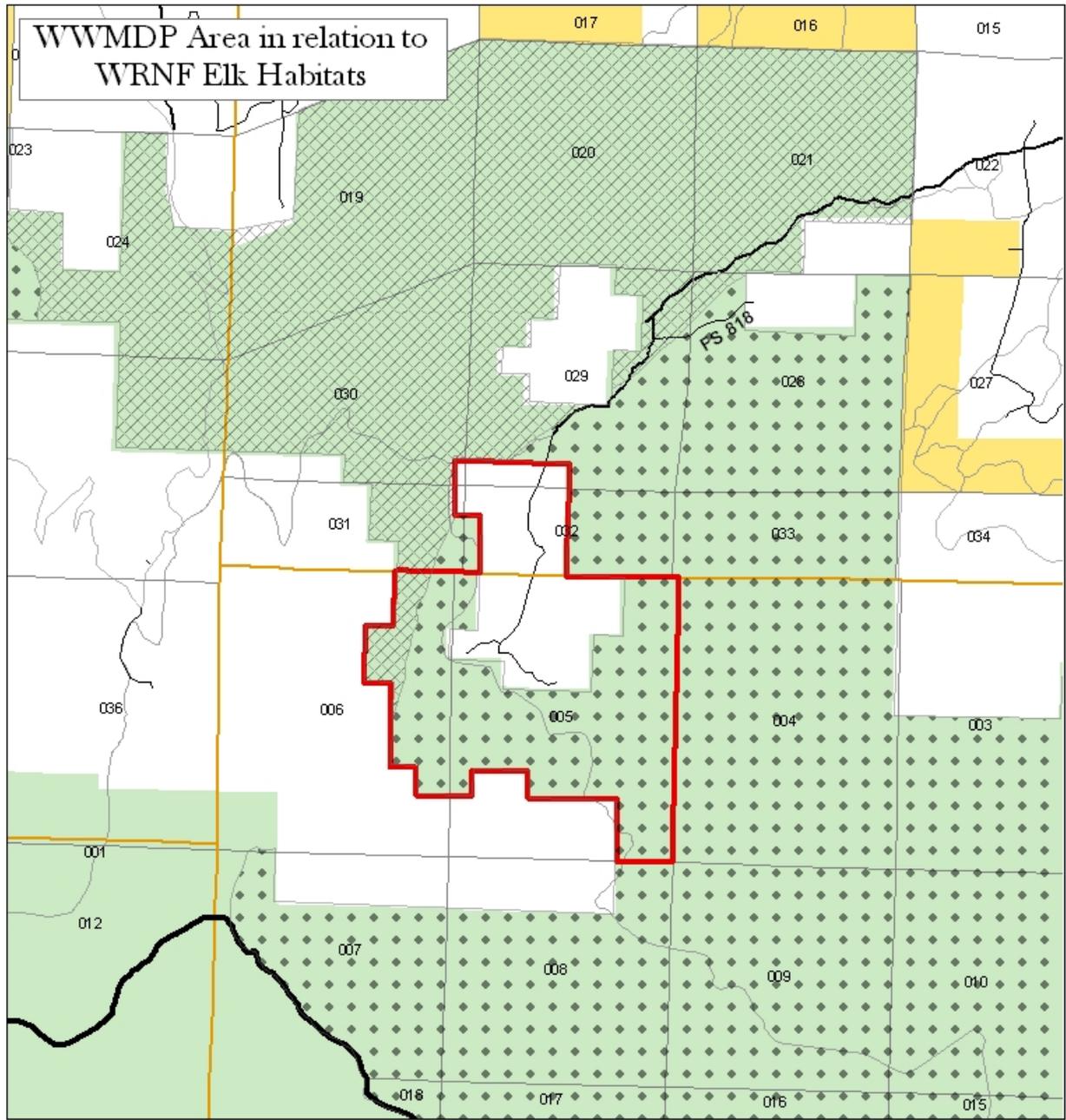
The WMMDP area is located within habitat mapped by WRNF as elk habitat (Figure 7) and by CDOW as an elk production area (calving habitat) (Figure 8). Under the WRNF Forest Plan, the elk habitat shown on Figure 6 is considered calving habitat.

Seasonally transitional habitats, such as in and near the private parcels where the existing and proposed new well pads are located, are often important for elk production (calving). Suitable areas for calving are selected by the cows and are generally in locations with gentle slopes, security from harassment, and a juxtaposition of cover, forage, and water (Seidel 1977). Lactating cows have high demands for high-quality forage and water. Calving sites may range in elevation from seasonally transitional areas—as is the case of the production area mapped around the WMMDP—to the middle to upper portions of summer range. Calving sites are traditional in that a given cow is likely to revisit the same area every year. In western Colorado, most calves are born in late May or early June and within 650 feet of water (Fitzgerald et al. 1994).

The calving habitat in the project area and vicinity is primarily spruce-fir/aspen, mixed with some tall oakbrush at the lower fringes. Aspen habitat is often regarded as the most productive type for elk reproduction in Colorado owing to the lush understory and proximity to water that characterize most stands. The West Mamm Creek riparian corridor is also suitable for calving, particularly in areas where the habitat is wider and more densely wooded. The mapped area of calving habitat that encompasses the project area (Figure 8) covers approximately 6,650 acres. Note that this mapped calving habitat is in addition to more extensive areas of mapped calving habitats farther south and west (Figure 8); additional calving areas are distributed across much of Battlement Mesa.

As also shown by Figure 7, WRNF has mapped elk (and deer) winter range in the project area, on southeast-facing areas of Gambel oak and serviceberry. On Colorado winter ranges, quaking aspen, Gambel oak (*Quercus gambelii*), serviceberry (*Amelanchier* spp.), sagebrush (*Artemisia/Seriphidium* spp.), and snowberry (*Symphoricarpos* spp.) are the major browse species used by elk (Hoover and Wills 1984). Elk feed heavily on aspen bark during the winter and spring.

Figure 8 shows elk habitats as mapped by CDOW. The differences are interesting, because CDOW shows most of the area on NFS land along and adjacent to FSR818 not as elk winter range, include severe winter range and winter concentration areas. Severe winter range is defined as areas used during the two worst winters out of ten, while winter concentration areas are defined as areas that support densities at least 200% higher than surrounding areas. During typical winter seasons, elk are more likely to concentrate in sagebrush expanses, pinyon-juniper woodlands, irrigated meadows, and other open habitats at lower elevations and on sunny aspects, where temperatures are warmer and snow cover is less persistent, even if such areas are relatively far from forested cover (Lyon and Ward 1982). These conditions are present at lower elevations along CR319 northeast of the WRNF boundary. Considering the elevation and north-facing aspect of much of this area, and deep and persistent snow cover observed in the area during the winters of 2008-09 and 2009-10, it seems unlikely that these types of use would extend as far upgradient (south) as indicated on Figure 8, except in very mild winters. The MIS report prepared for the project (BLM 2010c) provides additional detail on the status and management of Rocky Mountain elk in the WMMDP area and anticipated impacts from project implementation.



Legend

- West Mamm MDP Boundary
- Bureau of Land Management
- Bureau of Redamation
- Private
- State
- State, County, City, Areas
- US Forest Service
- X Deer & Elk Winter Range
- Elk Habitat



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This project was developed through digital means and may be updated without notice.

Figure 7

T:\gisuser\rbavers\WWMDP_USFS_mgmt_fig7_2

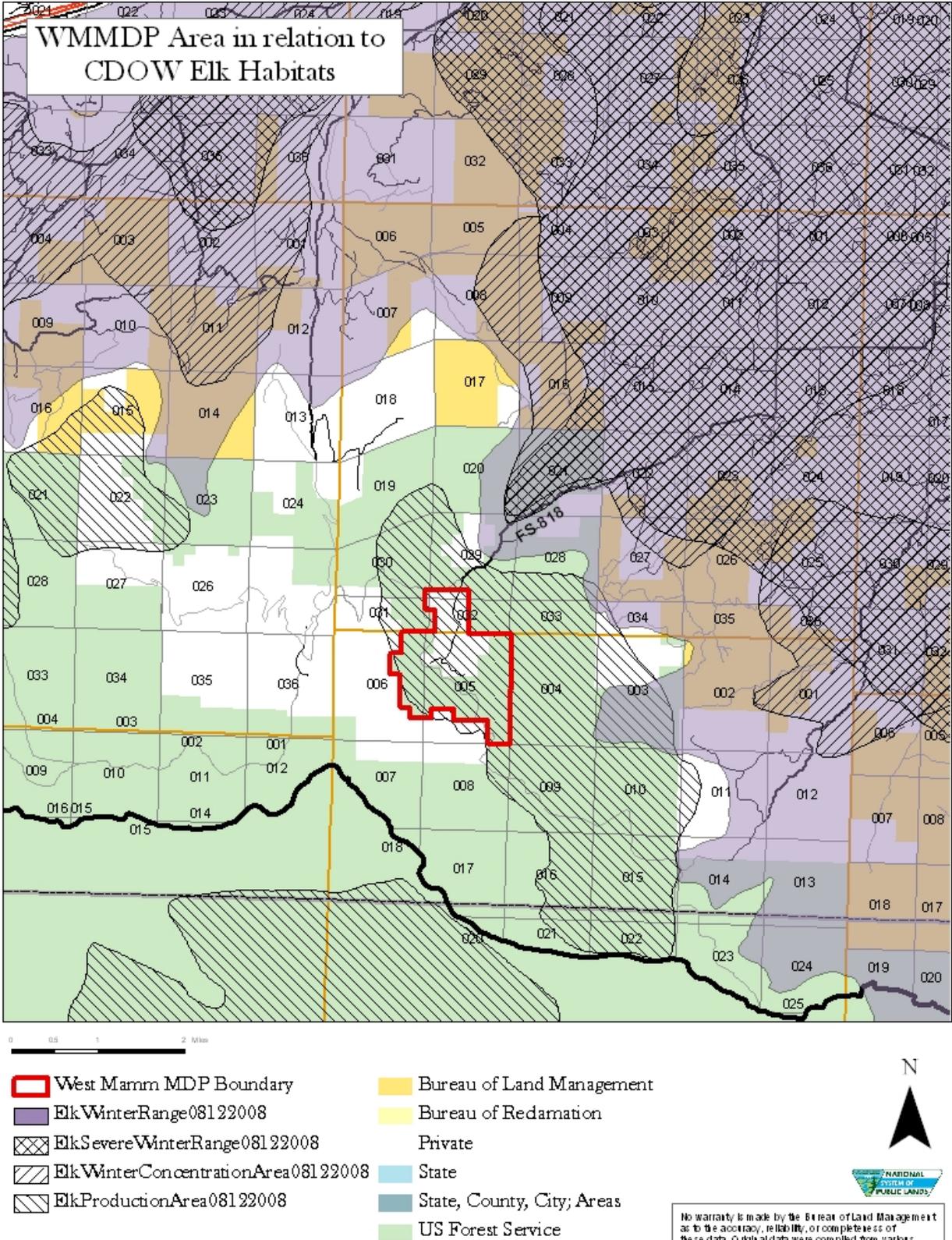


Figure 8

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Management Indicator Species – Cave Bats. Two cave-dwelling bats that are WRNF Management Indicator Species (MIS)—the fringed myotis and Townsend’s big-eared bat—are also BLM and WRNF sensitive species and therefore were addressed previously in the section on Special-status Species. However, because of the low potential for regular occurrence and for adverse impacts from the project, these species were not evaluated in the MIS Report for this project (BLM 2010c).

Birds

All of the surface disturbance resulting from construction of the well pads and associated facilities would occur on Fee lands, with the new Federal wells drilled directionally into Federal leases underlying the adjacent NFS lands. For this reason, BLM did not attach a COA related to elk calving in conjunction with its approval of the existing Federal wells. Similarly, LEII’s current Road Use Permit does not include a seasonal restriction related to elk calving.

Areas of montane or subalpine conifer/aspen habitats in the well development area and vicinity support the Neotropical migrants described in the Migratory Birds section as well as short-distance migrants such as the American robin (*Turdus migratorius*), white-breasted and red-breasted nuthatches (*Sitta carolinensis*, *S. canadensis*), and ruby-crowned kinglet (*Regulus calendula*) and year-round residents such as the hairy woodpecker (*Picoides villosus*), Steller’s jay (*Cyanocitta stelleri*), brown creeper (*Certhia americana*), and mountain chickadee (*P. gambeli*). Woodpecker nest cavities provide nest sites for such secondary cavity nesters as the tree swallow and violet-green swallow, house wren, and nuthatch species.

Perching birds commonly associated with oak-serviceberry include the several Neotropical migrant species described in the section on Migratory Birds, in addition to short-distance migrants such as the American robin and blue-gray gnatcatcher (*Polioptila caerulea*) and year-round residents such as the black-billed magpie (*Pica hudsonia*), western scrub-jay (*Aphelocoma californica*), and both the black-capped chickadee (*Poecile atricapillus*) and mountain chickadee.

The West Mamm Creek riparian corridor supports some of the species listed in the Migratory Birds section, in addition to short-distance migrants such as the red-naped sapsucker (*Sphyrapicus nuchalis*), song sparrow (*Melospiza melodia*), and fox sparrow (*Passerella iliaca*), and year-round residents such as the downy woodpecker (*Picoides pubescens*) and northern flicker (*Colaptes auratus*).

Birds of prey may nest in conifers, aspen, or very tall oaks associated with the WMMDP area, although no raptor nests were found during project-specific surveys. The section on Special-status Species discusses three raptors—the northern goshawk, flammulated owl, and boreal owl—that are potentially present within the WMMDP area or the general surroundings. Among other raptors, the species most likely to occur is the great horned owl (*Bubo virginiana*), which could nest in any wooded portion of the area. Another owl, the diminutive saw-whet owl (*Aegolius acadicus*), was identified as occurring in the project vicinity during surveys in May 2010 and could nest in the wooded conifer/aspen habitats.

Two woodland hawks, the Cooper’s (*Accipiter cooperii*) and sharp-shinned (*A. striatus*), may also fly through the area in search of small birds or small mammals and could nest in the scattered areas of conifers and aspen. Red-tailed hawks (*Buteo jamaicensis*) are common in the region but generally are not associated with areas of dense and tall woody vegetation except for nesting in trees, such as Douglas-fir or aspen protruding above the shrubs. In addition, the previously mentioned flammulated owl is thought to nest in the project area. A raptor survey is to be completed prior to the start of any construction, drilling, or completion activities.

One gallinaceous species, the wild turkey (*Meleagris gallopavo*), is common in mountain shrub habitats, where the acorns, berries, and invertebrate prey in the dense leaf litter provide abundant food. CDOW

has mapped the WMMDP area as wild turkey overall habitat. Another upland gamebird, the dusky (blue) blue grouse (*Dendragapus obscurus*), is potentially present in conifer/aspen habitats near the well pad sites, although this species generally occurs at higher elevations.

Management Indicator Species – Virginia’s Warbler. One species of Neotropical migrant songbird, Virginia’s warbler, is a USFS Management Indicator Species. This species was addressed previously in the section on Migratory Birds and in the MIS report for this project (BLM 2010c).

Reptiles and Amphibians

The WMMDP area is above the elevational range of most reptile species known to occur in Garfield County. The species most likely to occur is the western terrestrial garter snake (*Thamnophis elegans*) along West Mamm Creek. Species potentially present at the lowest elevations of the FSR818 access road but generally found at lower elevations include the western fence lizard (*Sceloporus undulatus*) and gopher snake (bullsnake) (*Pituophis catenifer*) in upland shrublands and milk snake (*Lampropeltis triangulum*) and smooth green snake (*Opheodrys vernalis*) along West Mamm Creek.

No amphibians are known or expected to occur onsite based on habitat conditions along the drainage. See the section on Special Status Species regarding the northern leopard frog and boreal toad.

Environmental Consequences

Proposed Action

Removal of dense oak-serviceberry habitat and aspen and conifers under the Proposed Action would reduce somewhat the availability of breeding and feeding habitat by the songbird and small mammal species listed above. This would also reduce the amount of cover and prey for avian and mammalian predators. However, the total direct habitat loss for combined new and existing project components—28.4 acres initially and 11.4 acres over the long term—represents a minor portion of a very extensive habitat type throughout the WMMDP area and vicinity. Additional, indirect habitat loss would result from avoidance or reduced use of areas surrounding construction or drilling/completion activities and along the road during these periods, this impact would be lessened by the location of project components along and existing roadway. Although existing use of the road is relatively light, it represents some amount of disturbance and access by humans into the habitat and has created a habitat edge on both sides throughout its length.

The extent of disturbance-related impacts on terrestrial wildlife depends on the intensity, frequency, duration, predictability, and season of the disturbance; the amount of topographic and vegetation screening between the disturbance source and wildlife receptors; and the furtiveness or sensitivity of the particular species. During construction, drilling, and completion activities on the well pads, zones of reduced use could extend from 100 meters for relatively tolerant species (e.g., most small birds and small mammals) to 0.25 mile or more for furtive species such as some birds of prey and, large carnivores, and hunted populations of deer and elk.

Management Indicator Species – Rocky Mountain Elk. In general, elk are capable of tolerating human presence when the intensity of the human activity, including noise—is low and consistent—i.e., they are able to habituate to it to some extent. This is less for hunted populations that perceive humans as threats or for high levels of disturbance and those that occur sporadically or unpredictably. Elk are especially sensitive to disturbance during the winter/spring transition season, when energy stores are depleted from the winter, the availability and palatability/nutrition of forage is minimal, and females are late in the gestation period or nursing young. Adding to these factors is the reduced screening provided when

deciduous trees and shrubs are bare and when some areas of escape for hiding cover less available due to snow accumulations. Elk that move through or tarry in the WMMDP area and vicinity during the calving season could be displaced some distance from the development area and FSR818 access road, possibly to lower habitats. Animals that do not relocate may be subject to increased stress from the human activity. However, the amount of winter range is extensive in the vicinity of the project—particularly at lower elevations north of the WRNF boundary along lower reaches of CR319. The amount of effective habitat loss due to disturbance is not expected to affect significantly the population size or population dynamics of elk in the project vicinity. Any changes would be negligible in terms DAU E-14.

BLM does not apply lease stipulations or COAs relative to elk, or other species that are not Federally protected, for directional drilling into Federal leases from Fee lands (private surface overlying private minerals). Therefore, BLM has no mechanism by which to attach a seasonal restriction (timing limitation, winter seasonal restriction) to the Federal wells and associated development activities. However, the Special Use Authorization required from WRNF for use of FSR818 to access the project area would include a winter seasonal restriction to prohibit use of the road to support construction of well pads, access roads, and pipelines during the calving season of May 15 through June 20 (Appendix A). Although not avoiding potential disturbance to elk, this approach would preclude physical habitat loss during the season of elk use.

Under the Proposed Action, the Special Use Authorization for FSR818 would also preclude use of that route to support construction, drilling, and completion activities for the Fee and Federal wells during the season of winter habitat use from December 1 through April 14 (Appendix A).

Together, the winter range winter seasonal restriction throughout the development phase and the calving winter seasonal restriction for the initial year of development are expected to reduce adverse impacts to elk that use the mapped calving area shown on Figures 7 and 8 or that move through the area *en route* to other habitats.

Management Indicator Species – Cave Bats. The BA/BE prepared by BLM for USFS sensitive species (BLM 2010b) addressed the cave-dwelling fringed myotis and Townsend’s big-eared bat and concluded that populations of these species would not be adversely affected by implementation of the Proposed Action.

Management Indicator Species – Virginia’s Warbler. The MIS report prepared by BLM (2010c) concluded that Virginia’s warbler would not be adversely affected at the population level. However, the potential exists for some negative impacts to use of nearby habitats for nesting and feeding, primarily during construction, drilling, and completion activities. Also see the section on Migratory Birds.

Operator-Requested Alternative

This alternative is identical to the Proposed Action, except that the 5-month winter seasonal restriction would not be attached by the WRNF to the Special Use Authorization required for use of FSR818 to access the project area. More precisely, this alternative would allow use of the road to support production and maintenance activities of the existing and proposed new Fee and Federal, as under the Proposed Action, and would allow use of the road to support construction, drilling, and completion activities during the winter seasonal restriction period, subject to the following:

- FSR818 could NOT be used to support construction of well pads, access roads, and pipelines during the period December 1 through April 14.

- During subsequent years (i.e., after the first year of development), FSR818 COULD be used to support drilling and completion activities for the new Fee or Federal wells, but only on a well pad constructed outside the winter use period (December 1 through April 14).

The latter provision, combined with the language for the elk calving winter seasonal restriction, would allow year-round drilling once the project has been initiated outside both of these winter seasonal restriction periods. Allowing year-round drilling, as requested by LEII, would shorten the duration of the development phase of the project by half, from 11 years to 5.5 years with one drill rig and from 6 years to 3 years with two drill rigs.

In general, the wildlife species described above would benefit from a reduction in the duration of the development phase associated with year-round drilling. Although the winter seasonal restriction under the Proposed Action is specifically intended to protect elk, this species could also benefit from the shorter development period associated with year-round drilling. Construction, drilling, and completion activities are accompanied by the greatest amount of human activity, traffic, noise, and dust, as well as light pollution associated with nighttime operations. Once the development phase is completed, long-term disturbance would consist primarily of tanker truck traffic associated with offsite haulage of produced water and condensate—assuming that LEII is unable to use pipelines to convey these fluids to a treatment or disposal facility.

Elk and other sensitive species adapt more readily to predictable, low- or moderate-intensity disturbance than to unpredictable, episodic, high-intensity disturbance. Regular, slow-speed tanker traffic on FSR818 during the production phase is more typical of the former type of disturbance. Drilling and completion activities at the well pads are more typical of the latter type of disturbance. Therefore, measures to move more quickly from development into production at the well pads would be expected to have a disproportionately greater benefit to elk than would measures to reduce the intensity of traffic on FSR818 during winter. Again, as noted above, even requiring a hiatus in development traffic during winter under the Proposed Action would not eliminate truck traffic, most of which is related to haulage of produced water and would occur even with a winter seasonal restriction in place.

The amount of traffic on FSR818 during drilling and completion was described in the section on Access and Transportation as approximately 26 average daily trips, versus 18 for initial production and 10 for long-term production (Table 4, page 16). Initial production would extend for the first few years until all of the wells have moved beyond the larger volumes of produced water shortly after being brought into production.

No Action Alternative

Impacts to terrestrial wildlife under the No Action Alternative would be less than under the Proposed Action because the 68 new Federal wells would not be permitted. This would reduce the duration of the drilling and completion phase, reduce traffic along the main access road (FSR818) and the access roads on private lands, and reduce the potential of accidental releases of produced water and potentially toxic chemical pollutants to the environment. However, because the three new Fee pads and associated 0.06 mile of new access roads and pipelines would be constructed under the authority of COGCC in relation to the proposed 21 new Fee wells, the amount of direct habitat loss would be the same under the No Action Alternative as under the Proposed Action.

3.3 SUMMARY OF CUMULATIVE IMPACTS

3.3.1 Proposed Action

Generally, cumulative impacts assess the proposed project in relation to past, present, and reasonably foreseeable future actions in the project area that could affect the same resources as the project. In this regard, the cumulative impact analysis for the WMMDP, with its 89 new wells, six existing wells, three new well pads, two existing well pads, 0.06 mile of new road, and use of the existing FSR818 (1.5 miles on NFS lands) evaluated whether:

- The project impacts would overlap with in time and space with the impacts of other actions.
- The project would intensify or exacerbate the impacts of other actions.
- The project and other actions in combination would cause potentially significant impacts that would not result from the project alone or the other actions without the project.

For the last several years, the Piceance Basin has experienced an increase pace and intensity of oil and gas development. This has resulted from multiple factors: higher natural gas prices, advances in technology that improve recovery from tight formations, and improvements in the ability of BLM to plan and permit new developments through certain provisions of the Energy Policy Act of 2005.

Garfield County has had a history of sporadic market-driven energy cycles throughout the last 50 years. Currently, approximately 6,000 wells are in production within the County, mostly drilled within the past 5 years. Approximately 20% to 25% of these wells involve Federal mineral leases. At present, the pace of development has slowed, due primarily to lower natural gas prices. This slower rate of development is projected to extend into the foreseeable future in the CRVFO area as the number of undeveloped leases gradually diminishes. In Garfield County, approximately 1,961 wells (Federal and Fee) were approved by COGCC in 2009 (COGCC 2009b). The most recent amendment to the CRVFO land use plan, the Roan Plateau RMPA/EIS (June 2006) estimated the development of 1,570 new Federal wells within the CRVFO during the 20-year life of the plan. The increased ability to reach otherwise inaccessible oil and gas reserves by directional drilling and, potentially, to recover natural gas from deeper formations than those currently being routinely developed, are likely to add to this total. The issuance of new Federal oil and gas leases in the CRVFO area would also increase the potential for additional natural gas development, although the large majority of geologically suitable areas have already been leased.

LEII's proposal to drill a total of 89 new wells on five pads on private lands would add, although negligibly, to the amount of development that is already ongoing or likely to be undertaken in Garfield County over the next several years. Both the WMMDP and the other oil and gas developments in the region are in addition to prior impacts resulting from conversion of native landscapes to agricultural lands (including non-native fields as well as dispersed grazing by livestock) and, more recently, to urban and suburban lands in response to human population growth. Other impacts in the area are related to the infrastructure, vehicular traffic, and commercial facilities spawned by the presence of a major interstate highway (I-70) across the breadth of the CRVFO. Still other impacts have resulted from mining, primarily surface quarries for sand, gravel, and rock on the floodplain and terraces along the Colorado River. Last, outdoor recreation has continued to expand in the area, including both motorized and non-motorized travel by increasing numbers of people in areas that previously were isolated from these activities.

Cumulative impacts are most easily observed and measured as surface disturbance or the loss of vegetation. The removal of vegetation would affect soil erosion, visual resources, surface water quality, wildlife, and livestock. Air quality would also be affected locally by the generation of fugitive dust.

Impacts associated with increased areas of bare soil at well pads would be primarily short term during construction, drilling, and drilling operations, with some long-term impacts following interim reclamation of the pads to reduce the disturbed area. Long-term impacts not abated by interim reclamation would include dust and noise associated with routine truck traffic, visual impacts of the pad working areas and surface facilities, visual impacts and reduced cover and forage for wildlife along reclaimed pipelines, increased potential for weed infestations, and potential for runoff of sediments into surface waters. These impacts would extend until abandonment of the wells at the end of their productive lives and the permanent reclamation of the pads and access roads. Cumulatively, the amount of surface disturbance from the WMMDP would be negligible.

Other cumulative impacts are associated not with surface disturbance but with releases of chemical pollutants to the environment. These include some organic and inorganic compounds that, when emitted to the atmosphere, represent a potential human health risk and/or may react to form haze and reduce visibility. They also include organic and inorganic compounds that, if released onto vegetation or into surface waters, could have adverse impacts on biota. Air emissions are routine in oil and gas operations, but at very low levels under normal operating conditions. Spills or releases onto vegetation or into surface waters are associated with abnormal situations, such as an accident involving a tanker truck or a spill from a storage tank or pipeline. While all of these have the potential to occur, and in fact do occur at very low frequencies, the magnitude of accidental spills or releases very rarely is such that it causes significant long-term damage.

Hazardous materials response plans required of oil and gas operators and their contract trucking companies substantially reduce the potential for significant long-term consequences. As with impacts from surface disturbance, impacts from emissions and spills or releases in conjunction with implementation of the WMMDP are expected to be negligible, including cumulatively.

Cumulative impacts may also result from the disturbance associated with human activity, operation of heavy equipment, and travel of trucks and larger vehicles on public roadways. These impacts affect primarily wildlife, which may avoid otherwise suitable habitats in proximity to roads and active well pads. The width of a zone of avoidance or reduced use varies by species, season, and type of disturbance. The resultant “effective habitat loss” is often much greater than the physical habitat loss from a project. Human residents that live in proximity to oil and gas developments and access roads are also be adversely affected, as are other users of public roadways such as recreationists. These impacts are greatest during construction, drilling, and completion operations, when the noise, dust, traffic, and (for residents) nighttime light pollution are most severe. However, residual impacts may extend throughout the life of the wells in terms of periodic major maintenance (e.g., workovers, tank replacement) or routine truck traffic. While the impacts to wildlife are cumulative with those resulting from other disturbances and from direct habitat loss, impacts to humans are more localized and seldom overlap with similar impacts from other sources.

A variety of BMPs and mitigation measures would be employed by BLM and the WRNF (Appendix A) to reduce the magnitude and duration of the types of adverse impacts discussed above. Although the WMMDP would have cumulative impacts on most resources, the relatively small scale and impermanence of the project combine to make the cumulative impacts negligible in comparison to the other past, present, and reasonably foreseeable impacts that would occur without the project and, in fact, even without any further development of Federal oil and gas leases.

3.3.2 Operator-Requested Alternative

Cumulative impacts under the Operator-Requested Alternative would be the same as under the Proposed Action in terms of type and extent. However, because this alternative would allow winter drilling, the

total duration of the development phase would be much shorter (3 to 5 years with two drill rigs and 6 to 11 years with one drill rig). More prompt shifting of the project from development to long-term production operations would shorten impacts related to the higher level of disturbance during drilling and completion. These include adverse impacts on traffic, noise, and wildlife (including special-status and MIS species as well as other wildlife).

While somewhat greater impacts on wintering elk could result from use of FSR818 to support drilling and completion during the winter season, these are expected to be minor compared to the production-related traffic that would be allowed during winter and would be offset by the shorter duration of development. Therefore, cumulative impacts to wildlife would be comparable to those under the Proposed Action.

3.3.3 No Action Alternative

Cumulative impacts under the No Action Alternative would be the same as under the Proposed Action in terms of type. In terms of duration and extent, however, this alternative would have lesser cumulative impacts owing to the total of 21 new wells instead of 68 new wells.

4. PERSONS AND AGENCIES CONSULTED

The following Federal, State, County, and Tribal entities were consulted during development of this EA:

- White River National Forest, Rifle Ranger District
- U.S. Fish and Wildlife Service
- Southern Ute Tribe
- Ute Mountain Ute Tribe
- Ute Indian Tribe (Uintah and Ouray Reservations)
- Colorado Division of Wildlife
- Colorado State Historic Preservation Officer (SHPO)
- Garfield County Road and Bridge Department

Preparation of the EA also included input by the following private parties or contractors:

- Wayne Bankert – Laramie Energy II
- Jim Rose – neighboring landowner
- Grand River Institute
- WestWater Engineering
- GEOSURV, Inc.
- Sorenson Engineering

5. INTERDISCIPLINARY REVIEW

The EA was prepared by staff of the CRVFO, with collaboration and review by WRNF personnel. Table 13 lists the project participants along with their areas of responsibility for the WMMDP.

Table 13. BLM and USFS Participants in Preparation of the EA

Name	Agency	Title	Responsibility
Rebecca Beavers	BLM	Natural Resource Specialist	Team Leader, Socio-Economics, Range Management, Visual Resource Management, Inventoried Roadless Areas
Allen Crockett	BLM	Supervisory NRS	Technical Review, NEPA Compliance
D.J. Beaupeurt	BLM	Realty Specialist	Realty Authorizations
Beth Brenneman	BLM	Ecologist	Vegetation, Special-status Species (Plants), Invasive Non-native Species
Sylvia Ringer	BLM	Wildlife Biologist	Migratory Birds, Special-status Species (Wildlife and Fish), Aquatic Wildlife, Terrestrial Wildlife
Karen Conrath	BLM	Geologist	Groundwater, Paleontology, Geology and Minerals
John Brogan	BLM	Archaeologist	Cultural Resources and Native American Religious Concerns
Jeff O'Connell	BLM	Hydrologist	Solids and Hazardous Waste, Soils, Air Quality, Surface Water, U.S. Waters, Noise, Wetlands
Dane Geyer	BLM	Petroleum Engineer	Downhole COAs
Karla Mobley	USFS	Civil Engineering Technician	Access and Transportation
Natasha Goedert	USFS	Wildlife Biologist	Contributor to Terrestrial Wildlife, MIS, and BA/BE

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APPENDIX A

**SURFACE-USE CONDITIONS OF APPROVAL AND APPROVAL
AND DOWNHOLE REGULATORY REMINDERS**

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**BLM SURFACE USE COAS APPLICABLE TO ACTIVITIES ASSOCIATED WITH FEDERAL WELLS
AND ASSOCIATED ROADS AND PIPELINES ON FEE LANDS IN THE MDDP AREA**

CRVFO Standard Oil and Gas COAs

The following standard surface-use COAs are in addition to applicable stipulations attached to the respective Federal leases. Wording and numbering of these COAs may differ from those included in CO140-08-117-SCX under which the existing Federal wells in the WMMDP area were drilled. In cases of discrepancies, the following COAs supersede earlier versions.

1. Administrative Notification. The operator shall notify the BLM representative at least 48 hours prior to initiation of construction.
2. Road Construction and Maintenance. The centerline of the right-of-way and the exterior limits shall be clearly flagged prior to any construction activity. 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.

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

3. Dust Abatement. The operator shall implement dust abatement measures as needed to prevent fugitive dust from vehicular traffic, equipment operations, or wind events. The BLM may direct the operator to change the level and type of treatment (watering or application of various dust agents, surfactants, and road surfacing material) if dust abatement measures are observed to be insufficient to prevent fugitive dust.
4. Drainage Crossings and Culverts. Construction activities at perennial, intermittent, and ephemeral drainage crossings (e.g. burying pipelines, installing culverts) shall be timed to avoid high flow conditions. Construction that disturbs any flowing stream shall utilize either a piped stream diversion or a cofferdam and pump to divert flow around the disturbed area.

Culverts at drainage crossings shall be designed and installed to pass a 25-year or greater storm event. On perennial and intermittent streams, culverts shall be designed to allow for passage of aquatic biota. The minimum culvert diameter in any installation for a drainage crossing or road drainage shall be 24 inches. Crossings of drainages deemed to be jurisdictional waters of the U.S. pursuant to Section 404 of the Clean Water Act may require additional culvert design capacity. Due to the flashy nature of area drainages and anticipated culvert maintenance, the U.S. Army Corps of Engineers (USACE) recommends designing drainage crossings for the 100-year event. Contact the USACE Colorado/Gunnison Basin Regulatory Office at 970-243-1199.

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

5. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the U.S. Army Corps of Engineers (USACE) prior to discharging fill material into waters of the U.S. in accordance with Section 404 of the Clean Water Act. Waters of the U.S. are defined in 33 CFR Section 328.3 and may include wetlands as well as perennial, intermittent, and ephemeral streams. Permanent impacts to waters of the U.S. may require mitigation. Contact the USACE Colorado/Gunnison Basin Regulatory Office at 970-243-1199. Copies of any printed or emailed approved USACE permits or verification letters shall be forwarded to the BLM.
6. Wetlands and Riparian Zones. The operator shall restore temporarily disturbed wetlands or riparian areas. The operator shall consult with the BLM Colorado River Valley Field Office to determine appropriate mitigation, including verification of native plant species to be used in restoration.
7. Reclamation. The goals, objectives, timelines, measures, and monitoring methods for final reclamation of oil and gas disturbances are described in Appendix I (Surface Reclamation) of the 1998 Draft Supplemental EIS (DSEIS). Specific measures to follow during interim and temporary (pre-interim) reclamation are described below.
 - a. Reclamation Plans. In areas that have low reclamation potential or are especially challenging to restore, reclamation plans would 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 for the pad. Reclamation, including seeding, of temporarily disturbed areas along roads, pipelines, and topsoil piles and berms, shall be completed within 30 days following completion of construction.

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

The deadlines for seeding described above are subject to extension upon approval of the BLM based on season, timing limitations, or other constraints on a case-by-case basis. If the BLM approves an extension for seeding, the operator may be required to stabilize the reclaimed surfaces using hydromulch, erosion matting, or other method until seeding is implemented.
 - c. Topsoil Stripping, Storage, and Replacement. All topsoil shall be stripped following removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. In areas of thin soil, a minimum of the upper 6 inches of surficial material shall be stripped. The BLM may specify a stripping depth during the onsite visit or based on subsequent information regarding soil thickness and suitability. The stripped topsoil shall be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. The BLM best management practice (BMP) for the Windrowing of Topsoil (COA number 18) 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.

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

Requests for use of soil amendments, including basic product information, shall be submitted to the BLM for approval.

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

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

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

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

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

- g. Mulch. Mulch shall be applied within 24 hours following completion of seeding. Mulch may consist of either hydromulch or of certified weed-free straw or certified weed-free native grass hay crimped into the soil. NOTE: Mulch is not required in areas where erosion potential mandates use of a biodegradable erosion-control blanket (straw matting).
- h. Erosion Control. Cut-and-fill slopes shall be protected against erosion with the use of water bars, lateral furrows, or other measures approved by the BLM. Cut-and-fill slopes along drainages or in areas with high erosion potential shall also be protected from erosion using hydromulch

designed specifically for erosion control or biodegradable blankets/matting, bales, or wattles of weed-free straw or weed-free native grass hay. A well-anchored fabric silt fence shall also be placed at the toe of cut-and-fill slopes along drainages or to protect other sensitive areas from deposition of soils eroded off the slopes. Additional BMPs shall be employed as necessary to reduce soil erosion and offsite transport of sediments.

- i. Site Protection. The pad shall be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until seeded species are firmly established, whichever comes later. The seeded species would be considered firmly established when at least 50% of the new plants are producing seed. The BLM would approve the type of fencing.
 - j. Monitoring. The operator shall conduct annual monitoring surveys of all sites categorized as “operator reclamation in progress” and shall submit an annual monitoring report of these sites to the BLM by **December 31** of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by BLM.
8. Weed Control. The operator shall regularly monitor and promptly control noxious weeds or other undesirable plant species as set forth in the Glenwood Springs Field Office *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, dated March 2007. A Pesticide Use Proposal (PUP) must be approved by the BLM prior to the use of herbicides. Annual weed monitoring reports shall be submitted to BLM by **December 1**.
9. Big Game Winter Range and Elk Calving. Because the existing and proposed new pads, roads, and pipelines would be located on Fee land, with wells drilled directionally into Federal leases underlying the adjacent NFS lands, BLM policy is to not apply any winter timing limitation (winter seasonal restriction) stipulation for deer and elk, even if attached to the target leases. This is because deer and elk are not Federally protected resources and because of BLM’s policy to minimize interference with decisions made by the surface landowner of Fee properties. However, see the seasonal restrictions (numbers 23 and 24, below) to be attached by WRNF to a Special Use Authorization for FSR818.

To protect elk during winter, migration, and calving seasons, employees of the operator, its contractors, or their subcontractors shall not keep dogs on well pads during construction, drilling, completion, and production/maintenance activities related to a Federal oil and gas well. Dogs brought to the site during visits or work shifts by employees of the operator, its contractors, or their subcontractors shall not be allowed off-leash while outside the vehicle.

10. Bald and Golden Eagles. It shall be the responsibility of the operator to comply with the Bald and Golden Eagle Protection Act (Eagle Act) with respect to “take” of either eagle species. Under the Eagle Act, “take” includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. “Disturb” means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. Avoidance of eagle nest sites, particularly during the nesting season, is the primary and preferred method to avoid a take. Any oil or gas construction, drilling, or completion activities planned within 0.5 mile of a bald or golden eagle nest, or other associated activities greater than 0.5

miles from a nest that may disturb eagles, should be coordinated with the BLM project lead and BLM wildlife biologist and the USFWS representative in the BLM Field Office (970-876-9051).

11. Hawks and Owls. To protect nesting by the flammulated owl, a BLM sensitive species known to nest in the project vicinity, and other birds of prey potentially nesting in the project vicinity, the initiation of construction, drilling, and completion activities in conjunction with Federal wells, including Fee pads, access roads, and pipelines associated with Federal minerals, shall not occur during the period May 1 to June 30. As allowed under the Migratory Bird Treaty Act (MBTA), this restriction does not apply to construction, drilling, or completion activities that were initiated before May 1 and are ongoing at the same location as of that date. An exception to this timing limitation (winter seasonal restriction) may be granted for initiation of construction, drilling, or completion activities in any year for which a nesting survey conducted by qualified biologist has not documented an active nest within 0.25 mile of a well pad or access road. Contact the USFWS representative in the BLM Field Office at 970-876-9051 and visit <http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm>.
12. Migratory Birds. It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act (MBTA) with respect to “take” of migratory bird species. Under the MBTA, “take” means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The operator shall prevent use by migratory birds of any pit containing fluids associated with oil or gas operations, including but not limited to reserve pits, produced water pits, frac-water pits, cuttings trenches (if covered by water/fluid), and evaporation pits. Fluids in these pits may pose a risk to migratory birds (e.g., waterfowl, shorebirds, wading birds, songbirds, and raptors) as a result of ingestion, absorption through the skin, or interference with buoyancy and temperature regulation. Regardless of the method used, it shall be in place within 24 hours following the placement of fluids into a pit. Because of high toxicity to birds, oil slicks and oil sheens should immediately be skimmed off the surface of any pit that is not netted. The most effective way to eliminate risk to migratory birds is prompt drainage, closure, and reclamation of pits, which is strongly encouraged. All mortality or injury to species protected by the MBTA shall be reported immediately to the BLM project lead and to the USFWS representative in the BLM Field Office at 970-876-9051 and visit <http://www.fws.gov/mountain-prairie/contaminants/oilpits.htm>.
13. Birds of Conservation Concern. Pursuant to BLM Instruction Memorandum 2008-050, all surface-disturbing activities are prohibited from May 1 to June 30 annually to reduce impacts to Birds of Conservation Concern (BCC). An exception to this COA may be granted if a nesting survey conducted during the nesting season indicates that no BCC species is nesting within 10 meters of the area to be disturbed. The nesting survey shall include an aural survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. The survey shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 a.m. under favorable conditions for detection and identification. In conformance with the Migratory Bird Treaty Act, this provision does not apply to construction, drilling, or completion activities that were initiated before May 1 and are ongoing at the same location as of that date.
14. Range Management. Range improvements (fences, gates, reservoirs, pipelines, etc) shall be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator would be responsible for repairing or replacing the damaged range improvements. If a new or improved access road bisects an existing livestock fence, steel frame gate(s) or a cattleguard with associated bypass gate shall be installed across the roadway to control grazing livestock.
15. Ips Beetle. To avoid mortality of pinyon pines due to infestations of the *Ips* beetle, any pinyon trees damaged during road, pad, or pipeline construction shall be chipped after being severed from the

stump or grubbed from the ground, buried in the toe of fill slopes (if feasible), or cut and removed from the site within 24 hours to a location approved by the Colorado State USFS.

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

Where feasible, the operator shall suspend ground-disturbing activities at the discovery site and immediately notify the BLM of any finds. The BLM will, as soon as feasible, have a BLM-permitted paleontologist check out the find and record and collect it if warranted. If ground-disturbing activities cannot be immediately suspended, the operator shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

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

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

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

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

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

The operator may relocate activities to avoid the expense of mitigation and delays associated with this process, as long as the new area has been appropriately cleared of resources and the exposed materials are recorded and stabilized. Otherwise, the operator shall be responsible for mitigation costs. The

BLM would provide technical and procedural guidelines for relocation and/or to conduct mitigation. Upon verification from the BLM that the required mitigation has been completed, the operator would be allowed to resume construction.

Antiquities, historic ruins, prehistoric ruins, and other cultural or paleontological objects of scientific interest that are outside the authorization boundaries but potentially affected, either directly or indirectly, shall also be included in this evaluation or mitigation. Impacts that occur to such resources as a result of the authorized activities shall be mitigated at the operator's cost, including the cost of consultation with Native American groups.

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

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

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 with **BLM Standard Environmental Color Yuma Green** to minimize contrast with adjacent vegetation or rock outcrops.

19. Windrowing of Topsoil. Topsoil shall be windrowed around the pad perimeter to create a berm that limits and redirects stormwater runoff and extends the viability of the topsoil per BLM Topsoil Best Management Practices (BLM 2009 PowerPoint presentation available upon request from Colorado River Valley Field Office). Topsoil shall also be windrowed, segregated, and stored along pipelines and roads for later spreading across the disturbed corridor during final reclamation. Topsoil berms shall be promptly seeded to maintain soil microbial activity, reduce erosion, and minimize weed establishment.
20. Reserve Pit. A minimum of 2 feet of freeboard shall be maintained in the reserve pit. Freeboard is measured from the highest level of drilling fluids and cuttings in the reserve pit to the lowest surface elevation of ground at the reserve pit perimeter.
21. Soils. Cuts and fills shall be minimized when working on erosive soils and slopes in excess of 30 percent. Cut-and-fill slopes shall be stabilized through revegetation practices with an approved seed mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with well-anchored silt fences, straw wattles, or other acceptable BMPs designed to minimize the potential for sediment transport. On slopes greater than 50 percent, BLM personnel may request a professional geotechnical analysis prior to construction.

SITE-SPECIFIC COAS APPLICABLE TO THE EXISTING AND PROPOSED NEW WELL PADS.

The following site-specific surface use COAs are in addition to the standard COAs applicable to all wells within the WMMDP and all stipulations attached to the respective Federal leases.

22. Generator Noise. The generator(s) and pump(s) serving any injection well or pipeline shall be installed and operated at the site in a manner that, at a minimum, meets the COGCC Noise Abatement regulation (No. 802) for Residential/Agricultural/Rural Zone. In summary, this regulation requires that the noise level not exceed 50 dBA between 7:00 p.m. and 7:00 a.m. at a distance of 350 feet from the noise source.

ADDITIONAL WRNF COAS APPLICABLE TO USE OF FSR818

23. Big Game Winter Range Seasonal Restriction (WRNF Forest Plan)

Proposed Action and No Action Alternative. To minimize impacts to wintering elk, no traffic on FSR818 shall occur in support of construction, drilling, or completion activities during a Timing Limitation (winter seasonal restriction) period of **December 1 through April 14** of each year. This winter seasonal restriction shall not apply to traffic on FSR818 associated with production or maintenance activities at well pads or along associated pipelines.

Operator-Requested Alternative. To minimize impacts to wintering elk, no traffic on FSR818 shall occur in support of construction activities during a TL period **December 1 through April 14** of each year. This TL shall also apply to traffic in support of the initiation of drilling and completion activities during the first year of well development but shall not apply to such activities in subsequent years if one new well has been drilled or one new pad has been constructed. The latter provision is intended to avoid physical habitat removal during the calving season while shortening the total duration of drilling and completion activities in the project area.

24. Elk Calving Seasonal Restriction (WRNF Forest Plan). To minimize impacts to elk calving, no traffic on FSR818 shall occur in support of construction, drilling, or completions activities during a seasonal restriction period of **May 15 through June 20** of each year, except that such use is allowed during the seasonal restriction period for a well pad, road, and pipeline constructed outside these dates. The latter provision is intended to avoid physical habitat removal during the calving season while not unduly lengthening the total duration of drilling and completion activities in the project area.

APPENDIX B

Cooperating Agency and Public Comments on the Proposed Action and BLM Responses

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BLM RESPONSES TO COOPERATING AGENCY AND PUBLIC COMMENTS
West Mamm Master Development Plan

The BLM Colorado River Field Office received comments from the U.S. Forest Service (USFS), Colorado Division of Wildlife (CDOW), Garfield County, and private citizens during the public scoping process for WMMDP. The comments are presented below, along with BLM's responses.

GLENN R. ADAMS, DISTRICT RANGER, WHITE RIVER NATIONAL FOREST (letter dated April 27, 2010)

Comment: *The decision framework discussion should clarify when the USFS is required to conduct National Environmental Policy Act (NEPA) analyses for Surface Use Plans of Operations (SUPOs) and when the BLM has the authority to approve Applications for Permits to Drill without needing USFS involvement in the process.*

Response: Language has been added.

Comment: *There are potential direct, indirect, and cumulative impacts to National Forest System (NFS) lands that need to be addressed in the EA for the WMMDP....The WRNF requests that BLM resource staff work with the appropriate WRNF resource staff...to address these potential impacts to NFS lands.*

Response: This was done.

Comment: *Changes to the WMMDP proposal resulting in additional surface disturbance activities on NFS lands will require consultation with the WRNF.*

Response: Noted.

Comment: *Any additional pipelines across NFS lands would require a Special Use Permit (SUP) authorization.*

Response: Noted.

Comment: *Elk, as a Management Indicator Species (MIS), need to be addressed in coordination with the Colorado Division of Wildlife.*

Response: BLM prepared an MIS report that was reviewed and approved by the WRNF.

Comment: *Forest Service Road (FSR818) travels through elk winter range and border...severe elk winter range [and] the project area is within an elk production area.*

Response: These issues were addressed in the EA and the MIS report.

Comment: *There are three breeding flammulated owl (USFS sensitive species) breeding locations just west [of the site] that need to be considered in the WMMDP.*

Response: This was done. Surveys by USFS in spring 2010 did not result in observations of the owl.

Comment: *FSR818 travels through lynx habitat....*

Response: BLM addressed lynx in the EA and a Biological Assessment (BA) submitted to the USFWS pursuant to Section 7 of the Endangered Species Act.

Comment: *Connected actions and road use need to be discussed in the BA as they impact lynx and other species.*

Response: This was done.

Comment: *The WRNF encourages BLM's wildlife specialist to consult with the WRNF wildlife specialist during the WMMDP wildlife analysis.*

Response: This was done.

Comment: *There is potential for WMMDP to contribute to air quality impacts to three Class I wilderness areas. The Hell's Gulch North, Phase 2 (HG2) EA cumulative impact assessment indicated adverse impacts to visibility in [several] Wilderness areas and Black Canyon of the Gunnison National Park.*

Response: Comment noted. BLM currently assesses air quality for APDs in the context of the cumulative impacts section of the Roan Plateau RMP Amendment and EIS, which predicted very minor impacts compared to existing baseline for 1,570 new wells. The WMMDP wells are within that number. Therefore, BLM concludes that the project would not contribute significantly to air quality degradation. When air quality modeling for the RMP revision currently underway, BLM will begin to use those results instead of the Roan Plateau results.

Comment: *There is potential for cumulative impacts to the acid neutralizing capacity of sensitive wilderness lakes....*

Response: See previous response to air quality topic.

Comment: *Impacts to Class I wilderness areas and wilderness lakes managed by the WRNF disclosed in the HG2 air quality modeling analysis should be considered as part of the WMMDP analysis.*

Response: See previous response to air quality topic.

Comment: *Air quality best management practices and conditions of approval similar to those used in the HG2 analysis should be considered by BLM to reduce emissions from the WMMDP.*

Response: Comment noted. Upon further consultation with WRNF, it was decided not to include these COAs

Comment: *The WRNF encourages BLM's air quality specialist to consult with the WRNF air quality specialist during the WMMDP air quality analysis.*

Response: WRNF air quality specialist reviewed the EA and provided comments that were addressed to the extent deemed appropriate by BLM within the context of how it approaches air quality for issuance of APDs on BLM, split-estate, or Fee lands not involving NFS surface lands. We realize that the USFS has a different approach to air quality analysis for oil and gas projects on NFS lands than does BLM. This project is entirely on Fee lands, except for the existing access road.

Comment: Significant roadwork completed on FSR818 needs to be listed as part of the Proposed Action.

Response: The WRNF has since determined that no roadwork on FSR818 is needed.

Comment: *When the winter and spring weather breaks, a field review should be completed by WRNF and BLM authorized officers, the county, the landowner, and Laramie Energy II to identify and address locations of concern:*

Response: Multiple site visits have been conducted by WRNF and BLM personnel, both together and separately—including multiple visits by the BLM representative who signs the FONSI (Allen Crockett, Supervisory Natural Resource Specialist/Physical Scientist). No further site visits are planned or considered by BLM to be necessary.

Comment: *Mitigation measures such as curve widening, turnout modification, turnout frequency, roadside clearing, signage, radio communications, additional traffic control, and safety instructions may be warranted.*

Response: The WRNF subsequently determined that these were not needed.

Comment: *The WRNF encourages the BLM's project lead to consult with the WRNF transportation specialist during the WMMDP transportation planning analysis.*

Response: This was done on an ongoing basis.

**J.T. ROMATZKE, AREA WILDLIFE MANAGER, COLORADO DIVISION OF WILDLIFE
(letter dated February 22, 2010)**

Comment: *Minimizing human-wildlife impacts as a clearly defined, fully developed component of this MDP and subsequent Environmental Assessment findings. LEII's Proposed Action does not fully describe wildlife avoidance or mitigation measures. The MDP lacks sufficient detail needed for public knowledge and disclosure of impacts. Such information would examine leases both pre and post of the GSRA 1999 FSEIS.*

Response: The document reviewed by CDOW and the public was the Proposed Action, not the entire Environmental Assessment (EA). Specific wildlife impacts and developed mitigation are identified and discussed in the Migratory Bird, Special-status Species, and Aquatic and Terrestrial Wildlife sections of the EA. Mitigation measures to be applied as Conditions of Approval are listed in Appendix B.

Comment: *The Proposed Action does not synthesize the site-specific data into a format that is concise and understandable.*

Response: The document available during the public scoping period for review was the Proposed Action for the MDP, not the EA. CRVFO's approach for all MDPs is to make the Proposed Action available for public review and comment to help guide the impact analysis and mitigation process to ensure that public issues and concerns are considered and, as appropriate, incorporated into the EA. The actual EA presents resource impacts and identified mitigation measures, as Conditions of Approval, by specific resource.

Comment: *The 1999 FSEIS within the Environmental Consequences section also acknowledges the fact that without the ability to mitigate and work with operators that own pre-existing leases the wildlife attributes in the planning area would suffer undue and unnecessary impacts. Private and public land within the boundary of the proposed MDP contains elk production area, lynx potential habitat and black bear fall concentration area as identified in the Glenwood Springs Resource Area Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement, January 1999, Chapter 3, pages 3-13 through 3-17 and Chapter 4, pages 4-18 and 4-27. The 2002 White River Forest Land and*

Management Plan also shows the area as elk production area, deer and elk winter range, Chapter 3, 3-55 through 59. The Final EIS 2002 Management Areas Map, Revised 2006-Errata #3 depicts the area having both 4.41 (deer and elk winter range) and 5.43 (elk habitat) wildlife management prescriptions.

Response: The Terrestrial Wildlife section of the EA discusses potential impacts to big game, along with a description of measures for avoidance, minimization, or mitigation. This discussion includes citations to the lease stipulations and COAs related to big game winter range.

Comment: More recent CDOW mapping (Natural Diversity Information Source [NDIS], 2010 and on-going, identify areas within MDP areas containing elk production area, lynx potential habitat, and black bear fall concentration areas.

Response: See preceding response. The EA discloses and analyzes potential impacts to these and other species. In addition, lynx are addressed in a Biological Assessment (BA) prepared by BLM and submitted to the U.S. Fish and Wildlife Service (USFWS). In that BA, BLM reached an effects determination of “May Affect, Not Likely to Adversely Affect.” The USFWS issued a concurrence letter agreeing with that determination on May 12, 2010.

Comment: CDOW supports the BLM Oil and Gas Lease Stipulations described on pages 18-21 of the MDP for the COC67149, COC67150 (11-13-03), and COC73256 leases; however, the CDOW believes that lease COC67150 (11-13-2003) contains an error in the stipulations – it appears that dates for timing limitations and mapped habitat are not consistent. The timing limitation dates are for critical winter range (December 1 through April 30), however the BLM, USFS, and NDIS mapping show elk calving area instead. The timing limitation dates are not consistent with the wildlife mapping contained in the 1999 Glenwood Springs Resource Area Oil and Gas Leasing and Development Final Supplemental location. The White River Forest Land and Management Plan, on page 3-60, describes the area as elk habitat in general and indicates that elk calving timing limitations are appropriate, page 3-63. USFS elk calving dates are May 15 through June 20, page 3-62. The Colorado NDIS, 2010 depicts the area as elk calving. Mapping sources indicate that the area of the MDP contains elk production area and not elk winter concentration areas, the correct timing limitation should be May 15 through June 20. The CDOW recommends that a Condition of Approval be attached to the COC67149 lease. The condition should require a timing limitation from May 15 through June 20 to prohibit all exploration, drilling or development activity.

Response: BLM did not discover this error until after the Proposed Action had been published. BLM does not attach winter seasonal restriction stipulations for big game (or other non-Federally protected resources) to well pads, pipelines, or access roads when the stipulations are associated with a Federal oil and gas lease to be accessed by directional drilling from outside the lease boundary. Therefore, the omission of that winter seasonal restriction from the subject leases, if such is the case, is moot as pertains to this project. However, the elk calving winter seasonal restriction dates identified in the CDOW comment will be attached by WRNF to the Special Use Authorization required for travel by LEII on FSR818 (West Mamm Creek Road) to access the WWMDP area.

Comment: The CDOW recommends (as a follow-up to timing stipulations) that LEII and contractors schedule operational maintenance activities so that site visits occur between the hours of 10:00 a.m. and 3:00 p.m. and reduce the number of daily/weekly site visitations between May 15 through June 30 for the life of the project.

Response: BLM does not believe it is practicable to require that all such activities be confined to this narrow window but encourages operators to operate outside the critical dawn/dusk periods.

Comment: *The CDOW also recommends as described in the Gas Lease Stipulations (page 18) that aquatic biological inventories be completed by the USFS, BLM, and/or CDOW within the area of development. Such surveys should be completed across seasons and prior to further development.*

Response: Development is not occurring within any riparian corridors. Previous surveys of West Mamm Creek, which lies adjacent to the long-used and heavily used West Mamm Creek Road, indicate a depauperata aquatic fauna, probably due to flashy flows with periodically very low flows, heavy sediment loads, and a discontinuous riparian corridor. Therefore, BLM disagrees that project-specific aquatic biota surveys are warranted.

Comment: *The BLM, USFS, and NDIS mapping identified the area as potential lynx habitat. CDOW anticipates that both the BLM and White River Forest would provide assistance, as appropriate, to LEII and subcontractors with respect to the 2008 Southern Rockies Lynx Management Direction Record of Decision and the 2002 Land and Resource Management Plan for the White River Forest.*

Response: BLM submitted a Biological Assessment (BA) to the USFWS for potential lynx habitat within or near the WMMDP boundary. BLM reached an effects determination of “May Affect, Not Likely to Adversely Affect.” If USFWS reaches a different determination and/or specifies conservation measures for the project implementation, BLM would work with LEII and USFWS to ensure that the measures are designed and implemented.

Comment: *The CDOW requests that LEII design and implement appropriate pit (including cuttings pits) fencing and netting techniques to protect wildlife. The CDOW recommends that development and operations/maintenance pits be fenced to exclude wildlife; pit wildlife exclusion fences must be a minimum of 7 feet high and have a 2-foot-high mesh fence along the bottom to exclude small mammals. All pits that contain produced water should be netted to deter birds/waterfowl from entry. Impermeable barriers should also be installed beneath all fluid pits to protect groundwater, riparian areas and wetlands.*

CDOW recommends that LEII and appropriate subcontractors review information about fencing for wildlife, information available from CDOW at <http://wildlife.state.co.us/NR/rdonlyres/20D5C775-55DD-4C6D-A5CF-C9B83FCEA69E/0/DOWFencingWithWildlifeInMind.pdf>.

Response: The CRVFO does not believe that it is practicable to construct wildlife-proof fencing around pits. However, we do require that pits be constructed and maintained in a way that allows any inadvertently entrapped animals to escape. Additional measures are required to reduce impacts to migratory birds for any pits that contain fluids. The latter issue is addressed in the Migratory Birds section of the EA and represented by a COA in Appendix A.

Comment: *If gas pipelines are pressure tested with water, CDOW recommends that the test water be captured and consigned to a certified disposal facility; CDOW requests that test water not be discharged to any surface drainage due to the potential contaminant issues associated with pipeline pressure test water. Any and all surface water discharges must be approved by the Colorado Department of Public Health and Environment’s Water Quality Control Division.*

Response: BLM has included a COA requiring that any water used to pressure test pipelines be transported to an approved treatment or disposal facility. The Hydrostatic Pipeline Testing section of the EA also addresses this concern.

Comment: *CDOW would need to know much more information about the conversion of produced water to fresh water via distillation before CDOW would support using the water for wildlife ponds as*

suggested on page 14 of the proposed MDP. Further, more detail would need to be provided to CDOW regarding the water treatment process before any water and/or materials could be considered for discharge to surface waters.

Response: The Proposed Action states that prior to any discharges, all required permits from the State of Colorado as well as approval from BLM would be obtained. While such beneficial uses are theoretically possible for some future developments—treatment of produced water to meet State and Federal water quality standards is technically possible, if uneconomic—BLM agrees that the wording in the Proposed Action is unrealistic and that such uses are, and are likely to remain, impermissible. The language has been removed. During occasional periods when the primary method of transporting produced water (by pipeline) is temporarily inoperable, such as due to pipeline maintenance, LEII would be required to implement the secondary method, consisting of trucking the water to an approved treatment or disposal facility.

Comment: CDOW recommends that during pipeline installations, LEII install trench plugs, earthen ramps, or other means necessary to ensure that open pipeline trenches do not trap wildlife, and that pipe strings do not impair wildlife movements.

Response: BLM has included a COA to this effect, to be applied during periods when a pipeline trench is to be left open overnight or longer. Because of the short pipeline lengths involved and the other ongoing construction activities during pipeline trenching and installation, the potential for injury or mortality of wildlife seems minimal. We do not agree that having pipeline sections temporarily laid on the surface prior to emplacement is an issue because of the short segments and short duration anticipated.

Comment: CDOW believes that requirements and standards set forth in the FSEIS have been omitted, selectively applied, or changed in a manner that does not reflect the intent of the FSEIS. For example, the FSEIS goes to great length to describe lease stipulations and Conditions of Approval that would be applied to offset or mitigate negative impacts to wildlife (FSEIS, Chapter 2, page 2-35, section 2.7). The proponent does not propose on-or-offsite mitigation due to four pads per section. Further, the MDP makes selective mention of applying the Condition of Approval that the FSEIS states would be applied to existing leases to protect wildlife.

Response: CDOW's understanding of the FSEIS at Section 2.7, pp.2-35 and 2-36, and how it pertains to the Geographical Area Plan (or Master Development Plan, as it is now known) is not entirely on target. Although an item under item #5 (p. 2-36) calls for the use of COAs to require reasonable mitigation for wildlife habitat impacts to big game winter range attributable to past and proposed oil and gas development within the GAP (MDP) area, the EA for the WMMDP has made the determination that the well pad densities or road densities do not exceed the threshold and therefore do not trigger a requirement for mitigation of indirect impacts. Further, the proposed new pads would be located on private surface with underlying private minerals and could be constructed under COGCC authority, irrespective of approval or denial by BLM of APDs for the new Federal wells.

Comment: Certain lease stipulations indicate that habitat improvement projects are required and appropriate to offset development impacts and habitat loss; the MDP does not identify or propose any such projects. CDOW is responsive to the idea of working with the operator and BLM/USFS to create habitat improvement projects or a wildlife mitigation plan. CDOW's expectation for habitat improvement projects or a wildlife mitigation plan is that a plan would be prepared and implemented in a timely manner. Mitigation measures should be sufficient to cover full field development/operational impacts generated by the MDP.

Response: The three proposed pads would be located on private surface with underlying private minerals. We agree that, for the purposes of the National Environmental Policy Act, authorizing the drilling of oil and gas wells into a Federal lease is a Federal action, even if the lease is reached from off-lease Fee land. However, construction of pads, roads, and pipelines in conjunction with the development of Fee leases is not a Federal action, even if Federal wells are to be located on the same pads and utilize the same roads and pipelines. BLM policy is that the bulk of responsibility for protection of surface resources and reclamation of disturbed areas on Fee land lies with the State of Colorado and with the private landowner through a Surface Use Agreement with the operator. Exceptions are when Federal resources (e.g., threatened or endangered species, migratory birds, cultural resources, waters of the U.S.) are present and would potentially be affected. BLM lacks authority under the Federal Land Policy and Management Act and the Mineral Leasing Act to require mitigation for surface impacts on non-Federal lands, except with regard to Federal resources or when the non-Federal lands directly overlie the Federal mineral lease being accessed.

Comment: *Other MDP concerns include vegetation management and vehicle/traffic management. Prior to facility construction and development, LEII should conduct baseline inventories and establish vegetation conditions to provide a basis for post-development habitat restoration across all plant communities throughout the project components including, ROWs, staging areas and supporting facilities and well pads. The 1999 FEIS clearly states that baseline inventories shall be completed prior to development. The MDP does not indicate if this requirement would be met. When final revegetation work is based on baseline conditions, restoration results mimic pre-disturbance conditions and provide the best opportunity to minimize habitat fragmentation.*

Response: Biological surveys of the WMMDP were completed in 2009 by West Water Engineering. The results of those surveys and the site visits by the BLM plant ecologist/reclamation specialist would help guide both interim and final revegetation of disturbed areas. Land health standards for vegetation and other resources were not conducted on this project because it is not located on BLM land.

Comment: *Proper management of topsoil is essential to reclamation success. Stockpiled soils should be protected from degradation due to contamination, compaction, and wind and water erosion during drilling and production operations. These soils should also be stored away from waterways or drainages where runoff could create erosion issues. CDOW recommends using best management practices (BMPs) to prevent weed establishment and to maintain soil microbial activity. In conjunction with soil management, the CDOW recommends beginning interim revegetation with the first available growing season and that interim reclamation is started as early as possible on pipeline ROWs and cut and fill locations. Reclamation should be required the same year of the construction (as appropriate). Reclamation results should fully conform to criteria described in Appendix G & I of the 1999 FSEIS.*

Response: We agree that reclamation should be conducted as soon as practicable following completion of drilling operations, although this is not necessarily possible in the same year as the initial disturbance due to the large number of wells being drilled on some pads and various other constraints, such as drilling in the winter months. Appendix B of the EA identifies COAs for topsoil management and reclamation, including a requirement for timely revegetation.

Comment: *The MDP lacks sufficient evaluation with regard to reclamation of impacts to the land by gas development. The CDOW believes that evaluation and monitoring of reclamation efforts should be required. An evaluation of past reclamation efforts along with, the present condition and status of lands within the planning area with respect to wildlife, water quality and fisheries should be included in the final MDP.*

Response: As stated in a previous response, CDOW reviewed the Proposed Action, not the assessment of impacts or the information pertaining to COAs and other mitigation measures, resource inventories, reclamation, and monitoring. BLM believes that these aspects of the Proposed Action and of BLM's regulatory authority would result in a project that minimizes adverse impacts to wildlife.

Comment: *The CDOW supports reclamation requirements that are performance based rather than prescriptive. For example, the operator would reclaim disturbed ground to achieve x% cover, versus operator would broadcast a certain amount of pounds of a required seed mix. Reclamation success should be monitored and evaluated with a standard methodology. The goals of the reclamation should be clearly defined with regard to timeframe, vegetative cover objectives, soil protection, and wildlife forage. The CDOW would like to see the interim reclamation standards (as described in the 1999 FEIS) implemented as performance criteria that must be met before new well pads can be built and drilled.*

Response: A requirement for reclamation monitoring is attached as a COA in Appendix A. The BLM requires operators to monitor reclamation based on the objectives presented in the 1998 Draft Supplement EIS, including comparison to nearby undisturbed sites. BLM does not specify a certain number of pounds, nor do we specify a required seed mix. Operators are required to submit annual reclamation reports to the CRVFO, which must include quantitative data on plant species cover, richness, and composition in reclaimed areas. LEII has conducted reclamation monitoring and submitted annual reports to the CRVFO since 2008.

Comment: *The introduction of or spreading of non-native, undesirable vegetation and noxious weeds is a challenge to control in large-scale ground disturbing activities such as this concentrated facility development. Large-scale projects create conditions favorable for the introduction and spread of weeds. Reducing the impact of weeds is a vigilant, and long-term multiple season effort. Weed impacts can be reduced by limiting the vehicles associated with the construction component of this project, washing vehicles to prevent weed seed spread, topsoil segregation and management, utilization of certified weed free seed and straw, and conducting pre-disturbance weed surveys along the ROWs. Weed management activities should be monitored along with reclamation success on at least an annual basis as identified in the 1998 GSRA Oil & Gas Leasing & Development Draft Supplemental Environmental Impact Statement Appendix E, page E-12. The White River Forest Land and Management Plan, on page 3-58, 59, describe vegetation management as designed to maintain or improve deer and elk habitat objectives.*

Response: The section of the EA on invasive non-native species and the COAs in Appendix A address weed monitoring and control.

Comment: *Vehicle traffic during and post construction can create short and long-term impacts to wildlife. Development of a comprehensive traffic/travel management plan for the project can provide guidance for employees to avoid and minimize vehicle caused impacts. A comprehensive traffic/travel plan should address carpooling; prohibit parking outside of designated locations; limit non-essential traffic on the ROW during construction; post speed limits; restrict or prohibit travel off established roads and outside of proposed and permanent and temporary easement areas, and prohibit motorized access by unauthorized persons; implement erosion and sediment control measures (including limiting or prohibiting vehicle traffic along the ROW easements and roads during excessively wet and muddy conditions); and sign and close ROWs and access roads to public access.*

Response: The EA includes a section on Access and Transportation and addresses the unavoidable impacts associated with the need for heavy vehicular traffic during exploration and development and, to a much lesser extent, during ongoing production and maintenance. Culvert sizing is addressed in the section on Surface Water. Erosion and sediment control are addressed in the section on Soils. Some of the COAs in Appendix A also address these topics.

Comment: *The CDOW recommends that LEII perform surface water quality sampling and analysis to establish baseline water quality in West Mamm Creek both upstream and downstream of low water crossings. LEII should perform follow up sampling and analysis to monitor water quality in West Mamm Creek at least every 3 months while drilling operations are being conducted and within 3 months after the drilling operations are concluded. Sampling should apply to each period of drilling operations if the drilling rig is removed and there is a break in the drilling operations. Physical habitat conditions and collection of macroinvertebrates could also be initiated to assess water quality conditions in relation to stream crossings.*

Response: BLM disagrees with the need for, or utility of, this type of inventory and monitoring. The aquatic biota of West Mamm Creek is limited by less-than-optimal conditions of flow volume, sediment load, substrate, and adjacent riparian habitat quality. We believe that LEII's operations are unlikely to result in inadvertent releases of hydrocarbons, produced water, or other pollutants to the stream. In the event of such an occurrence, we doubt that pre- or post-drilling samples of benthic macroinvertebrates would have much bearing on the cleanup protocols to be applied, which presumably would relate to concentrations in the water or sediments of the stream or damage to the substrate and adjacent vegetation rather than on changes in the assemblage of larval insects.

Comment: *CDOW recommends LEII restrict vehicles from driving through streams. CDOW also recommends LEII utilize appropriate and effective culverts that do not preclude upstream movement of fish. LEII should consult the U.S. Army Corps of Engineers for permit approval regarding construction activities associated with waterways.*

Response: LEII constructed one concrete apron on West Mamm Creek in 2008 to reduce stream sediment loads when the first two well pads were constructed in the area. None of the new pad locations is proposed in a riparian area. BLM does not anticipate that LEII or its contractors would drive through West Mamm Creek. A COA in Appendix A requires that LEII obtain any permits from USACE for any construction activities related to waterways.

JAKE MALL, GARFIELD COUNTY ROAD AND BRIDGE DEPARTMENT (letter dated January 25, 2010)

Comment: *Garfield County would request a meeting with all parties involved prior to any activities associated with this WMMDP to discuss the following conditions that apply to the roads used to access this area.*

Response: A Condition of Approval in Appendix A specifies a meeting to be attended by representatives of Garfield County, BLM, USFS, and LEII prior to any construction activities in the West Mamm Master Development Plan area.

Comment: *All vehicles hauling materials and equipment for this WMMDP shall abide by Garfield County's oversize/overweight permit system. All vehicles requiring oversize/overweight permits shall apply for them at Garfield County Road and Bridge Department. All vehicles applying for oversize/overweight permits shall have a letter or e-mail from Laramie Energy II LLC stating said vehicles can obtain permits under their road bond on file with Garfield County.*

Response: Comment noted.

Comment: *Any pipelines or utilities that may be placed within Garfield County road right of ways would require permitting by Garfield County Road and Bridge Department and may require approval of the Board of Garfield County Commissioners.*

Response: Comment noted. The Proposed Action from LEII does not include placing pipelines or utilities in the Garfield County road rights-of-way.

Comment: *As Laramie Energy II LLC has improved the status of CR319 and Garfield County has added more miles of asphalt pavement on Cr. 319, Laramie II LLC would be asked to contribute to a dust control program on the unpaved portion and would be responsible for damage to the paved portion caused by their drilling activities in this area.*

Response: A Condition of Approval in Appendix A specifies that dust abatement measures must be in place as needed to prevent dust caused by vehicle traffic, equipment operations, or windstorm events.

ALICE GUSTAFSON, GLENWOOD SPRINGS, COLORADO (letter dated January 18, 2010)

Comment: *Considering that you on this committee likely have been given directives to push this through, I would like to suggest that you read the enclosed documents before you allow this to happen, even though the pads are located on private land. This information is not “just opinion” but based on scientific expertise in the protection of natural water sources and public health. Across the United States, gas wells using the traditional “fracking” method of retrieving natural gas have left in their wake toxic pollution to the aquifers, streams and rivers. I guess we expect that these pollutants would be washed off down the Colorado and out to sea with no residual problems. However, with the information I have provided you (gained from just Googling gas drilling problems), one can easily see that the traditional way of getting natural gas has a multitude of problems. The most important of these is the influx of carcinogens and neural toxins into our potable water source. It would be easy to turn a blind eye to these reports and to follow the propaganda of the gas corporation spokesperson, paid by the gas company. It was the same with Rocky Flats some years ago where they actually received an award for environmental management, totally ignoring the mass of plutonium gathering in the building and soils around Rocky Flats.*

I expect that you would write “opinion” next to these comments and put this letter in a pile to be bound for posterity. But, if any of you can stand up to the pressure being put on you to “get this through,” maybe you would speak for those of us who have clearly spoken out against these present practices. OSHA’s permissible exposure limit for benzene is 1 ppm (part per million). However, the National Institute for Occupational Safety and Health (NIOSH) has set a Recommended Exposure Limit of 0.1 ppm. These are very small amounts of benzene. Recent studies from China and Great Britain say that benzene can cause various hematological cancers and blood diseases at extraordinary low doses...a few ppm (see enclosed information). This is not the only toxic chemical available in fracking fluid for your drinking pleasure. Many cases of contamination to drinking water have been documented across the United States, yet we still put a blind eye to the practice here in Colorado. Methane has exploded in houses and comes out tap water faucets. People are getting neurological disorders and skin problems. The resistance too has been because the gas companies refuse to own up in what is in the fracking fluids.

I think as you are public servant, not industry servants, you owe it to our Garfield County population and everyone (including wildlife) effected by pollution of the aquifer and Colorado River to look at alternatives to fracking fluid use. In addition, we need to look to other energy extracting methods that are non-polluting, such as solar energy, which do not have such devastating effects to the public health.

Response: The Energy Policy Act of 2005 amended the Safe Drinking Water Act of 1974 to exempt “the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities” from requirements to provide a list of injected compounds. The Clean Water Act of 1977 also exempts frac fluids from its list of pollutants if hydraulic fracturing of a well has been “approved by authority of the State in which the well is located, and if the State determines that the injection... would not result in the degradation of ground or surface water resources.” It is beyond the purview of the BLM to regulate use of these fluids, or to require operators to disclose their constituents or the proportions of these compounds.

No comprehensive, up-to-date list of typical chemicals currently used in the well completion (fracing) process in western Colorado is available to BLM or the public. Compounds used, and their concentrations, are often proprietary. In general, however, fracing fluids consist of water (often including produced water that has been treated) with the addition of sand or some other material to “prop” open the newly created fractures and a surfactant to reduce the surface tension between the hydrocarbons and the rock particles between which they are trapped. Other additives may include a small amount of bleach or other compound to kill bacteria that could be present in the injected water, as a way to prevent bacterial growth from clogging the formation. A weak acid is also commonly used, but it is consumed (i.e., neutralized) during the process of commingling with the generally basic (alkaline) waters in the formation.

As stated in the EA, hydrofracturing would be conducted at 5,000 feet or more below ground surface, much deeper than any aquifers that are potentially used as water sources or that could connect with surface waters and seeps or springs. Casing and cementing programs required by BLM and COGCC are designed to protect and isolate all useable water zones and potential fresh water zones. It is highly unlikely that any shallow or deep groundwater resources would be affected, as the thick impermeable layers of rock at the top of the Williams Fork Formation would prevent water or hydrocarbons from migrating to potable water zones and prevent shallow groundwater from migrating into deeper formation water zones.

Measures would also be taken on drilling pads to prevent spills or leakage that could impact shallow groundwater aquifers. These would include lined containment berms and drain pans around produced water tanks and methanol tanks, respectively.

Along with the introduced chemicals, frac fluid is in close contact with rock during the course of the stimulation treatment and, when recovered, may contain a variety of materials occurring naturally in the gas-bearing zones. Chief among these are dissolved salts laid down with the rocks when they were deposited or migrating into the formation from other bedrock layers. Also present in trace amounts are naturally occurring chemicals, including petroleum-related hydrocarbons, dissolved metals, and radionuclides. Typically, the concentrations of the petroleum-related hydrocarbons exceed drinking water standards in the flowback water recovered during fracing, and of course salt is much higher than the drinking water standard, since the formation water is a brine. The present technical infeasibility to economically treat produced water or flowback water to drinking water standards, or for other beneficial uses, is the reason that these fluids are currently required to be disposed at an approved facility, whether an evaporation pond or reinjection into a deep formation.

STEPHAN ADAMS, MESA, COLORADO (email dated January 28, 2010)

Comment: *Please make sure that fossils are protected as required under the Paleontological Resources Preservation Act during the West Mamm Master Development Plan process. Pre-activity surveys and*

construction monitoring should be conducted by BLM-permitted paleontologists in areas likely to contain fossils.

Response: BLM has a geologist/paleontologist on its CRVFO staff to assess the paleontologic potential of an area before final planning or approval of oil and gas projects. That person is also the author of the Paleontology section of the Environmental Assessment.

BOB ELDERKIN, SILT, COLORADO (email dated February 19, 2010)

Comment: *Laramie Energy is proposing to drill up to 4 wells per section in this phase. They make one statement that this phase would determine if future wells are required. The current fracking technology would frac somewhere between 6-9 ac. This means that a lot of future wells would be needed or else a lot of gas would not be recovered. This is in violation of the Federal rules requiring all economic recovery of federal minerals. The question is would these additional wells be drilled from the proposed well pads or would additional pads be required? If additional pads are required, this would increase the surface impacts.*

Response: You apparently misunderstand the well numbers and densities being proposed. Laramie Energy II is currently proposing a 5- to 6-year development plan that involves the constructing, drilling, and completion of up to 89 Federal and Fee wells from five well pads, including three new pads and two existing pads located on private surface owned by the Johnson Family. Six wells were previously drilled on the two existing pads, bringing the total wells in the boundary area to 95 if all proposed wells are drilled. These wells are developed at a 10-acre downhole spacing.

Comment: *The proposal states that all cuttings would be removed off site except for up to 6 wells. Later it states that the cutting may be removed off site. Which would it be?*

Response: The Proposed Action from LEII states, “Dewatering systems would be used and drill cuttings for up to six wells would be buried on location in cuttings pits. The cuttings from the remaining wells would be stored on location, dried, and hauled to the Garfield County landfill or other State-approved disposal facility.”

Comment: *On page 13, it states that the fracking solution is non toxic without mentioning what chemicals are in the solution. Will the BLM in fact review the chemical contents of the fracking solution and make the determination whether or not this is true? If BLM does review the contents and some are toxic, what happens then?*

Response: The Energy Policy Act of 2005 amended the Safe Drinking Water Act of 1974 to exempt “the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities” from requirements to provide a list of injected compounds. The Clean Water Act of 1977 also exempts frac fluids from its list of pollutants if hydraulic fracturing of a well has been “approved by authority of the State in which the well is located, and if the State determines that the injection... would not result in the degradation of ground or surface water resources.” It is beyond the purview of the BLM to regulate use of these fluids, or to require operators to disclose their constituents or the proportions of these compounds.

No comprehensive, up-to-date list of typical chemicals currently used in the well completion (fracing) process in western Colorado is available to BLM or the public. Compounds used, and their concentrations, are often proprietary. In general, however, fracing fluids consist of water (often including produced water that has been treated) with the addition of sand or some other material to “prop” open the

newly created fractures and a surfactant to reduce the surface tension between the hydrocarbons and the rock particles between which they are trapped. Other additives may include a small amount of bleach or other compound to kill bacteria that could be present in the injected water, as a way to prevent bacterial growth from clogging the formation. A weak acid is also commonly used, but it is consumed (i.e., neutralized) during the process of commingling with the generally basic (alkaline) waters in the formation.

Comment: *The proposal does not discuss the pipeline plans with respect to the capacity. Will the planned pipelines be constructed before during or after drilling is completed. If before, how would needed capacity be determined? If additional wells would be drilled to fully recover most of the gas, would this require additional pipelines and surface disturbance?*

Response: An independent company, ETC Canyon Pipeline, LLC (ETC), has been approved by the BLM and USFS to install a 12-inch diameter buried steel natural gas pipeline originating in Section 29, T7S, R93W. This pipeline would be used to gather and convey natural gas production from the WMMDP area.

Comment: *There is no discussion of what vapor recovery methods would be used to eliminate vapor loss from onsite storage tanks.*

Response: The State of Colorado requires that these vapors be collected and periodically destroyed through thermal destruction (incineration).

Comment: *The proposed reclamation plan needs additional thought. On page 15 it says interim reclamation would be done within 90 days of well completion without saying which well.*

Response: The Conditions of Approval in Appendix A provides a detailed summary of the steps required for interim reclamation, including earthwork, seeding, and monitoring, and the associated reclamation deadlines. The phrase “within 90 days of well completion” cited in the comment is referring to the last well to be drilled at a pad.

Comment: *On page 16, proponent states that all areas to be reseeded would be roller packed. This is very conducive to forming a hard crust, which is very detrimental to achieving good revegetation. I would suggest this not be done or done only where specific problems direct its use.*

Response: The use of roller packing in this instance is the use of a sheep’s foot roller, which leaves pock marks in the soil, allowing seeds to fall into areas of “microtopography” where they are protected from wind and water.

Comment: *On page 16 it states, “Acceptable establishment: Acceptable level of desirable vegetation by the end of the fifth growing season.” This level is not defined and therefore could be anything. A specific value needs to be stated. Otherwise it’s one persons opinion and not measurable.*

Response: Reclamation is considered successful if it meets the objectives set forth in the Conditions of Approval as identified in the Appendix E of the GSRA Oil & Gas Leasing & Development Draft Supplemental Environmental Impact Statement (DSEIS)(BLM 1998). In summary, the objectives in Appendix E of the DSEIS, revegetation would be considered successful if an acceptable level of desirable vegetation is reached by the end of the fifth growing season. This level is determined by the CRVFO Ecologist.

PETER HART ON BEHALF OF WILDERNESS WORKSHOP, NATURAL RESOURCES DEFENSE COUNCIL, AND CENTER FOR NATIVE ECOSYSTEMS (letter dated February 20, 2010)

NOTE: Numerous footnotes provided with the comments are not copied below.

Comment 1: BLM must conduct an EIS. *The National Environmental Policy Act of 1969, as amended (NEPA)(42 USCS §§ 4321 et. seq.), generally requires a federal agency to prepare an Environmental Impact Statement (EIS) for a proposed “major Federal action[s].” See specifically 42 U.S.C. § 4332(2)(C)(i-iii). The Council on Environmental Quality regulations define a major federal action as actions with effects that may be major and which are potentially subject to federal control and responsibility. 40 C.F.R. § 1505.18. The authorization of 71 new natural gas wells along with all of the connected infrastructure, test wells, traffic, compressors, etc. within [CRVFO] promise major impacts to western Colorado’s already degraded air quality and other important public resources.*

Following paragraphs discuss the inadequacy of existing environmental analysis, a wealth of relevant new information that the BLM has not examined, the numerous connected actions that must be analyzed together with this project, and some of the environmental concerns associated with the proposed action. In light of these facts it is clear that the BLM must conduct a full EIS rather than an EA.

Response: BLM does not agree with this conclusion, which we believe overstates the impacts.

Comment 2: Any NEPA analysis must consider connected, similar, and cumulative actions, and their direct and indirect environmental consequences. *There are a host of existing projects and infrastructure in the general area that must be analyzed along with the proposed project’s environmental impacts. Council on Environmental Quality (CEQ) regulations require federal agencies to consider “connected actions,” “similar actions,” and “cumulative actions” together with “direct” and “indirect” impacts. 40 CFR § 1508.25. Connected actions are those that*

1. *“automatically trigger other actions which may require environmental impact statements,”*
2. *actions that “cannot or will not proceed unless other actions are taken previously or simultaneously,” and,*
3. *actions that are “interdependent parts” of a larger action and “depend on the larger action for their justification.”*

(40 CFR § 1508.25(a)). The CEQ regulations define similar actions as those that “have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography.” Id. The CEQ regulations also state when agencies ought to analyze such similar actions in a single impact statement. (Agencies “should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives is to treat them in a single impact statement.” 40 CFR § 15.08.25.)

While federal agencies have considerable discretion in determining the scope of a NEPA document, there are situations where an agency must consider several related actions in a single NEPA document. In Fritiofson v. Alexander, the Fifth Circuit held that in a cumulative impact analysis, an agency should consider “(1) past and present actions without regard to whether they themselves triggered NEPA responsibilities and (2) future actions that are ‘reasonably foreseeable,’ even if they are not yet proposals and may never trigger NEPA-review requirements. 772 F.2d 1225, 1245 (5th Cir. 1985). The court stated:

Sections 1508.7 and 1508.27 require an analysis, when making the NEPA-threshold decision, as opposed to the EIS-scoping decision, whether it is “reasonable to anticipate cumulatively significant impacts” from the specific impacts of the proposed project when added to the impacts from “past, present, and reasonably foreseeable future actions,” which are “related” to the proposed project. The regulation does not limit the inquiry to the cumulative impacts that can be expected from proposed projects; rather, the inquiry also extends to the effects that can be anticipated from “reasonably foreseeable future actions.”

Id. at 1243; *see also* 42 U.S.C.S. §§ 4321-4347. For both EAs and EISs, BLM’s obligation to analyze impacts extends beyond the immediate impacts of the project at hand to include the cumulative impacts of the project, taken together with the impacts of existing, proposed, or reasonably foreseeable projects, on the environment. In order to comply with these mandates, the BLM must describe and analyze impacts beyond the borders of the Glenwood Springs Field Office and beyond the list of known future gas development projects.

To ensure that combined impacts of separate activities do not escape consideration, NEPA requires BLM to consider cumulative environmental impacts in its environmental analyses. *See Davis v. Mineta*, 302 F.3d 1104, 1125 (10th Cir. 2002); *see also Grand Canyon Trust v. Federal Aviation Admin.*, 290 F.3d 339, 345-47 (D.C. Cir. 2002). NEPA’s regulations provide that “effects” includes ecological, aesthetic, and historic impacts, “whether direct, indirect, or cumulative.” 40 C.F.R. § 1508.8. “Cumulative impact,” in turn, is defined as:

...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Id. § 1508.7.

Based on these regulations, NEPA documents must provide useful analysis of past, present, and future actions. *City of Carmel-By-The-Sea v. U.S. Dept. of Transp.*, 123 F.3d 1142, 1160 (9th Cir. 1997); *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 809-810 (9th Cir. 1999). As the D.C. Circuit has held, the fact that a project may result in even a small incremental increase in the overall impacts to a resource is meaningless if “there is no way to determine . . . whether [this small increase] in addition to the other [impacts], will ‘significantly affect’ the quality of the human environment.” *Grand Canyon Trust*, 290 F.3d at 346.

It is established that the cumulative impacts analysis must include “some quantified or detailed information” since without such information it is not possible for the court or the public to be sure that the agency provided the hard look that is required of its review. *Neighbors of Cuddy Mountain v. Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1998). “The Circuit has also explained that this analysis is particularly important in an EA. That is because so many more EAs than EISs are prepared, and thus there is a higher risk of cumulative impacts resulting from the many smaller decisions.”

In this case, all related existing projects and infrastructure in the general area must be analyzed along with the proposed action regardless of whether the agency conducts an EA or an EIS. The Mamm Creek Pipeline and the test wells drilled and completed by Laramie Energy II in 2008 are just two examples. To ensure compliance with NEPA, CEQ guidance on the implementation of NEPA, and the Administrative Procedure Act (APA) the impacts of all of these projects must be analyzed together. A comprehensive

map of existing, proposed, and reasonably foreseeable facilities and infrastructure ought to be included with any analysis showing exactly what the agency has and has not analyzed.

Response: In fact, the EA did address Fee lands that required access across White River National Forest lands. This is the only connected action as we interpret it. The EA also addressed cumulative impacts.

Comment 3: This project would far exceed the current reasonably foreseeable development scenario and contribute to ongoing non-compliance with BLM guidance. *The [CRVFO's] reasonably foreseeable development scenario (RFD) for oil and gas was created as a way to anticipate or forecast the impacts drilling would have on the environment over the course of the Resource Management Plan (RMP). See BLM guidance, Instruction Memorandum (IM) 2004-089. This same BLM guidance acknowledges that environmental analysis may need to be supplemented if anticipated environmental effects from development are exceeded. Further, regulations suggest that tiering to existing analysis is inappropriate where the broad environmental impact statements are outdated and in need of supplementation. The Council on Environmental Quality (CEQ) regulations state that:*

(c) Agencies:

(1) Shall prepare supplements to either draft or final environmental impact statements if:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or

(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

40 CFR § 1502.9. The CEQ requires supplementation where "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 CFR § 1502.9(c)(1)(ii)(2003).

In order to permit well-informed management of the diverse resources under BLM purview, it is critical that the agency maintains an accurate inventory of the amount of oil and gas development and related disturbance on public lands. According to statements from both industry and the BLM, the current RFD for the [CRVFO] represents only a small fraction of the actual amount of development existing, authorized, and anticipated for the area.

We understand that the BLM is undertaking plan revisions and amendments to address this very issue. However, we are extremely concerned that the agency may not have an up to date and thorough assessment of the current situation. Obviously, if the number of wells and/or amount of surface disturbance associated with current development substantially exceeds that anticipated in the current RFD, the agency should not continue to approve applications for permits to drill (APDs), much less 71-well projects, until additional environmental analysis is completed.

Response: The RFD is nothing more than an estimate of the amount of natural gas and associated condensate that is potentially able to be recovered based on current technology and downhole spacing orders, irrespective of whatever restrictions may be attached to development of the resource by lease stipulations and conditions of approval. It does not establish a limit on the amount of development that can occur. The amount of development of Federal oil and gas wells is well within the cumulative impacts analyzed in the Roan Plateau RMPA/EIS. The new RMP revision currently underway will analyze and disclose impacts from additional development. The current plan with Amendments is sufficient for analysis of the WMMDP.

Comment 4: A new air quality analysis is required. *Again, we understand that the [CRVFO] is currently revising the RMP. We are also aware that a new air quality analysis is a significant part of that RMP revision. Until the plan is final and the analysis complete, however, one thing is clear: the agency*

has failed to adequately analyze ongoing air impacts associated with the boom of oil and gas development in the area. And, the agency cannot and should not continue to authorize ongoing development until an adequate and comprehensive analysis is complete.

Recent MDPs in the [CRVFOO] tier to the air quality impact analysis conducted for the Roan Plateau Resource Management Plan Amendment (RMPA) and the final Roan Environmental Impact Statement (EIS). "Tiering" is a widely accepted practice. It allows land managers to incorporate analyses undertaken in broader environmental impact statements into narrower site-specific analyses to avoid unneeded repetition. See 40 CFR 1508.28. Agencies cannot, however, tier to decisions that do not fulfill requirements of the National Environmental Policy Act (NEPA) or authorize activities in violation of other federal or state laws.

In this case, the impacts of oil and gas development on air quality were never adequately studied or disclosed in the Roan RMPA or the final Roan EIS. The cumulative impact analysis undertaken by BLM in the Roan EIS failed to take into account reasonably foreseeable development. The modeling undertaken in that document did not account for the area's dramatically expanding private oil and gas development. Important Class 1 airsheds that are likely to be impacted by increased oil and gas development were inexplicably omitted from that analysis. Further BLM failed to use statutory baseline dates to determine compliance with Prevention of Significant Deterioration (PSD) increments. Neither the RMPA nor the EIS quantified ozone emissions. Neither document analyzed whether ozone pollution from the proposed development would violate Ozone National Ambient Air Quality Standards (NAAQS). And both documents failed to adequately assess impacts that ozone pollution would have on the environment. Further, there are questions about the applicability of any air quality analysis conducted specifically for the Roan Planning area to projects outside the boundaries of that planning area. These are just a few of the inadequacies in the Roan analysis.

The BLM simply cannot tier to the Roan RMPA and EIS. The analysis undertaken in that document failed to comply with the mandates of NEPA and may lead to violations of the Clean Air Act (CAA). The agency must prepare a new and adequate analysis detailing impacts that this project will have on air quality.

Response: The data sources and assumptions used for the drill rig and construction-related emissions described in the EA under the heading "Affected Environment and Environmental Consequences" are listed in the references for that section.

"Criteria pollutants" (PM₁₀, PM_{2.5}, CO, SO₂, and NO₂), hazardous air pollutants (benzene, ethylbenzene, formaldehyde, hydrogen sulfide, toluene, and xylenes), sulfur and nitrogen deposition, acid neutralizing capacity, and visibility screening were all discussed (and generally aggregated) under "Affected Environment and Environmental Consequences," where it states that the conclusions were drawn from the Roan Plateau RMPA/EIS (BLM 2006:4-26 to 4-37). Analysis was completed with regard to greenhouse gas emissions, including both near-field and far-field analyses. The refined visibility analysis indicated a "just noticeable" impact on visibility for one day each at two Class I areas (Black Canyon of the Gunnison National Park and the Mt. Zirkel Wilderness). For the other pollutants and greenhouse gases analyzed, the implementation of oil and gas development under the Roan Plateau RMPA/EIS would have either no or negligible long-term adverse impacts on air quality or greenhouse gas concentrations. Since the Proposed Action is within the scope of the reasonable foreseeable development scenario analyzed in that document, it is anticipated that the Proposed Action would be unlikely to have adverse effects on air quality. The Roan Plateau RMPA/EIS also serves as a cumulative effects analysis with regard to air pollutant emissions.

Ozone models are designed for urban areas, are very expensive and time-consuming to implement, and are not considered applicable for use in rural areas such as Garfield County. Ozone impacts can instead

be estimated via the visual screening analysis performed as part of the Roan Plateau RMPA/EIS, which used VOC and NO_x screening tables developed by Scheffe (1988). These VOC/NO_x screening tables have been used in other EIS analyses, and the BLM supports their use in this application. In recognition of the importance of limiting ozone concentrations, monitoring programs have been implemented throughout Garfield and surrounding counties by Garfield County administrators, the U.S. Forest Service, and at least one oil and gas operator.

Dust suppression measures are included in the Standard Conditions of Approval (Appendix A). Use of electric vehicles and solar and wind power are not feasible requirements for construction of pads, roads, and pipelines, since drilling rigs and other equipment used for these purposes does not exist that utilizes such alternative energy sources. The GSEO currently encourages operators to utilize green completions and to capture greenhouse gas emissions and hazardous air pollutants (HAPs). It is currently not possible to capture emissions from most equipment in a form that could be contained and transported offsite.

Based on the above, BLM disagrees with the conclusion reached in the comment. The new air quality modeling effort underway in connection with the RMP revision for the CRVFO will address future development under the selected alternative. In the meantime, BLM believes that the current modeling under the Roan RMPA/EIS is adequate for individual MDP projects.

Comment 5: Any analysis must consider ground level ozone. *Oil and gas extraction, processing, transportation and use contribute to ground level ozone via the emission of ozone precursors, nitrogen oxides (“NO_x”), carbon monoxide and volatile organic compounds (“VOCs”). Ozone at the ground level is a dangerous pollutant which causes a variety of adverse impacts to human health, wildlife, natural ecosystems, and agriculture. There is significant new information about impacts from ozone that BLM must analyze in a NEPA document prior to authorizing additional oil and gas development.*

In a February 28, 2006 Federal Register Notice, EPA announced the release of EPA's final document, Air Quality Criteria for Ozone and Other Photochemical Oxidants. This Air Quality Criteria contains significant new information that BLM has not previously considered in any effective RMP or RMP amendment. BLM must consider this information before authorizing more natural gas developments. This new scientific information must be analyzed under NEPA regardless of any potential Clean Air Act process that may occur. See e.g. UPROSE et al. v. NYPA et al., 729 N.Y.S.2d 42 N.Y.A.D. 2 Dept., 2001.

Furthermore, in a March 27, 2008, Federal Register Notice, EPA announced that it had revised the National Ambient Air Quality Standard (“NAAQS”) for ozone down to 0.075 parts per million and creating a new rounding convention so that 0.076 parts per million is above the new NAAQS. EPA is now proposing to tighten that limit to a range of 60-70 ppb to align with the level scientists say is needed to safeguard against increased respiratory diseases, particularly in children and the elderly. This is also significant new information which BLM has not considered but must prior to authorizing this project.

The failure to assess project impacts to ozone is concerning given that oil and gas development has been linked to exceedances and in some cases violations of ozone NAAQS. In the Denver metro area, oil and gas developments in Weld County have been required to control flash emissions from atmospheric condensate tanks, controls emissions from glycol dehydrators, and control emissions from compressor engines to protect ozone NAAQS. In other parts of the west, oil and gas development has been linked to exceedances of ozone NAAQS, including in southwestern Wyoming, an area of booming oil and gas drilling.

The EPA and states have made clear that ozone is a concern when it comes to oil and gas drilling and production activities EPA is also in the process of reviewing and revising the following new source performance standards (NSPS) and national emission standards for hazardous air pollutants (NESHAP)

under sections 111 and 112 of the Clean Air Act (CAA): the NSPS for Equipment; Leaks of VOC from Onshore Natural Gas Processing; (40 CFR part 60, subpart KKK); the NSPS for Onshore Gas Processing; SO₂ Emissions (40 CFR part 60, subpart LLL); the NESHAP for Oil and Natural Gas Production Facilities (40 CFR part 63 subpart HH); and the NESHAP for Natural Gas Transmission and Storage Facilities (40 CFR part 63, subpart HHH).

Finally, a recent study in the Journal of Air and Waste Management indicates a clear potential for oil and gas development to negatively affect regional ozone concentrations in the western United States, including several treasured national parks and wilderness areas in the Four Corners region. The study concludes that that accelerated energy development in this part of the country will worsen existing problems and further degrade regional air quality.

Because BLM has not considered this new information and because the agency has never taken a hard look at many of the air quality impacts of ongoing development, the BLM cannot authorize additional development until an adequate analysis has been conducted. Children and others who develop asthma, have asthma attacks or even die will gain no comfort by the thought that the problem will eventually be addressed. BLM cannot continue to authorize natural gas development until it has fully analyzed the cumulative impact of its proposed action considering the new, significant information on ground level ozone and proposed mitigation.

Response: See response to previous comment.

Comment 6: Any Analysis must aggregate interrelated and adjacent emission sources. *BLM must ensure compliance with Prevention of Significant Deterioration (PSD) requirements by aggregating interrelated and adjacent sources in any analysis. PSD regulations at 40 CFR § 51.166(b)(5) define a stationary source as, "any building, structure, facility, or installation which emits or may emit a regulated NSR pollutant." Regulations at 40 CFR § 51.166(b)(6) further define "building, structure, facility, or installation" as "all of the pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control)[.]" The regulations further state, "Pollutant emitting activities are considered part of the same industrial grouping if they belong to the same 'Major Group' (i.e., which have the same first two digit code) as described in the Standard Industrial Classification Manual[.]"*

In this case, BLM must ensure that emissions from proposed gas wells are aggregated together with other interrelated and adjacent sources and/or other sources owned or under common control by Laramie Energy II, LLC and Laramie Energy affiliates. This is the only way to ensure compliance with PSD regulations and the Colorado State Implementation Plan (SIP). The proposed wells and downstream compressor stations and/or other pollutant emitting activities are all interrelated, adjacent, and under common ownership or control. Furthermore, they are all part of the same industrial grouping. According to the Standard Industrial Classification Manual, producing natural gas wells and related facilities fall under Major Group 13, or "Oil and Gas Extraction."

With regard to the adjacency of these developments, although the Environmental Protection Agency has noted that the distance associated with "adjacent" "must be considered on a case-by-case basis," the agency has noted that two pollutant emitting activities that are interdependent operations under common control can be considered adjacent when they are upwards of 20 miles apart or even greater. EPA noted that in relation to two interdependent facilities in Utah 21.5 miles apart, "the lengthy distance between the facilities 'is not an overriding factor that would prevent them from being considered a single source.'"

Response: See response to earlier comment.

Comment 7: BLM must analyze possible impacts to Class 1 airsheds. *The Clean Air Act includes specific protections for visibility in the nation’s wilderness areas. The Act “declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution.” 42 U.S.C. § 7491(a)(1). Mandatory federal Class I areas include national parks (over 6,000 acres) and wilderness areas (over 5,000 acres). 42 U.S.C. § 7472(a). Class I areas that may be impacted by the proposed development include: Maroon Bells/ Snowmass, Eagle’s Nest, and Flat Tops.*

Response: See response to earlier comment.

Comment 8: Any analysis must consider greenhouse gas emissions and global warming contributors. *BLM must comply with Department of Interior Secretary Order # 3226. This order provides:*

Each bureau and office of the Department will consider and analyze potential climate change impacts when . . . making major decisions regarding the potential utilization of resources under the Department’s purview. Departmental activities covered by this Order include . . . planning and management activities associated with oil, gas and mineral development on public lands[.]

This project will contribute to climate change in a variety of ways. Contributions include emissions of carbon dioxide and nitrous oxides from mobile sources during exploration; the emissions of carbon dioxide, carbon monoxide, nitrous oxides and methane during extraction, processing, and transportation from drilling, extraction and processing equipment, such as drilling rigs, compressors, pumps and other equipment; the emissions of methane during extraction, processing and transportation from escaped “natural gas”; and the emissions of carbon dioxide, carbon monoxide, nitrous oxides and methane during the use of the extracted oil and gas such as the emissions of carbon dioxide, carbon monoxide, nitrous oxides and methane from natural gas fired power plants and the emissions of carbon dioxide, carbon monoxide and nitrous oxides from mobile sources burning natural gas or gasoline that comes from petroleum. Any analysis must consider these contributions and a make well founded conclusion on their significance.

In light of the NEPA requirement that agencies take a hard look at new information or circumstances concerning the environmental effects of a federal action, we have included a number of climate change related references at the end of this document. We ask that the BLM consider those resources in analyzing the likely impacts of the proposed action. We further recommend that the Glenwood Springs Field Office undertake a thorough analysis of climate related impacts associated with ongoing oil and gas development in the revision of their RMP.

Response: The BLM recognizes and discloses the potential for climate change to have significant impacts on precipitation, snowmelt, and other aspects of the landscape in the western U.S., as well as the scientific consensus that increased levels of greenhouse gases (GHGs) are causing the current global warming trend. However, as stated in the EA’s analysis of air quality impacts:

The assessment of the effects of GHG emissions on climate change remains in its formative phase; therefore, it is not yet possible to know with certainty the net impact to climate from GHGs produced globally over the last century or from those produced today. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts of climate change on the specific area of the Proposed Action. In addition, while any oil and gas leasing or development projects may contribute GHGs to the atmosphere, these contributions would not have a significant effect on a phenomenon occurring at the global scale believed by experts to be due to more than a century of human activities.

Comment 9: Any analysis must consider impacts to wildlife species, including T&E and sensitive and special-status species and impacts to habitat. *Our preliminary screen of the project area shows overlap with lynx habitat. In fact, the project area overlaps with a BLM mapped lynx analysis unit. The area also provides habitat for black bear, turkey, elk (including elk production and migration), moose, mountain lions, and mule deer. The area has also been identified as part of the Roan network conservation area by the Colorado Natural Heritage Program (CNHP) and CNHP has identified the importance of the area as montane riparian forest. There are probably additional wildlife resources that we haven't identified that must be studied in detail. Importantly, all of these resources are increasingly impacted by oil and gas development. The impacts to these resources should be analyzed on a meaningful and broad scale that considers trends throughout the Colorado River corridor, throughout the [CRVFO], and throughout the region.*

Response: Impacts to special-status and other wildlife and their habitats are addressed in the EA in the sections on Migratory Birds, Special Status Species, Aquatic Wildlife, and Terrestrial Wildlife. BLM submitted a Biological Assessment (BA) to the USFWS for the Canada lynx. In the BA, BLM reached an effects determination of “May Affect, Not Likely to Adversely Affect.” The USFWS issued a concurrence letter dated May 12, 2010, agreeing with BLM’s determination.

Comment 10: Any analysis must consider impacts to scenic values. *FLPMA specifically identifies “scenic value” as a resource of BLM lands for purposes of inventory and management. 43 U.S.C. § 1711(a). The unspoiled viewsheds of lands with wilderness characteristics generally provide spectacular viewing experiences. The scenic values of these lands will be severely compromised if destructive activities or other visual impairments are permitted through oil and gas development. For example, air pollution from compressor stations include precursors to ozone, which when combined with the dust from truck traffic on roads can decrease visibility and degrade scenic quality. Such impacts must be accounted for and scenic values protected. Another example may be the unsightly impact of sprawling oil and gas infrastructure fragmenting pristine and pastoral viewsheds. The Mamm Creek area is particularly susceptible as it is one of the most beautiful backdrops in the Colorado River corridor.*

Response: The EA includes a section on Visual Resources, which includes scenic value.

Comment 11: Any analysis must consider human health impacts. *- Protecting and promoting human health and well-being is a fundamental requirement of NEPA. The Act requires federal agencies to consider the effects of their policies and programs on the “human environment.” 42 U.S.C. § 4332. In implementing NEPA, the BLM is obligated to analyze and disclose health impacts associated with proposed actions. The increasing awareness that oil and gas development may have significant human health impacts deserves analysis. Since this analysis has not occurred at a programmatic level within the [Colorado River Valley] Field Office or the Grand Junction Field Office, the agency must consider the impacts of individual projects when authorizing further oil and gas development.*

The fundamental purpose of NEPA is:

to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

42 U.S.C. § 4321 (emphasis added). Additional objectives of the statute include “[assuring for] all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings” and “[attainment of] the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences. 42 U.S.C. § 4331.

In creating the CEQ, NEPA tasked this new body with developing and recommending to the President:

national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation.

42 U.S.C. § 4344. Federal regulations on the implementation of NEPA clearly require analysis of health impacts by defining “effects” to be analyzed as: “ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative.” 40 C.F.R. § 1508.8. Federal regulations further suggest that the significance of a proposed action must include analysis of effects to public health:

(b) Intensity: This refers to the severity of an impact...The following should be considered in evaluating intensity:

(2) The degree to which the proposed action affects public health or safety.

40 C.F.R. 1508.27.

Senate debates on NEPA support the assertion that health was a central objective of the Act. Consider, for example, comments from Senator Henry Jackson:

When we speak of the environment, basically, we are talking about the relationship between man and these physical and biological and social forces that impact upon him. A public policy for the environment basically is not a public policy for those things out there. It is a policy for people.

Hearings on S. 1075, S. 237, and S. 1752, Senate Committee on Interior and Insular Affairs, 91st Cong., 1st Session. 118 (1969).

Finally, NEPA section 204 charges the CEQ with the objective of fostering and promoting environmental quality as a means to meet the health objectives of the Nation. 42 U.S.C. § 4344. The health objectives of the Nation were promulgated by the U.S. Department of Health and Human Services in Healthy People 2010 report. The report articulates the Nation’s health priorities as: 1) increasing quality and years of healthy life, and 2) eliminating health disparities.

Clearly, then, agencies charged with implementation of NEPA have an obligation to analyze and disclose to the American people adverse health impacts resulting from federal actions. With increasing concern in western Colorado, and everywhere oil and gas extraction occurs, that oil and gas development may bring with it a host of unknown and undisclosed health impacts the BLM must study, disclose, and attempt to minimize these impacts.

Response: BLM believes that human health and the environment are adequately addressed in the EA and in the RMP/EIS under which BLM plans and approves oil and gas project.

Comment 12: Best management practices. *To the extent that they are being used, we commend the BLM on the use of the following best management practices (BMPs). To the extent that they are not used in this project we suggest that the BLM mandate the following [list included with comment]:*

Response: Thank you for your suggestions. The approved plan will incorporate such BMPs and mitigation measures as BLM concludes is appropriate and within its regulatory authority. Recognize that the State of Colorado also imposes certain restrictions on oil and gas development that are beyond or in addition to those within BLM’s authority, particularly for projects on Fee lands, such as the WMMDP.

APPENDIX C

13-POINT SURFACE USE PLAN OF OPERATIONS SUBMITTED BY LARAMIE ENERGY II, LLC.

West Mamm Master Development Plan (WMMDP)

Federal Wells Drilled on Private Lands:

<u>Pad</u>	<u>Wells</u>	<u>QtrQtr</u>	<u>Sec</u>	<u>TwN</u>	<u>Rng</u>	<u>PM</u>	<u>Lease</u>
Johnson 32-03	9	TR66	29	7 S	93W	6 th	COC67149
			32	8S	93W	6 th	COC73256
Johnson 05-03	8	TR40	5	8 S	93 W	6 th	COC67150
Johnson 05-05*	18	TR40	5	8 S	93W	6 th	COC67149
							COC67150
Johnson 05-06	19	TR40	5	8 S	93 W	6 th	COC67150
Johnson 05-07*	14	TR40	5	8 S	93W	6 th	COC67150

* Existing Pad

Garfield County, CO

Leases:

COC67149 (20 Acres)
COC67150 (660 Acres)
COC73256 (61.7 Acres)

Communitization Agreement:

COC73718 (Sec.5, T8S, R93W)

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LARAMIE ENERGY II, LLC

Johnson 32-03 Pad – 17 Wells
Johnson 5-03 Pad – 18 Wells
Johnson 5-05 Pad – 18 Wells
Johnson 5-06 Pad – 22 Wells
Johnson 5-07 Pad – 14 Wells

Garfield County, Colorado

Lease No. COC67149, 67150, and 73256

MULTI-POINT SURFACE USE AND OPERATIONS PLAN

1. Existing Roads

For existing and proposed access roads refer to the “Access Road” and “Vicinity” exhibits.

To access the proposed project area, travel south from the Rifle, Colorado exit on Interstate-70, turn left on Airport Road and continue on until Airport Road intersects or becomes West Mamm Creek road (~1.8 miles). Continue on ~0.8 miles to the intersection of CR319. Continue south on CR319 approximately 8.0 miles until it becomes FSR818. Continue on FSR818 ~3.7 miles to the gated private property where FSR818 ends.

Heavy trucks would use the Garfield County haul routes identified on the County website to access the project area.

In 2008, LEII worked with the White River National Forest to obtain a Road Use Permit for FSR818 and also a Special Use Authorization for a gas gathering line and water line through forest lands. CR319 and FSR818 were designed, engineered, and constructed or reconstructed to USFS standards. LEII also worked with the private landowner to design and construct access roads, gas and water gathering lines through the private lands. The construction on the private land included two low-water crossings across West Mamm creek that were designed, engineered, and constructed. This work effectively put the infrastructure into place to develop the Federal and Mineral acreage with minimal additional new road construction.

2. Planned Access Roads:

- a. Any new road construction would conform to recommended standards outlined in The Oil and Gas Gold Book-**Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development** (BLM and USFS, 2006) and BLM Handbook 9113 (Roads Manual). **The centerline of the right-of-way and the exterior limits would be clearly flagged prior to any construction activity.**
- b. A copy of these stipulations, including exhibits and the Plan(s) of Operation, would be readily available at the project area and reviewed with persons directing equipment operation.

- c. When saturated soil conditions exist on or along the right-of-way route, construction would be halted until soil material dries out or is frozen sufficiently for construction to proceed without undue damage and erosion to soils.
- d. All new access roads would be designed and constructed by the crown and ditch method. The roads would have a 16 to 24 foot running surface with 4 feet on each side for borrow ditch. The road disturbed width would be determined by the topography. Construction would be accomplished to minimize any disturbance yet construct a travel way that is both safe and structurally sound. The travel way would be topped with an initial minimum gravel application of 6" of 3" minus gravel. Re-surfacing would be applied with the onset of road damage (displaced or rutted roadbed).
- e. LEII policy is to implement the use of the existing vegetation and topography to minimize the visual and surface disturbance impacts to the environment. Any vegetation that would require removal would be stored and be redistributed over the cut and fill slopes after re-seeding. Some of the vegetation debris would be placed at the toe of the fill slopes to be used for stormwater management.
- f. The topsoil would be stripped to minimum depth of 6 inches. Or lacking top soil, the top 6" of soil would be stripped and stockpiled separate from other spoils to ensure soil horizons are not blended and the fertility of the topsoil layer is not compromised. Under no circumstances, would the topsoil be used for construction purposes.
- g. Culverts would be installed at drainage crossings and would pass a 25-year or greater storm event. Laramie would submit an ACOE 404 permit under Laramie's nationwide bond for any crossings that are determined to be navigable waters. Best Management Practices as outlined in Laramie West Mamm Project Stormwater Management Plan (CDPHE Certification Number COR-03E157) would be implemented at each drainage crossing and for the entire length of the road where deemed necessary to comply with State of Colorado Stormwater requirements.
- h. LEII would be responsible for continuous inspection and maintenance of the access road. LEII would conform to a schedule of preventive maintenance, which at a minimum, provides for the following corrective measures on as needed basis. (Problem areas would be corrected as needed.)
- i. Road surface grading and surface aggregate replacement.
- j. Relief ditch, culvert cleaning and cattle guard cleaning and sign maintenance.
- k. Erosion control measures for cut and fill slopes and all other disturbed areas.
- l. Road and slope stabilization measures as required. The road would be maintained to the standards required for the construction of the road until final abandonment and rehabilitation takes place.
- m. Stormwater Best Management Practice (BMP) maintenance.
- n. Dust abatement would be applied as needed or if requested by the BLM. Level and type of abatement (watering, application of various dust suppression agents, surfacing) would depend on the conditions. Laramie would incorporate sufficient dust abatement to prevent any heavy plumes of dust from construction or road use.

- o. Weed Control. Weed monitoring and reclamation measures would be continued on an annual basis, or more frequently, if necessary, throughout the life of the project.
- p. All equipment and vehicles would be confined to the access roads, pads and areas specified in the site-specific APDs. The proposed new access and footages are included in Table 1.

3. Location of Existing Wells

The Colorado Oil and Gas Conservation (COGCC) identified 12 (Including 9 LEII) oil and gas wells in various states of activity within one mile of the WMMDP boundary as of September 28, 2009. The “Well Vicinity Maps” for each well pad illustrate the location of individual well sites as well as multi-well locations.

Table 1. Proposed Well Pads, Roads, and Pipelines						
Well Pad	Lease	Legal Description T7S, R 93W	Surface	Short Term Acres +-	Long Term Acres +-	Remarks
Johnson 32-03	FEE	Tract 66, Sec.32	Private	3.2	1.2	
	COC79325					
	COC67149					
		T8S, R93W				
Johnson 5-03	FEE	Tract 40 Sec. 5	Private	3.2	1.2	
	COC67150					
Johnson 5-05	FEE	Tract 40 Sec. 5	Private	4.2	1.2	Pad Existing
	COC67149					CO140-08-117(CX)
	COC67150					
Johnson 5-06	FEE	Tract 40 Sec. 5	Private	3.7	1.2	
	COC-67150					
Johnson 5-07	FEE	Tract 40, Sec. 5	Private	4.7	1.2	Pad Existing
	COC-67150					CO140-08-117(CX)
Sub-Total			Private	19.0	6.0	
Well Pad	Road miles/ft.		Figure A	50 feet	30 feet	Remarks
Johnson 32-03	0.01	60	See Figure A	0.07	0.04	
Johnson 5-03	0.01	50	See Figure A	0.06	0.03	
Johnson 5-05	0.19	980	See Figure A		0.67	Reclaimed to 30' (08)
Johnson 5-06	0.04	230	See Figure A	0.26	0.15	
Johnson 5-07	1.30	6,850	See Figure A		4.69	Reclaimed to 30'(08)
Subtotal	1.55	8,170		0.39	5.58	
Pipelines*	Length miles/ft					
Johnson 32-03	0.01	60	See Figure A	Private	See Note	
Johnson 5-03	0.01	50	See Figure A	Private	See Note	
Johnson 5-05	0.19	980	See Figure A	Private	See Note	Existing in Place
Johnson 5-06	0.04	230	See Figure A	Private	See Note	
Johnson 5-07	1.30	6,850	See Figure A	Private	See Note	Existing in Place
TOTAL	1.55	8,170				
Note: Pipeline buried adjacent to roads. Disturbance included in Road Totals						
GRAND TOTAL			Private	19.39	11.58	59.7 % Interim
<p>Notes: Short-term disturbance for road width includes installation of natural gas and produced water pipelines in shoulder of access road prior to final grading. Disturbance is estimated at an average of 50 feet from toe of fill to top of cut. Long-term disturbance is estimated at 30 feet (including running surface and borrow ditches).</p>						

The “Well Vicinity Maps” also illustrate domestic water sources within one mile of the West Mamm Project area. LEII implements a ground-water sampling and monitoring program to conduct pre-drill and post-drill sampling of any wells within one-half mile of any drilling activity. The purpose of the program is to delineate the existing or background ground-water quality and quantities in areas of upcoming Laramie Energy II operations within the West Mamm project area. The water samples are gathered by an independent contractor, analyzed, and the results submitted to the Colorado Oil and Gas conservation Commission as well as the owners of the wells. If requested, this data may be supplied to the BLM.

4. Location of Existing and/or Proposed Production Facilities and Production Gathering and Service Lines:

A. Existing Production Facilities and Gathering Lines

1. Currently, the Johnson 5-05 pad is the only location with existing production facilities (Tanks, Separators, and Meters) were installed by LEII in 2008.
2. Gathering lines are installed to the Johnson 5-05 as well as the Johnson 5-07 pad.. These lines are 6” welded steel and tie into the 8’ gathering line that runs the length of the project area. To date, the production from this acreage is gathered by EnCana in the SENE Sec. 29, T7S, R93W. LEII is in the process of signing a gathering agreement with Energy Transfer (ETC) for long term gathering.

B. Production Facilities

1. See the “Production Layout” exhibit for a production facilities schematic. All permanent (onsite for six (6) months or longer) structures constructed or installed would be painted a flat, non-reflective, earth tone color to match the standard environmental colors or colors requested by the surface owner. Facilities required to comply with the Occupational Safety and Health Act (OSHA) may be excluded. Production facilities would be placed to allow maximum reshaping of cuts and fills.
2. If a tank battery is constructed, a metal containment ring of sufficient capacity to contain 1 ½ times the storage capacity of the largest tank would surround it. All load lines and valves would be placed inside the metal containment ring surrounding the tank battery. Guards would be installed around the well head(s) for protection of wild life and livestock.
3. All site security guidelines identified in 43 CFR 3162.7 regulations would be adhered to.
4. All off-lease storage, off-lease measurement or commingling on-lease or off-lease would have prior written approval from the Authorized Officer.
5. All product lines entering and leaving hydrocarbon storage tanks would be effectively sealed in accordance with 43 CFR 3164.1 Onshore Oil and Gas Orders No. 3 (Site Security).
6. Gas meter runs for each well would be located within one hundred (100) feet of the wellhead. The gas flowline would be buried from the wellhead to the meter and downstream for the remainder of the pad. Meter runs would be housed and/or fenced.
7. The oil and gas measurement facilities would be installed on the well locations. The oil and gas meters would be calibrated in place prior to any deliveries. Tests for meter accuracy would be conducted monthly for the first three (3) months on new meter installations and at

least quarterly thereafter. The Authorized Officer would be provided with a date and times for the initial meter calibration and all future meter proving schedules. A copy of the meter calibration report would be submitted to the Field Office. All meter measurement facilities would conform to the API standards for liquid hydrocarbons and the AGA standard for natural gas measurement.

8. To minimize the amount of vehicular traffic to and from the project site, remote telemetry equipment would be installed at each multi-well pad.

C. Gathering Lines

1. In 2008, LEII worked with the White River National Forest to obtain a Road Use Permit and also a Special Use Authorization for a gas gathering line and water line through forest lands. CR319 and FSR818 were designed, engineered, and constructed or re-constructed to USFS standards. LEII also worked with the private landowner to design and construct access roads, gas and water gathering lines through the private lands. The construction on the private land included two low-water crossings across West Mamm creek that were designed, engineered, and constructed. This work effectively put the infrastructure into place to develop the Federal and Private Mineral acreage with minimal additional new road construction or gathering lines.
2. All new lines installed would be fusion bonded welded steel with a diameter up to 8". All lines would follow the new or existing road access routes in order to minimize disturbance as much as possible.
3. LEII's policy is to install gathering lines in the cut edge of the access road just above the borrow ditch or in the access road prior to the access road being contoured, final graded and graveled. By initially "pioneering" the road in to its disturbance area and then burying the pipe, Laramie can contour the cut and fill slopes over the lines and interim reclaim. By using this method Laramie reduces any other disturbance both visually and surface wise that might occur if the line is buried outside the road corridor. This procedure has worked successfully in other areas, including the White River National Forest and Helmer Gulch.
6. Lines would be buried to a depth up to 60 inches (below frost level) in the roadway and at road crossings. These are minimum depths and the pipe would be installed to a depth that can safely accommodate existing land and road uses. The access road disturbance would be used as part of or the entire disturbance for the pipeline and would be the working side of pipeline construction. Once the pipeline is in place, the road shoulder ditch would be shaped, and lined with gravel.
7. Open trenches would be maintained in a safe condition. As necessary to maintain safety, trenches adjacent to roads would be covered and/or warning barriers erected upon completion of daily construction or at anytime personnel are not present at the construction site.
8. Pipeline warning signs would be installed along the pipeline easements within ninety days of construction completion and prior to use of the pipeline for transportation of product. Pipeline warning signs would be installed at all road crossings. For safety purposes each sign would be visible from marker to marker, permanently marked with the right-of-way serial number and would clearly identify the underground location, owner and purpose (product) of the pipeline.

9. In addition to the installation of the gas gathering lines, LEII intends to install a 4" poly pipe in the common trench to allow for the capability to move produced water, completion water, or drilling water throughout the field. The lines would be laid parallel to the gas lines separated by sand bags or some other adequate means of separation. The lines would be installed in anticipation of a future water management system which currently LEII is exploring different technologies.
- D. LEII would protect all survey monuments, witness corners, reference monuments and bearing trees in the affected areas against disturbance during construction, operations, maintenance and termination of the facilities authorized herein.

LEII would immediately notify the Authorized Officer (Colorado River Valley Field Office) in the event that any corners, monuments or markers are disturbed or are anticipated to be disturbed. If any monuments, corner or accessories are destroyed, obliterated or damaged during construction, operation or maintenance, LEII would secure the services of a Registered Land Surveyor to restore the disturbed monuments, corner or accessories, at the same location, using surveying procedures found in the Manual of Surveying Instructions for the Survey of public Lands of the United States, latest edition. LEII would ensure the Registered Land Surveyor properly records the survey in compliance with Colorado Revised Statutes 38-53-101 through 38-53-112 (1973) and LEII would send a copy to the Authorized Officer.
- E. During drilling and subsequent operations, all equipment and vehicles would be confined to the access road easements and any additional areas as specified in the Application for Permit to Drill.
- F. Topsoil would be stripped to a minimum depth of 6". Topsoil storage would be no deeper (higher) than the minimum height needed for storage without creating a large feature. If topsoil is less than 6", then the top 6" of surface material would be stripped and piled as described. The topsoil piles would be seeded within 1 week of completed pad construction.
- G. The cut and fill slopes would be protected against riling and erosion with measures such as water bars, lateral furrows, or other measures approved by the Authorized Officer. Weed free straw bales or a fabric silt fence would be used at the toe of the fill slopes with brush/slash incorporated below the fence.
- H. LEII or its successors would be responsible for road maintenance for the life of the project.

5. Location and Type of Water Supply:

Water for the well would be trucked or pumped from approved sources. Water would be purchased from a private entity from their water well or adjudicated source from the Colorado River. The Colorado Division of Water Resources requires the owner to meter the volume pumped and augment all diversions with industrial contracts with the Bureau of Reclamation. Drilling, completion, and produced water would be recycled and used.

6. Source of Construction Materials:

No construction materials are needed for drilling operations. Surface and subsoil materials within the proposed construction areas would be used. Gravel for the access roads, facilities site and well pad would be obtained from private sources at the time of construction. The surface disturbance for the new access roads, facilities, and well pads are on private surface. LEII has negotiated and recorded a Surface Use and Right of Way Agreement with the landowner.

7. Methods of Handling Waste Disposal:

A LEII's plan is to drill the wells in the West Mamm project area with a dewatering system with no need for a reserve pit. Drilling fluids are recycled and re-used with cuttings being de-watered and captured in a catch pan and removed to the cuttings pit.

Produced water is recycled and used in LEII's drilling operations after completion of a well.

Produced fluids—liquid hydrocarbons produced during completion operations would be placed in test tanks on the location.

A permanent 300-400 bbl steel tank would be installed next to the production facilities to contain any produced water (if not used for drilling or completion) for the duration of the well. The produced water would be disposed of at one of the following approved disposal facilities:

- a. RNI (Dalbo) Evaporation Facility – Rangely, CO
- b. Danish Flats Evaporation Facility – Cisco, Utah (22 miles west of Colorado on Interstate 70).

Cuttings: Will be contained on location in the cuttings pit.

Drilling fluids and chemicals: These are recycled through the dewatering system, treated and re-used.

Sewage: Chemical toilets or an enclosed sewer system would be used. Contents would be disposed of at an approved disposal facility. No bore holes would be used for disposal of waste materials. Human waste would be contained and would be disposed of at an approved sanitary landfill.

Garbage and other waste materials: All garbage and trash would be stored in a totally enclosed trash container and removed and deposited in an approved sanitary landfill within one week following termination of drilling operations. No garbage or trash would be disposed of in the reserve pit. The well site and access road would be kept free of trash and debris at all times.

LEII complies with those standards set forth by CERCLA and RICRA for the disposal of hazardous waste materials from oil and gas development. Also, hazardous substances specifically listed by the EPA as a hazardous waste or demonstrating a characteristic of a hazardous waste would not be used in drilling, testing, or completion operations.

8. Ancillary Facilities

There are no ancillary facilities planned beyond the standard drilling operations equipment at this time. Standard Drilling Operation Equipment on location includes: Drilling rig with associated equipment; living facilities for company representative, tool pusher, mud logger, directional driller; toilet facilities; and trash container(s).

9. Well site Layout

The "Well Location Map" shows the surface location and bottomhole location. The "Pad Layout" illustrates the site and topography.. The "Well Vicinity Map" shows the water and gas wells within one-mile of the pad location. The "Production Schematic" illustrates the surface pad layout and shows the proposed pipeline and access route. The "Multi-Well Plan shows the lease boundaries and the wells planned from the location. Surface locations were surveyed and oriented to accommodate the topography of the project area as well as to maximize the number of wells that could be drilled.

LEII intends to test the limits of the directional drilling capabilities within the West Mamm Project area by attempting to directionally drill some wells with a horizontal distance of up to 3000'. Torque and differential sticking (drag) of the drill string becomes a serious concern drilling this distance. In addition, completion of the well becomes an issue when installing the production string (2 3/8" steel pipe) in the 4 1/2" casing. Running the production string through the bends in the casing becomes increasingly more difficult as the angles increase. The difficulty arises when the production string and tools would not bend enough to get past the angle of the casing at the top of the producing zone.

The following applies to all surface locations:

- A. The working surface of each well pad would be about 250 feet by 450 feet (2.6 acres). The total disturbed area for each pad is estimated to be 3.2- 3.7 acres or less and includes cut and fill slopes, soil stockpile, and surface water diversions/BMPs.
- B. The topsoil would be stripped to minimum depth of 6 inches. Alternatively, lacking top soil, the top 6" of soil would be stripped and stockpiled separate from other spoils to ensure soil horizons are not blended and the fertility of the topsoil layer is not compromised. Under no circumstances, would the topsoil be used for construction purposes.
- C. Fill slopes would be armored with excavated rock and/or slash vegetation as well as having silt fences installed to reduce the velocity of rain drops and subsequent erosion along the toe of the well pad fill slope. Also, if needed, aspen matting would be lain down to allow for erosion mitigation as well as enhancing reestablishment of vegetation.
- E. Prior to commencement of drilling operations, the cuttings pit would be fenced on three (3) sides using three strands of barbed wire according to the following minimum standards:
 - o Corner posts shall be cemented and/or braced in such a manner to keep the fence tight at all times.
 - o Standard steel, wood, or pipe posts shall be used between the corner braces. The maximum distance between any two (2) posts shall be no greater than sixteen (16) feet.
 - o All wire shall be stretched using a stretching device before it is attached to the corner posts.
 - o The fourth side of the cuttings pit would be fenced immediately upon removal of the drilling rig and the fencing would be maintained until the pit is backfilled.
- F. Cut slopes, associated with pad construction, would be left rough to provide a seed catchment surface, and may require 'step cutting' when heights exceed 15 feet.
- G. The attached exhibits for each surface location are complete sets of surveys for each well pad. Each exhibit includes a location map, topographic map, vicinity map, pad layout, existing contours, rig layout, production layout including reclaimed area, and cut and fill cross-sections. Multiple wellheads and production equipment are identified and the surface location is designed to accomplish the multi-well program with no expansion beyond what is identified in the exhibits.

10. Plans for Restoration of the Surface

- A. If the well is a Producer, LEII would conduct Interim Reclamation with the following:

1. The Bureau of Land Management, BLM Silt Field Office, (970) 876-9000, and the private landowner would be notified at least forty-eight (48) hours before starting reclamation work that involves earth-moving equipment and upon completion of restoration measures.
 2. Immediately upon completion of drilling and completion operations, the location and surrounding area would be cleared of all remaining debris, materials, trash and junk not required for production, and hauled to the nearest legal landfill.
 3. The backfilling of the cuttings pit would be done in such a manner that the cuttings would be confined to the pit and not squeezed out and incorporated in the surface materials. There would be a minimum of three feet of cover (overburden) on the pit. When work is complete, the pit area would support the weight of heavy equipment without sinking.
 4. After completion activities, LEII would reduce the size of the well pad to the minimum surface area needed for production operations, while providing for reshaping and stabilization of cut and fill slopes. Slopes would be re-contoured to minimize areas that exceed a 3:1 slope. Any areas exceeding the 3:1 slope criteria or high walls shall be reclaimed using enhanced stabilization and erosion prevention methods.
 5. Upon completion of backfilling, leveling and re-contouring, the stockpiled topsoil would be evenly spread over the reclaimed area(s). Prior to reseeding, all disturbed surfaces would be scarified and left with a rough surface. No depressions would be left that would trap water and form ponds. Any stockpiled ground cover would be evenly distributed over the disturbed areas.
 6. The recommended BLM seed mix would be used on all disturbed areas or as required by the Private Surface Owner. The recommended seed mixes identified in attachments 1 and 2 of the Notice to Lessee (Revisions to BLM Energy Office Revegetation Requirements) dated May 1, 2008, would be complied with. If the seeding is unsuccessful, subsequent seeding may be required.
- B. After the Last Well on a Location is Abandoned, LEII will:
Ensure the well site, roads or other disturbed areas would be restored to near their original condition. This procedure would include:
1. Ensuring re-vegetation of the disturbed areas to the specifications of the landowner or BLM at the time of abandonment.
 2. All disturbed surfaces would be re-contoured to the approximate natural contours ("Final Abandonment" exhibit) and reseeded according to landowner or BLM recommendations. Reclamation of the well pad and access road would be performed as soon as practical after final abandonment and reseeding operations would be performed in the fall or spring following completion of reclamation operations. During reclamation of the site, fill material would be pushed into cuts and up over the back slope. Topsoil would be distributed evenly over the location and seeded according to the recommended seed mixture.
 3. The access road and location would be re-contoured and ripped or disked prior to seeding. Prior to reclamation of the access road, the BLM or landowner would be consulted to determine any road portions that might remain.

4. All cut slopes from access roads and well pad construction would be reseeded within 48 hours after construction is completed.
5. Immediately upon abandonment of all the wells on the pad, all equipment would be removed from the location and surrounding area(s) would be cleared of all debris, materials, trash and junk that may have collected. Pipelines would be cut and abandoned at the location.
6. The recommended BLM seed mix would be used on all disturbed areas or as required by the private surface owner. The recommended seed mixes identified in attachments 1 and 2 of the Notice to Lessee (Revisions to BLM Energy Office Revegetation Requirements) dated May 1, 2008, would be complied with.
7. Those disturbed areas around locations that are being reclaimed may require fencing after seeding to keep wildlife and livestock out until the vegetation gets established. Where fencing is needed, LEII would consider the needs of the wildlife during the design of the fencing. The CDOW would be contacted for recommendations for appropriate fencing in each area. Once vegetation has been established, the fencing would be removed or reduced in size as required by the Authorized Officer.

11. Surface and Mineral Ownership

The surface is on private owned by R.M. and Lindsey A. Johnson. Attached is a Memorandum of Surface Use and Right-of-Way Agreement between LEII Energy II and the landowner. Also, a Surface Waiver between LEII II and the Johnsons is attached for the BLM record. This waiver is required by the COGCC under Rule 305 for landowner consultation.

The private mineral estate is owned by R.M. and Lindsey A. Johnson who LEII has acquired a mineral lease. The Federal minerals are managed by the Department of Interior Bureau of Land Management from which LEII has leases.

12. Other Information

- a. A cultural resource inventory report is part of the environmental assessment process. A cultural survey was conducted by a third party in July of 2009 for the pads and any new access.
- b. LEII is responsible for informing all persons in the area who are associated with this project that they would be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts or fossils. LEII would immediately bring to the attention of the Authorized Officer (BLM Silt Field Office) any and all antiquities or other objects of historic or scientific interest including, but not limited to, historic or prehistoric ruins, artifacts, or fossils discovered as a result of operations under this permit. LEII would immediately suspend all activities in the area of the object and would leave such discoveries intact until told to proceed by the Authorized Officer. Notice to proceed would be based upon evaluation of the cultural significance of the object.
- c. Stormwater Management would be managed under LEII's Stormwater Management Plan known as the "West Mamm Creek Project Area" under CDPHE General Permit No. COR-03E157.
- d. Sediment would be trapped before it reaches lakes, wetlands/riparian areas, intermittent drainage channels, and streams.
- e. U.S. Army Corps of Engineers 404 permits would be submitted for any drainage determined to be navigable waters.

f. Miscellaneous Information

1. There would be no deviation from the proposed drilling and/or workover program without prior approval from the Authorized Officer. Safe drilling and operating practices would be observed.
2. Sundry Notice and Report on Wells (Form 3160-5) would be filed for approval for all changes or plans and other operations in accordance with 43 CFR 3164.
3. The dirt contractor would be provided with an approved copy of the surface use plan.

13. Lessee's or Operator's Representative and Certification:

Representative: Laramie Energy II, LLC
Wayne P. Bankert
601 28 ¼ Rd. No. D
Grand Junction, CO
(970) 683-5419 Office
(970) 985-5383 Cell
(970) 683-5594 Fax

Operator: Same as above.

Certification: I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill sites and access routes; that I am familiar with the conditions which currently exist; that the statements made in the plan are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein would be performed by Laramie Energy LLC and its contractors and subcontractors to conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of false statements.

Signature: Wayne P. Bankert Date: 9-30-09
Wayne P. Bankert
Senior Regulatory and Environmental Coordinator
Laramie Energy II, LLC

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Appendix D
Laramie Energy II, LLC

West Mamm Master 10-Point Drilling Plan

For All Federal Wells Drilled in:

Twn. 7 South, Rng. 93 West 6th PM
Twn. 8 South, Rng. 93 West 6th PM
Garfield County, CO

Including but not limited to:

Leases:

COC67149
COC67150
COC73256

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10-Point Drilling Plan West Mamm Project

1 & 2. Estimated Tops of Geological Markers and Formations Expected to Contain Water, Oil and Gas and Other Minerals:

**Will be submitted for site-specific Applications for Permit to Drill.

* The top of the Mesa Verde Group and the Williams Fork Formation is interpreted to be one and the same.

Any sources water and prospectively valuable minerals encountered during drilling would be recorded by depth and adequately protected. A sample would be taken of any water flow and furnished to the Glenwood Springs Energy Office for analysis, if requested.

3. Pressure Control and Auxiliary Equipment

After setting surface casing to the specified depth (section 5), 5,000-psi equipment would be used. Equipment would be installed per **Attachment A**. Test pressures would be as follows:

11" – 5,000-psi ram type BOP's	5,000 psi
11" – 5,000-psi annual BOP's	2,500 psi
Ancillary equipment and choke manifold	5,000 psi
Surface casing	1,500 psi

Pressure tests would be conducted after installation of equipment and prior to drilling out casing float equipment and every 30 days thereafter. A certified tester would perform pressure testing and charts would be made available from Laramie upon request.

BOP, choke manifold, and accumulator equipment installation would be consistent with 43 CFR Part 3164.1 Onshore Oil and Gas Order No. 2.

Auxiliary equipment:

- a) Manually operated kelly cocks.
- b) Full opening floor valves capable of fitting all drill-string connections would be kept on the floor in the open position.

4 & 5. Casing and Cementing Program

Hole Info		Setting Depth			Casing Information						
<u>Hole</u>	<u>Size</u>	<u>MD</u>	<u>TVD</u>	<u>Size</u>	<u>Grade</u>	<u>Weight</u>	<u>Type</u>	<u>psi</u>	<u>psi</u>	<u>Klbs</u>	
Cond.		40'		16"	0.25"	Thick Wall					
Surf.	12 1/4	1500	TBD	8 5/8"	J-55	32.0 lb	STC	New	2530	3930	372
Prod.	7 7/8	TBD	TBD	4 1/2"	I-80	11.6 lb	LTC	New	6350	7780	267

TBD- Casing setting depths would be submitted for each Application for Permit to Drill

Surface Casing Setting Depth: Surface Casing would be set at a minimum of 1500' MD.

Cementing Program

<u>Casing</u>	<u>Stage</u>	<u>Sx.</u>	<u>Yield</u>	<u>Weight</u>	<u>Type</u>	<u>~TOC</u>
Conductor					Redi-mix	
Surface	Lead	**	2.37	12.3 ppg	Rockies LT, 0.125#/sk Polyflake + additives	
	Tail	**	1.44	14.2 ppg	Rockies HE, 0.125#/sk Polyflake + additives	Surface
Production	Lead	**	2.40	11.0 ppg	25/75 Poz G with 10% lime, 8% gel, 0.125 #/sk Polyflake	200' Above
	Tail	**	1.46	13.6 ppg	50/50 Poz G 2% Gel, 0.3% Halad-322, 0.3% Versaset, 0.2% Super CBL, 0.4% HR-601, 0.13#/sk Polyflake, 7#/sx Gilsonite, 3#/sx Silicate, 0.6% Halad-23	WS/MV Contact

** Sacks of cement would be submitted for each Application for Permit to Drill.

Area Fracture Gradient: 0.65 psi 1 foot

Surface Casing Full cement returns back to surface would be attempted, calculation for hole size and pipe size are used with a 50 to 100% excess volume.

If full returns are not seen or fallback occurs, 1" injection of remedial cement down the backside would be performed and topped to surface.

Production Lead Cement to tie cement to bottom of surface casing (volumes to be calculated from caliper log +10%). Volumes on APD are based on a 9" hole to compensate for washout.

Tail Cement from well total depth and tie to bottom of lead cement 200' above top of Mesa Verde gas as determined from porosity log (volume to be calculated from caliper log).

Conductor pipe and surface casing is cemented back to surface.

Placement of production casing cement on all wells is attempted to isolate the casing from all formations. If cement cannot be circulated back to surface casing, the minimum TOC would be 200 feet above the Wasatch / Mesa Verde Contact.

6. Mud Program:

<u>From (md)</u>	<u>To (md)</u>	<u>Mud Type</u>	<u>Weight ppg</u>	<u>Vis.</u>	<u>Water Loss</u>	<u>Chemicals</u>
0/0	1500	Spud	9.0-9.5	40-50		
1500	TD	LSND	9.0-10.0	40-60	8-12	Visease & 507

Spud mud would be used to drill surface (gel and lime). System would be converted to a low solids non-dispersed gel polymer system with WL of 6 to 10 from under surface, weight of 9.0 – 9.8 and Vis of 40-45 would be maintained until more weight is needed (possibly preparing logs) then would be 9.5 – 13.0 ppg as needed. Sufficient mud materials to maintain mud properties, control lost circulation and to contain blowout would be available at the wellsite.

Mud reports would be kept on location at all times. No chrome constituent additives would be used in the mud system on Federal and Indian lands without prior BLM approval to ensure adequate protection of fresh water aquifers.

7. Testing, Logging, and Core Programs:

Cores: None

DSTs: As needed; none anticipated

Sampling: None

Surveys: Run every 100’ on surface hole and on trips

Mud logger: one-man or computer unit with at least total gas and drill rate from base of surface casing to TD.

Logging Open-hole logs: An attempt would be made to obtain open-hole logs for each well. Logs and intervals include HRI with SP, GR, and CALIPER from TD to surface casing, Spectral Density/Dual Spaced Neutron from TD to top of Williams Fork and over other selected zone of interest. Logs would be submitted to the BLM in **.LAS** format along with Form 3160-4 “Well Completion and Recompletion Report”.

Cased-hole logs: Cased-hole logging tools would be run in the case the well cannot be logged open-hole. Logs and intervals include a cased-hole pulsed neutron log from TD to 100’ above top of Williams Fork and GR from TD to surface casing.

As Field Development progresses and knowledge of the reservoir increases, fewer open-hole logs would be run and replaced with cased hole.

Anticipated Pressures and Temperatures:

No over pressured formation is anticipated. A BHT of 170-190 degrees F is expected. A BHP of 2922 psi is expected.

Proper mud weight would be maintained to drill at a balanced or slightly over-balanced condition.

Notification would be made if planned drilling practices deviate from this.

9 & 10. Drilling Schedule

Anticipated starting date: To be Determined for each well

Duration of operation: 15-20 days per well

No location would be moved, no well would be plugged and no drilling or work-over equipment would be removed from a well to be placed in a suspended status without prior approval of the Authorized Officer. If operations are to be suspended, prior approval of the Authorized Officer would be obtained and notification given before resumption of operations.

The spud date would be reported orally to the Authorized Officer within a minimum of twenty-four (24) hours prior to spudding. Written notification in the form of a Sundry Notice (Form 3160-5) would be submitted to the Field Office within twenty-four (24) hours after spudding. If the spudding occurs on a weekend or holiday, the written report would be submitted on the following regular workday.

In accordance with Onshore Oil and Gas Order No. 1, this well would be reported on Form 9-329, "Monthly Report of Operations", starting with the month in which operations commence and continue each month until the well is physically plugged and abandoned. This report would be filed directly with the Minerals Management Office, Production Accounting Division, P. O. Box 17110, Denver, Colorado 80217.

Immediate Report: Spills, blowouts, fires, leaks, accidents or any other unusual occurrences shall be promptly reported to the Field Office in accordance with requirement of winter seasonal restriction-3A.

If a replacement rig is contemplated for completion operations, a Sundry Notice (Form 3160-5) to that effect would be filed for prior approval of the Authorized Officer and all conditions of this approved plan are applicable during all operations conducted with the replacement rig. In emergency situations, verbal approval to bring on a replacement rig would be obtained from the Authorized Officer.

Should the well be successfully completed for production, the Authorized Officer would be notified when the well is placed in a producing status. Such notification would be sent by telegram or other written communication not later than five (5) business days following the date the well is placed on production.

A first production conference would be scheduled within fifteen (15) days after receipt of the first production report. The BLM Field Office would coordinate the field conference.

No well abandonment operations would be commenced without prior approval of the Authorized Officer. In the case of newly drilled dry holes or failures, and in emergency situations, oral approval would be obtained from the Authorized Officer. A "Subsequent Report of Abandonment" (Form 3160-5) would be filed with the Field Office within thirty (30) days following completion of the well for abandonment. This report would indicate where plugs were placed and the current status of surface restoration. Final abandonment notice would be completed to the satisfaction of the Authorized Officer or his representative, or the appropriate surface managing agency.

Approval to vent/flare gas during initial well evaluation would be obtained from the Field Office. The preliminary approval would not exceed 30 days or 50 MMCF gas. Approval to vent/flare beyond this initial test period would require Field Office approval pursuant to guidelines in winter seasonal restriction-4A.

Upon completion of approved plugging, a regulation marker would be erected in accordance with 43 CFR 3162.6. The marker would be constructed after contouring. The top of the marker would be closed or capped and the following minimum information would be permanently placed on the marker with a plate, cap or beaded-on with a welding torch: "Well name", as applicable; "well number, location by quarter/quarter section, township and range"; and "lease number".

Laramie Energy II, LLC would be operating under its Colorado Bond # COB000206.