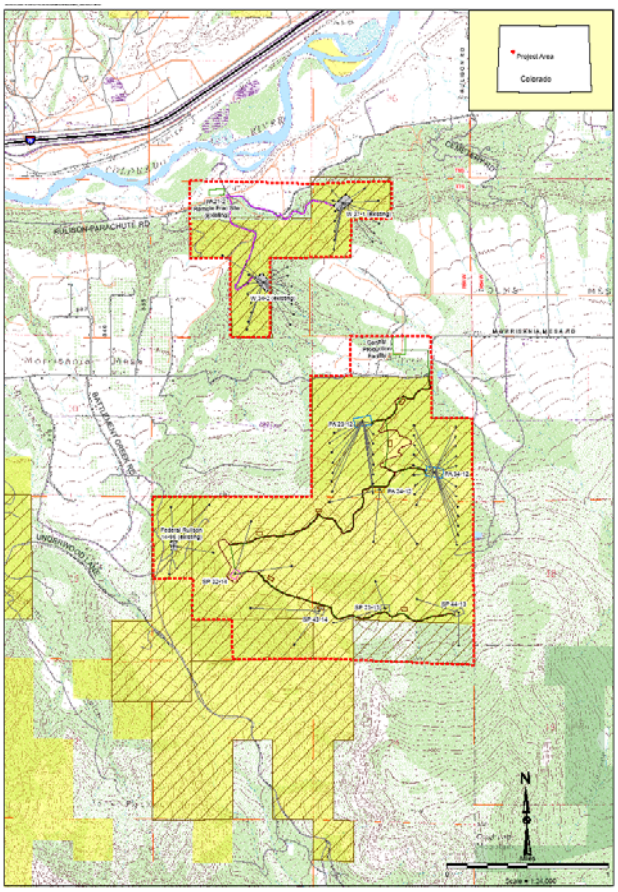
**U. S. Department of the Interior**
Bureau of Land Management
Colorado State Office

Glenwood Springs Energy Office August 2007

# Doghead Mountain Geographic Area Plan for Oil and Gas Exploration and Development EA# CO-140-2007-042

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## CO-140-2007-042

The environmental assessment analyzing the environmental effects of the proposed action has been reviewed. The approved mitigation measures result in a Finding of No Significant Impact on the human environment. Therefore, an environmental impact statement is not necessary to further analyze the environmental effects of the proposed action.

## DECISION RECORD

DECISION: Because of the steep terrain and high visibility of portions of the DMGAP area and the level of detail currently available from Williams, it is not possible at this time to determine whether some project components would meet VRM objectives. Making this determination would require site-specific information such as the limits of disturbance, cut-and-fill heights, and potential visual mitigation measures. Therefore, approval of new pads PA 32-14, 43-14, approval of the access road between the PA 24-12 and 32-14 pads, and the approval of expansion of the existing W 37-1 and W 34-2 pads is deferred until information sufficient for a VRM determination has been submitted to, and analyzed by, the BLM.

The APDs associated with the balance of the developments described in the DMGAP are approved subject to the mitigation measures presented in Appendices D and E. This decision will provide for the orderly, economical, and environmentally sound exploration and development of oil and gas resources on valid oil and gas leases.

RATIONALE:

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

2. The environmental impacts have been mitigated with measures included in the attached Conditions of Approval.

MITIGATION MEASURES: Mitigation measures presented in Appendices D and E will be incorporated as Conditions of Approval for both surface and drilling operations.

PREPARED BY: Tetra Tech, Inc.; WestWater Engineering, Inc.; and the BLM Glenwood Springs Energy Office, Bridget Kobe Clayton, Project Lead.

SIGNATURE OF PLANNING AND ENVIRONMENTAL COORDINATOR:

Planning and Environmental Coordinator — Date: 8/22/07

SIGNATURE OF AUTHORIZED OFFICER:

Authorized Officer — Date: 8/22/07

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## EXECUTIVE SUMMARY

Williams Production RMT Company (Williams) proposes to develop oil and gas resources in an area of approximately 2,120 acres of Federal, private, and split-estate lands located about 5 miles east of the town of Parachute, Garfield County, Colorado. The proposed development plan, referred to as the Doghead Mountain Geographic Area Plan (DMGAP), was prepared by the Bureau of Land Management (BLM), Glenwood Springs Energy Office (GSEO) to meet the requirements for an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA). The DMGAP was prepared based on information provided by Williams and its consultants and independent review and analysis by a BLM Interdisciplinary (ID) Team.

The proposed action described in the DMGAP consists of drilling up to 82 wells from three existing and seven new well pads, all on Federal surface. The downhole locations of the 82 wells would include 72 completed in Federal mineral estate and 10 in private mineral estate. Williams expects to drill four wells from two new well pads in 2007, with the remaining wells to be completed from 2008 to 2010.

The proposed action would be structured so that well pads could undergo one or both of two phases of activity: 1) exploration phase using a conventional drilling rig, and 2) development phase using an efficiency drilling rig. Phasing would be conducted on a per well pad basis such that for the DMGAP as a whole, activities associated with the exploration phase would be occurring at some well pads at the same time that activities associated with the development phase would be occurring at other well pads.

Total surface disturbance from well pad and centralized facilities construction would be approximately 24.8 acres (including staging areas), representing a range in pad size from 1.4 to 3.8 acres. Following drilling and completion activities, interim reclamation would reduce the long-term surface disturbance on the 10 pads to approximately 10.0 acres, which would extend through the anticipated 35-year life of the wells.

Other ground-disturbing activities described in the DMGAP would include 6.7 miles of new access roads and 4.3 miles of new pipelines, representing 66.7 acres of disturbance. The pipelines would be collocated with roads to the extent possible. The new roads and pipelines would be built within a 50-foot right-of-way (ROW). The finished road surface would be approximately 14 feet along most of the road lengths, with widths of up to 25 feet where needed at switchbacks. Long-term surface disturbance along the finished road surfaces and adjacent drainage ditches would be up to 20.3 acres.

Permanent surface facilities needed to support oil and gas development include the wellheads, separation and dehydration units, and above-ground tanks for storage of condensate and produced water. Each pad would also have a reserve pit or a cuttings trench, depending on the type of drill rig used, for the disposal of drill cuttings and miscellaneous drilling debris. Following completion of the wells at a pad, the reserve pit or cuttings trench would have hydrocarbons and debris removed and then be dried, backfilled, covered, and reclaimed. Produced water from the wells would be transported by truck or buried pipeline to a water treatment facility owned and operated by Williams or an approved commercial disposal facility.

Following completion activities at a pad, areas not needed during production would be revegetated using reclamation methods, standards, and species prescribed by BLM. When all of the wells at a pad are no longer producing economic quantities of gas, the wells would be closed and abandoned, and the pad would undergo final reclamation.

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**TABLE OF CONTENTS**


LIST OF TABLES ..... ii
LIST OF TABLES (CONT.) ..... iii
LIST OF FIGURES ..... iii
LIST OF APPENDICES ..... iii
1.0 PURPOSE AND NEED FOR THE ACTION ..... 1
2.0 PROPOSED ACTION ..... 5
2.1 How to Read Section 2.0 ..... 5
2.2 Project Overview ..... 5
2.3 Phased Development ..... 7
2.3.1 Exploration Phase: Conventional Drilling ..... 7
2.3.2 Development Phase: Efficiency Drilling ..... 7
2.3.3 DMGAP Comprehensive Plan ..... 7
2.4 Construction, Maintenance, and Use of Access Roads ..... 13
2.4.1 Estimates of Traffic and Work Force ..... 13
2.5 Pad Design, Construction, Restoration, and Abandonment ..... 16
2.6 Drilling Operations ..... 17
2.7 Completion Operations ..... 18
2.7.1 Exploration Phase: Conventional Drilling ..... 18
2.7.2 Development Phase: Efficiency Drilling ..... 19
2.8 Well Production Facilities ..... 19
2.8.1 Exploration Phase: Conventional Drilling ..... 23
2.8.2 Development Phase: Efficiency Drilling ..... 23
2.9 Production Operations and Maintenance ..... 24
2.10 Best Management Practices, Design Features, and Mitigation Measures ..... 24
2.10.1 General ..... 24
2.10.2 Construction ..... 24
2.10.3 Drilling and Completion Operations ..... 25
2.10.4 Production Equipment and Pipelines ..... 25
2.10.5 Production Operations and Maintenance ..... 25
2.10.6 Interim Reclamation ..... 26
2.10.7 Abandonment ..... 26
2.10.8 Final Reclamation ..... 26
2.10.9 Big Game Habitat Mitigation and Enhancements ..... 27
3.0 NO ACTION ALTERNATIVE ..... 28
4.0 ALTERNATIVES CONSIDERED DURING DEVELOPMENT OF THE DMGAP 28
4.1 Project Component Modifications ..... 28
4.2 Access Road Alternatives ..... 29
4.3 Development Using Conventional Drilling ..... 30
5.0 SUMMARY OF LEASE AND GRANT STIPULATIONS ..... 30
6.0 LAND USE PLAN CONFORMANCE REVIEW ..... 30
7.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES ..... 31
7.1 Critical Environmental Elements ..... 32
7.1.1 Air Quality ..... 33
7.1.2 Areas of Critical Environmental Concern (ACECs) ..... 34

7.1.3 Cultural Resources ... 34
7.1.4 Floodplains ... 36
7.1.5 Invasive Non-native Species ... 37
7.1.6 Migratory Birds ... 42
7.1.7 Native American Religious Concerns ... 44
7.1.8 Prime or Unique Farmlands ... 44
7.1.9 Special Status Species ... 45
7.1.10 Wastes, Hazardous or Solid ... 53
7.1.11 Water Quality, Surface and Ground ... 56
7.1.12 Wetlands and Riparian Zones ... 64
7.1.13 Wild and Scenic Rivers ... 66
7.2 Other Affected Resources ... 67
7.2.1 Access and Transportation ... 67
7.2.2 Geology and Minerals ... 69
7.2.3 Noise ... 71
7.2.4 Paleontology ... 74
7.2.5 Range Resources/Management ... 75
7.2.6 Realty Authorizations ... 76
7.2.7 Recreation ... 76
7.2.8 Socioeconomics ... 77
7.2.9 Soils ... 80
7.2.10 Vegetation ... 89
7.2.11 Visual Resources ... 97
7.2.12 Wildlife, Aquatic ... 104
7.2.13 Wildlife, Terrestrial ... 105
8.0 CUMULATIVE IMPACTS ... 110
9.0 FUTURE IMPLEMENTATION ACTIONS USING STATUTORY CATEGORICAL EXCLUSIONS ... 113
10.0 ORGANIZATIONS CONSULTED ... 114
11.0 LIST OF PREPARERS AND INTERDISCIPLINARY REVIEW ... 114
12.0 REFERENCES ... 116

## LIST OF TABLES

Table 1. Proposed Action Well Pads and Wells ... 6
Table 2. Projected Drilling Schedule for the Phased Development Process ... 8
Table 3. Summary of Estimated Surface Disturbances in the DMGAP ... 9
Table 4. Traffic Estimates for Exploration Phase Drilling and Well Completion for 19 Wells .. 14
Table 5. Traffic Estimates for Development Phase Drilling and Well Completion for 63 Wells 15
Table 6. Critical Elements of the Human Environment ... 33
Table 7. Invasive Non-native Species in the DMGAP ... 37
Table 8. Potential Material Outputs from Oil and Gas Extraction Processes ... 54
Table 9. CDPHE Classifications and Numeric Standards in the DMGAP ... 57
Table 10. Proposed Crossings of Drainages in the DMGAP ... 62
Table 11. Other Resources Considered in the Analysis ... 67

## LIST OF TABLES (CONT.)

Table 12. Noises Levels Associated with Oil and Gas Production..... 73
Table 13. Noise Levels Associated with Typical Construction Equipment ..... 73
Table 14. Range Management Allotments..... 76
Table 15. Soil Map Units in the DMGAP..... 83
Table 16. Slope Classes in the DMGAP..... 89
Table 17. Vegetation in the DMGAP ..... 91
Table 18. List of Preparers..... 115
Table 19. List of BLM Interdisciplinary Team Reviewers..... 115

## LIST OF FIGURES

Figure 1 Doghead Mountain GAP EA Proposed Action..... 3
Figure 2 SIMOPS Drilling, Completing, and Producing..... 20
Figure 3 Wildlife Resources-Threatened and Endangered Species..... 38
Figure 4 Surface Water, Wetlands, Riparian, and Groundwater Resources..... 49
Figure 5 Soils Resources-Soil Map Units..... 85
Figure 6 Soils Resources-Slope Classes ..... 87
Figure 7 Vegetation Resources ..... 93
Figure 8 Visual Resources Management ..... 98
Figure 9 Wildlife Resources-Big Game Activity..... 107
Figure 10 Cumulative Impacts Area ..... 111

## LIST OF APPENDICES

APPENDIX A GLOSSARY..... 123
APPENDIX B PUBLIC COMMENTS AND RESPONSES ..... 129
APPENDIX C SURFACE USE CONDITIONS OF APPROVAL..... 145
APPENDIX D SITE-SPECIFIC AND DOWNHOLE CONDITIONS OF APPROVAL..... 153
APPENDIX E HABITAT MITIGATION PLAN ..... 171

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# Doghead Mountain Geographic Area Plan
# For Oil and Gas Exploration and Development
# EA#CO-140-2007-042

## 1.0 PURPOSE AND NEED FOR THE ACTION

Williams Production RMT Company (Williams), a natural gas company, is proposing a 4-year program of natural gas exploration and development on approximately 2,120 acres of public and private lands located in the Piceance Basin about 5 miles east of the town of Parachute, Garfield County, Colorado (**Figure 1**). This proposal is referred to as the Doghead Mountain Geographic Area Plan (DMGAP) and includes portions of Sections 1, 2, 12, 13, and 14, Township 7 South (T7S), Range 95 West (R95W), 6th Principal Meridian.

The proposal consists of constructing, drilling, completing, and operating up to 82 new wells from up to three existing and seven new surface locations. Ancillary facilities connected to the project that would be constructed or upgraded include access roads, gathering pipelines, and a variety of surface locations for production facilities (tanks, separators, dehydrators, etc.). Included in the proposal are mitigation measures designed to minimize or eliminate impacts to surface and downhole resources.

Exploration and development of Federal oil and gas leases by private industry is an integral part of the BLM's oil and gas leasing program under authority of the Mineral Leasing Act of 1920 as amended, the Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management Act of 1976, the National Materials and Minerals Policy, Research and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

The purpose of the action is to develop natural gas resources on Federal leases COC06934, COC01524, COC05173, and COC06266B consistent with existing Federal lease rights. Lease holders retain rights to drill for, extract, remove, and market gas products. National mineral leasing policies and the regulations by which they are enforced recognize the statutory right of lease holders 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 lease holder to build and maintain necessary improvements, subject to renewal or extension of the lease or leases in accordance with the appropriate authority. The proposed project would allow the lease holder, Williams, to determine through natural gas exploration if and where additional development and production is feasible.

The purpose and need for action would have been met by structuring the development of the leases as a series of individual proposals. However, the current Glenwood Springs Resource Area Resource Management Plan (RMP, BLM 1999a), in addition to more recent BLM policy, specifies the use of multiple well development plan proposals as a means to more effectively manage Federal lease development.

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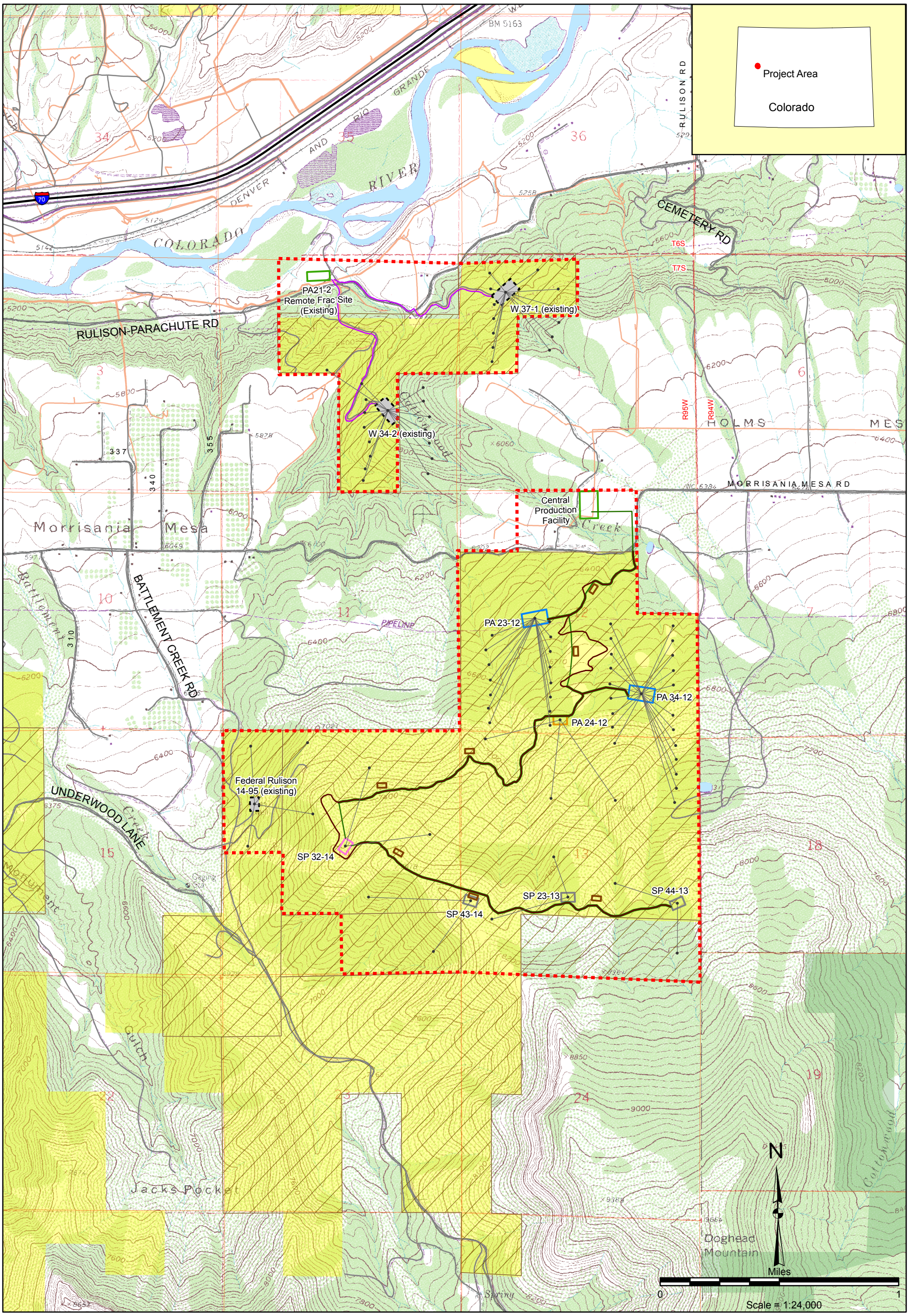


AUG 20, 2007

Highways
Other Road
County Roads
Pipeline

**Proposed/Existing Pad**
Existing Pad
2007
2008
2009
2010

Offsite Facility
Proposed Staging Area (Pipeline Construction)
Proposed Frac Line and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road
Downholes

Federal Mineral Lease
DMGAP

**Surface Ownership**
BLM
USFS

**FIGURE 1**
**DOGHEAD MOUNTAIN GAP**
**EA PROPOSED ACTION**
**WILLIAMS PRODUCTION**

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# 2.0 PROPOSED ACTION

## 2.1 How to Read Section 2.0

This section includes the following subsections:

- Section 2.2 Project Overview
- Section 2.3 Phased Development
    - Section 2.3.1 Exploration Phase: Conventional Drilling, which includes exploratory wells using conventional drilling technology
    - Section 2.3.2 Development Phase: Efficiency Drilling, which includes development wells using efficiency drilling technology to directionally drill up to 22 wells per pad
    - Section 2.3.3 DMGAP Comprehensive Plan, which includes the overall plan for well development in the DMGAP area. This section presents the specific temporal and spatial employment of the exploration phase and the development phase in the DMGAP and a summary of the estimated surface disturbances that would result from implementation of the proposed action.
- Sections 2.4 through 2.9 provide a description of the activities under the proposed action. Details of these components are differentiated for the exploration phase and the development phase, where necessary. These sections include:
    - Section 2.4 Construction, maintenance, and use of access roads
    - Section 2.5 Pad design, construction, restoration, and abandonment
    - Section 2.6 Drilling operations
    - Section 2.7 Completion operations
    - Section 2.8 Well production facilities
    - Section 2.9 Production operations and maintenance
- Section 2.10 Best Management Practices and Design Features presents the Best Management Practices (BMPs) and design features that would be incorporated during implementation of the proposed action to minimize impacts to environmental or natural resources.

Mitigation measures would be determined in accordance with the *Master Application for a Permit to Drill (APD)* (Williams 2006a) and site-specific Conditions of Approval (COAs) as determined by BLM.

## 2.2 Project Overview

The life of the proposed project in its entirety could extend up to 35 years because the reasonable productive life of a gas well completed in the Mesaverde Group is estimated to be 30 to 35 years.

**Figure 1** and **Table 1** present the locations of the proposed drilling activities and the property ownership in those areas. The area identified in the DMGAP encompasses the areas within which surface and subsurface activities are proposed on Federal property and the areas within which surface activities are proposed on private (fee) property. The DMGAP includes:

- A northern area comprising portions of Sections 1 and 2, T7S, R95W
- A southern area comprising portions of Sections 12, 13, and 14, T7S, R95W

| Table 1. Proposed Action Well Pads and Wells | | | | | |
|---|---|---|---|---|---|
| **Well Pad** | **Surface Location Lease[1]** | **Surface Location[2]** | **Proposed Number of Wells** | **Downhole Location[2]** | **Downhole Lease[1]** |
| W 37-1 (existing) | Federal COC05173 | NWNW Sec. 1 | 13 | NW Sec. 1 | Federal COC05173 and private lease |
| W 34-2 (existing) | | NWSE Sec. 2 | 16 | SE Sec. 2, NW Sec. 2 | |
| PA 23-12 | | SENW Sec. 12 | 16 | SW Sec. 12 | Federal COC05173 |
| PA 24-12 | | SESW Sec. 12 | 3 | NE Sec. 13, NW Sec. 13 | |
| PA 34-12 | | SESE Sec. 12 | 22 | SE Sec. 12, NE Sec. 13 | |
| SP 32-14 | | SWNE Sec. 14 | 2 | NE Sec. 14 | |
| SP 43-14 | | SESE Sec. 14 | 2 | SE Sec. 14 | Federal COC05173 and COC06934 |
| 4-13 | | NESE Sec. 13 | 2 | SE Sec. 13 | Federal COC05173 and COC06266B |
| SP 23-13 | | NESW Sec. 13 | 2 | SW Sec. 13 | |
| Federal Rulison 14-95 (existing) | Federal COC01524 | SWNW Sec. 14 | 4 | NW Sec. 14 | Federal COC01524 and COC05173 |

[1] All Federal surface and subsurface property ownership in the DMGAP is BLM.
[2] All of the DMGAP is within T7S, R95W.

The proposed action includes the following components, as illustrated in **Figure 1**:

- New well pads and expansions of existing well pads
- New roads and upgrades to existing roads
- New pipelines and upgrades to existing pipelines
- Staging areas for use in construction of pipelines and associated facilities
- Remote frac pad at existing site
- New centralized production facilities

The DMGAP is intended to describe a future development strategy given current market conditions and company constraints. If fully implemented, this proposal would result in up to 82 downhole locations drilled over the course of 4 years (2007 through 2010) at 10 surface locations, including three existing well pads and seven new well pads (**Figure 1** and **Table 1**). The total number of wells drilled would depend largely on factors out of Williams' control, such as geologic success, engineering technology, economic factors, availability of commodity markets, and lease notices. Implementation of the full proposed drilling schedule is anticipated to take 4 years; however, potential timing limitations, rig availability, and natural gas prices (economics) may extend this timeline.

Full development of the proposed action does not preclude additional future developments on these Federal leases. It might reasonably be anticipated that additional developments could occur in the future, either within the DMGAP area or in offsite areas accessed by directional drilling techniques from pads in

the DMGAP area, due to alterations in downhole spacing orders or changes in environmental, economic, or technological conditions.

The proposed action would be structured as phased development in which each well pad would undergo one or both of two distinct phases: 1) exploration phase using a conventional drilling rig, and 2) development phase using an efficiency drilling rig. Phasing would be conducted on a per well pad basis such that in the DMGAP as a whole, activities associated with the exploration phase would be occurring at some well pads at the same time that activities associated with the development phase would be occurring at other well pads.

A Plan of Development (POD) would be submitted for each well pad when the APD is submitted. The POD would provide detailed information for the proposed construction, drilling, completions, and operations, and steps taken during planning to minimize impacts to environmental or natural resources.

## 2.3 Phased Development

This section describes the phased development approach of the project.

### *2.3.1 Exploration Phase: Conventional Drilling*

The primary objective of the proposed exploratory drilling is to evaluate the following aspects of gas development in the DMGAP area:

- Potential productivity of the lease area
- Economics of drilling and completion techniques
- Feasibility of developing, capturing, producing, and transporting natural gas
- Depths or pressure windows that may be preferred as the target for economic gas production

Conventional rigs (designed to drill one to eight wells per well pad) would be used for the exploration phase of the proposed project. Conventional drilling rigs are better suited for exploratory work compared to efficiency drilling rigs because conventional drilling rigs require less space for the drilling operations and are easier to move. Efficiency drilling rigs are designed to drill many wells (up to 22 wells) from a location, and therefore, are typically not used for exploratory work.

### *2.3.2 Development Phase: Efficiency Drilling*

This phase would implement new efficiency drilling rig technology which incorporates off-shore drilling methods with application to on-shore drilling. This technology allows drilling of multiple wells (up to 22) from a single location. Compared to completion operations using conventional drilling rigs, this new technology would allow for simultaneous drilling, completion, and production operations for all wells at a well pad location, thus significantly reducing the timeframe to develop all wells at the well pad location. This is referred to as simultaneous operations (SIMOPS). In general, clustered development using efficiency rigs would be used for the development phase of the proposed project.

The concept of multi-well drilling from a single location has been discussed at the local, state, and Federal levels over the past year, including with BLM.

### *2.3.3 DMGAP Comprehensive Plan*

**Table 2** presents the overall plan for well development in the DMGAP area, identifying the specific temporal and spatial employment of the exploration phase and the development phase. This table

presents the proposed drilling schedule for each well pad, as projected for the years 2007 through 2010. Williams proposes the following activities:

- Six well pads - exploration phase only
- Two well pads - exploration phase and development phase
- Two well pads - development phase only

**Table 2. Projected Drilling Schedule for the Phased Development Process**

| Well Pad | Section | 2007 | 2008 | 2009 | 2010 | Total |
|---|---|---|---|---|---|---|
| PA 23-12 | 12 | 2 exploration | | 14 development | | 16 |
| PA 34-12 | 12 | 2 exploration | | 20 development | | 22 |
| W 37-1 (existing) | 1 | | 13 development | | | 13 |
| W 34-2 (existing) | 2 | | 16 development | | | 16 |
| PA 24-12 | 12 | | 3 exploration | | | 3 |
| Federal Rulison 14-95 (existing) | 14 | | 4 exploration | | | 4 |
| SP 32-14 | 14 | | | 2 exploration | | 2 |
| SP 44-13 | 13 | | | | 2 exploration | 2 |
| SP 23-13 | 13 | | | | 2 exploration | 2 |
| SP 43-14 | 14 | | | | 2 exploration | 2 |
| Number of Wells per Year | | 4 | 36 | 36 | 6 | 82 |

**Table 3** presents a summary of the estimated surface disturbances that would result from implementation of the proposed action. For each project component the table presents:

- The total size of the working area, which includes new long-term disturbance, new short-term disturbance, and further disturbance to the working area.
  - The one exception is existing pad PA 21-2, at which no construction would occur.
  - Although the disturbance for new roads and new pipelines is presented separately in the table, these components would be collocated where practicable; therefore, the actual amount of new disturbance that would result from implementation of the proposed action is likely to be less than the total amount of disturbance presented in the table.
  - The finished road surface would be 14 to 25 feet wide. Estimates of impacts from roads are based on the maximum width of 25 feet; therefore, the actual amount of new disturbance that would result from implementation of the proposed action is likely to be less than the total amount of disturbance presented in the table.
  - **Figure 1** depicts the working areas of the project components.
- The long-term disturbance associated with the footprint, which could extend up to 35 years.
- The short-term disturbance to be reclaimed after completion activities, within 1 to 2 years.

Discussions of the project components are presented in the subsections that follow.

| Table 3. Summary of Estimated Surface Disturbances | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Component** | **Phase** | **Design and Construction Features** | **Drilling Features** | **Completion Features** | **Production Features** | **Working Area[1] (acres)** | **Long-term Impact[2] (acres)** | **Short-term Impact[3] (acres)** |
| ROADS | | | | | | | | |
| New roads and turnouts | Exploration and Development | Finished road surface of 14 to 25 feet width | N/A | N/A | N/A | 29.4 | 14.7 | 14.7 |
| Existing road expansions, upgrades | Exploration and Development | Average current road width is 15 feet (4.1 acres) | N/A | N/A | N/A | 11.1 | 5.6 | 5.5 |
| PADS | | | | | | | | |
| Existing well pad expansions Federal Rulison 14-95 | Exploration | Current size: 1.4 acres, including wellheads, separators, reserve pit. | 10,000 gallons water/well | 5-7 fracture stimulation stages/well, 170,000 gallons water/fracture stimulation stage, mobile service rig, pump trucks, sand trucks, frac tanks, mobile wireline trucks | 1 separator per well, 1+ condensate tank/mineral interest, 2+ water tanks | 1.4 | 0.5 | 0.9 |
| Existing well pad expansions W 34-2, W 37-1 | Development | Current size: 1.5 acre and 1.7 acre. wellheads, separators, cuttings trench | 10,000 gallons water/well | SIMOPS, completion at remote frac site, Flowback Units | 1 separator per well, 1+ condensate tank/mineral interest. Water to be piped to offsite water processing facility | 7.8 | 1.4 | 6.4 |
| New well pads PA 24-12, SP 44-13, SP 23-13, SP 43-14, SP 32-14 | Exploration | Wellheads, separators, reserve pit | 10,000 gallons water/well | 5-7 fracture stimulation stages/well, 170,000 gallons water/fracture stimulation stage, mobile service rig, pump trucks, sand trucks, frac tanks, mobile wireline trucks | 1 separator per well, 1+ condensate tank/mineral interest, 2+ water tanks per pad | 6.9 | 2.6 | 4.3 |

| Table 3. Summary of Estimated Surface Disturbances | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Component** | **Phase** | **Design and Construction Features** | **Drilling Features** | **Completion Features** | **Production Features** | **Working Area[1] (acres)** | **Long-term Impact[2] (acres)** | **Short-term Impact[3] (acres)** |
| Existing remote frac pad in NENW Sec. 2 | Development | Fracture stimulation equipment, frac tanks | N/A | Remote frac site servicing multiple well pads, temporary surface or buried high pressure frac pipelines, multiple frac tanks, rig, pump trucks, sand trucks | N/A | 0 | 0† | 0† |
| New centralized collection facility in NENW Sec. 12 | Development | Tankage for condensate and water | N/A | N/A | Condensate tanks and water tanks sufficient to handle volume produced (estimated 8 condensate tanks and 4 water tanks) | 5.5 | 5.5 | 0 |
| Staging areas (7) | N/A | Reclaimed after construction of pipelines is completed | N/A | N/A | N/A | 3.2 | 0 | 3.2 |
| PIPELINES | | | | | | | | |
| New gas pipelines and existing gas pipelines upgrades | Exploration and Development | Located adjacent to new access roads wherever practical; actual disturbance is likely to be less than presented | N/A | N/A | Gas lines installed to each well pad | 26.2 | 0 | 26.2 |
| Existing gas pipelines upgrades | Exploration and Development | Located adjacent to existing access roads | N/A | N/A | Gas lines that access pads W 37-1 and W 34-2 | N/A | N/A | N/A |
| Condensate pipelines | Development | Located adjacent to existing access roads; collocated with gas line | N/A | N/A | Condensate lines that terminate at centralized collection facility | N/A | N/A | N/A |

| Table 3. Summary of Estimated Surface Disturbances | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Component** | **Phase** | **Design and Construction Features** | **Drilling Features** | **Completion Features** | **Production Features** | **Working Area[1] (acres)** | **Long-term Impact[2] (acres)** | **Short-term Impact[3] (acres)** |
| Produced water pipelines | Development | Located adjacent to existing access roads; collocated with gas line | N/A | N/A | Produced water lines that terminate at centralized collection facility | N/A | N/A | N/A |
| Temporary frac water transfer lines | Exploration and Development | Located adjacent to existing access roads; temporary surface lines | N/A | N/A | Produced water and condensate lines that terminate at centralized collection facility | N/A | N/A | N/A |
| TOTAL DISTURBANCE | | | | | | 99.2 | 31.3 | 67.9 |

[1] Working area includes new long-term disturbance, new short-term disturbance, and further disturbance of existing disturbed areas.
[2] Long-term impacts would extend through anticipated 35-year life of project.
[3] Short-term impacts are areas subject to interim reclamation following drilling and completion activities at a pad and following construction of roads and pipelines.

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## 2.4 Construction, Maintenance, and Use of Access Roads

The DMGAP area is accessible from Parachute, Colorado by traveling approximately 3 to 4 miles east on Garfield County Roads 301 (Morrisania Mesa Road), 302 (Underwood Lane), and 309 (Rulison-Parachute Road) (**Figure 1**).

**Figure 1** and **Table 3** present the road system in the DMGAP area under the proposed action. To the extent feasible, existing roads would be used to access the proposed well pad facilities. Williams proposes to construct 4.9 miles of new road to access the proposed well pad facilities. In addition, approximately 1.8 miles of existing roads may require upgrading or expansion, the extent of which would be determined after additional survey work has been completed.

Road construction would occur in a 50-foot-wide easement. The finished road surface would be approximately 14 feet along most of the road lengths, with widths of up to 25 feet where needed at switchbacks. All roads would be surfaced with gravel for the duration of production operations. Long-term land conversion would be up to 14.7 acres from the construction of new roads and up to 5.6 acres from the expansion of the existing roads. Short-term disturbance (1 to 2 years) during road construction would be a maximum of 20.2 acres (**Table 3**).

The timing of road work would be dependent upon the drilling schedule (**Table 2**); roads would be constructed or upgraded periodically as needed to access well pads for drilling. Because the proposed action is phased development, for the DMGAP as a whole, road construction and upgrading would occur periodically throughout the 4-year drilling period.

For well pads where both exploration and development are proposed, the road system used during the exploration phase would also be adequate for the development phase; no additional road work would be required when moving from the exploration phase to the development phase to access a given well pad.

Maintenance of the roads used to access well locations would continue until final abandonment and reclamation of the well locations, at which point the roads would also be reclaimed. A regular road maintenance program would include, but is not limited to blading, ditching, culvert installation and cleanout, weed control, and gravel surfacing where excessive rutting or erosion may occur. Roads would be maintained in a safe and usable condition. Access roads would be reclaimed in accordance with the BLM reclamation COA (**Appendix C**).

### *2.4.1 Estimates of Traffic and Work Force*

Estimated traffic requirements for drilling and completion operations are shown in **Table 4** for the exploration phase (19 wells) and in **Table 5** for the development phase (63 wells). The “Trip Type” column lists the various service and supply vehicles that would travel to and from the well sites and production facilities. The “Round-Trip Frequency” column lists the number of trips. The figures provided in these tables are estimates. The level of drilling and production activity may vary over time in response to weather and other factors.

| Table 4. Traffic Estimates for Exploration Phase Drilling and Well Completion for 19 Wells | |
|---|---|
| **Trip Type** | **Round-Trip Frequency** |
| **Drilling (1 conventional drill rig, 8 well pads, 19 wells, 17 days per well, 323 days total)** | |
| Drilling rig crews (1 rig, 2 crews/rig) | 2/day |
| Conventional drilling rig move [1] | 10/pad |
| Drill bit/tool delivery | 1 biweekly |
| Mechanics/Welders | 2/week |
| Supply delivery | 4/week |
| Fresh water truck [2] | 2/day |
| Fuel trucks | 2/week |
| Wireline unit | 2/well |
| Cement trucks and crew | 4/well |
| **Subtotal** | **1,877 trips within 323-day period** |
| **Completion (1 rig, 8 well pads, 19 wells, 4 days per well, 76 days total)** | |
| Service rig (or coiled tubing unit or snubbing unit) [3] | 4/well |
| Service rig crew | 1/day |
| Wireline unit | 6/well |
| Consultant | 1/day |
| Frac/produced water trucks [4] | 45/well |
| Pump trucks | 6/well |
| Sand trucks | 4/well |
| Equipment trucks (frac tanks) | 32/pad |
| Equipment trucks (other equipment) | 2/well |
| Testing and operations | 8/well |
| **Subtotal** | **1,833 trips within 76-day period** |
| **TOTAL** | **3,710 trips** |

[1] Four trucks and a crane would be required to move each rig to and from each well pad within the DMGAP area. Unlike efficiency rigs, conventional rigs require some equipment to "skid" to the adjacent location on a pad. When drilling is complete on a pad, the rig would move to the next pad or outside the DMGAP area.

[2] Williams contracts with trucking companies who have their own legal sources of water to provide fresh water for drilling purposes and dust control.

[3] During the completion process, any or all of these types of units may be used. The average use for all such units per well is noted.

[4] On average, a well will require 4,000 barrels of water for each fracture stimulation stage, and there may be as many as seven stages per well. This water is supplied by Williams' water recycling facilities located in the Grand Valley and Rulison Fields. The frac water is recycled and reused for subsequent wells. As much as 50% of the frac water is returned within 1 week; therefore, additional trucked water is needed to replenish. The number of water truck trips noted is an estimate for two wells on one pad with a 50% replenishment rate and subsequent trucking of water off the pad once the wells are fully completed.

| Table 5. Traffic Estimates for Development Phase Drilling and Well Completion for 63 Wells | |
|---|---|
| **Trip Type** | **Round-Trip Frequency** |
| **Drilling (1 efficiency drill rig, 4 well pads, 63 wells, 12 days per well, 756 days total)** | |
| Rig crews (1 rig, 2 crews/rig) | 2/day |
| Efficiency drilling rig move [1] | 16/pad |
| Drill bit/tool delivery | 1/week |
| Mechanics | 2/week |
| Supply delivery | 4/week |
| Fresh water truck [2] | 2/day |
| Fuel trucks | 2/week |
| Wireline unit | 2/well |
| Cement trucks and crew | 4/well |
| **Subtotal** | **4,438 trips within 756-day period** |
| **Completion on well pad site for well pads: PA 23-12 and PA 34-12 (1 rig, 2 well pads, 34 wells, 4 days per well, 136 days total)** | |
| Service rig (or coiled tubing unit or snubbing unit) [3] | 4/well |
| Service rig crew | 1/day |
| Wireline unit | 6/well |
| Consultant | 1/day |
| Frac/produced water trucks [4] | 45/well |
| Pump trucks | 6/well |
| Sand trucks | 4/well |
| Equipment trucks (frac tanks) | 32/pad |
| **Subtotal** | **2,546 trips within 136-day period** |
| **Completion on remote frac site[d] for well pads: W 34-2 and W 37-1 (2 pads, 29 wells, 4 days per well, 116 days total)** | |
| Frac/produced water trucks [5] | ▪ 45 to remote frac site/well<br>▪ 0 to well pad |
| Pump trucks | ▪ 6 to remote frac site/well<br>▪ 0 to well pad |
| Sand trucks | ▪ 4 to remote frac site/well<br>▪ 0 to well pad |
| Equipment trucks (frac tanks) | ▪ 32 to remote frac site/well<br>▪ 0 to well pad |
| Testing and operations | ▪ 0 to remote frac site<br>▪ 2 to well pad/day |
| **Subtotal** | **2,987 trips within 116-day period** |
| **TOTAL** | **9,971 trips** |

[1] Eight trucks and a crane would be required to move an efficiency rig to and from each well pad within the DMGAP area. Unlike conventional rigs, efficiency rigs do not require outside equipment to "skid" to the adjacent location on a pad. When drilling is complete on a pad, the rig would move to the next pad or outside the DMGAP area.

[2] Williams contracts with trucking companies who have their own legal sources of water to provide fresh water for drilling purposes and dust control.

[3] During the completion process, any or all of these types of units may be used. The average use for all such units per well is noted.

[4] On average, a well will require 4,000 barrels of water for each fracture stimulation stage, and there may be as many as seven stages per well. This water is supplied by Williams' water recycling facilities located in the Grand Valley and Rulison Fields. The frac water is recycled and reused for subsequent wells. As much as 50% of the frac water is returned within 1 week; therefore, additional trucked water is needed to replenish. The number of water truck trips noted is an estimate for two wells on one pad with a 50% replenishment rate and subsequent trucking of water off the pad once the wells are fully completed.

[5] Assuming no water replenishment system in place.

## 2.5 Pad Design, Construction, Restoration, and Abandonment

**Figure 1** and **Table 3** present the proposed system of pads in the DMGAP area. The three main pad functions associated with the proposed project include:

- Well pads: consist of wellheads, separators, and temporary completion equipment (flowback units and tanks)
- Frac pads: consist of sufficient space to temporarily hold equipment required to perform fracture stimulation services
- Production pads: consist of any tankage required to hold produced water or condensate

Williams proposes to construct seven new well pads, all of which would also be on-site frac pads (**Table 3, Figure 1**). The working pad size includes the areas that would be used during construction, drilling, and completion activities. Efficiency rigs require a larger working pad size compared to conventional rigs to accommodate the equipment necessary to drill more wells in one location. The well pads at which only the exploration phase is proposed would be constructed to the size adequate to accommodate conventional rigs. The well pads at which both the exploration phase and development phase are proposed would ultimately be designed and built to a size that would accommodate efficiency drilling rigs, while keeping surface disturbance to a minimum at each well pad location. For the exploration phase at these well pads, the well pads may be built large enough to accommodate efficiency rigs, or the well pads may initially be built only to accommodate conventional rigs and then enlarged at a later date to prepare the well pad for efficiency rig drilling. After completion operations, these pads would be reduced to a long-term footprint.

The proposed action also includes the use of three existing well pads (**Table 3, Figure 1**). Existing well pads W 37-1 and W 34-2 previously underwent exploration; therefore, only the development phase is proposed at these pads. These pads would be expanded to a working pad size that would accommodate an efficiency rig and after completion operations would be reduced in size to a long-term footprint that is equal to or less than the current pad size. These pads would be serviced by a remote frac site. The proposed activities at existing well pad Federal Rulison 14-95 are exploration via conventional drilling and on-site frac. This pad would be expanded to a working pad size that would accommodate a conventional drilling rig and after completion operations would be reduced to a long-term footprint that is equal to or less than the current pad size.

Additional proposed pads include one remote frac pad in the northern portion of Section 2 that would be used during the completion operations of the development phase and one centralized production facility in the northern portion of Section 12 that would be used for the life of the wells. Neither of these pads would be used as a drilling location (**Table 3, Figure 1**).

Each pad would be leveled using cut and fill construction techniques, where needed. The top 6 to 8 inches of soil (more if available) and associated vegetative material would be removed and stockpiled prior to constructing each pad. Stormwater controls would be installed on all pads, as needed.

For the exploration phase, one reserve pit for drilling muds would be used at each drilling location. The reserve pits would be designed and constructed according to BLM requirements. Williams uses water-based drilling muds that do not contain hazardous substances. Material safety data sheets (MSDSs) would be available at each well pad location. The reserve pits would be open to allow for evaporation of pit fluids, as allowed under Federal and state regulations. Reserve pit fluids would be evaporated, removed, or solidified, and the pits would be closed as soon as practical but no longer than current regulations allow (typically within 1 year from the date drilling operations reached total depth).

A reserve pit is not required for efficiency rigs because they operate using a closed system. However, there is a need to dispose of drill cuttings. Therefore, instead of a reserve pit, a cuttings trench would be constructed. This trench is typically at the same location as the drilling rig and constructed large enough to handle all of the cuttings generated. All produced well cuttings would be disposed of in trenches specifically sized for their volume (approximately 385 cubic yards per well) with all stormwater controls specified by state and Federal regulations. In cases where the necessary volume is unavailable on site (i.e., due to unforeseen events such as bedrock that prohibits deep trenches), a backup site may be needed. This site would be constructed to meet all the applicable regulations.

With all pads combined, the proposed action would result in up to 11.0 acres of long-term (up to 35 years) disturbance from pads. With all pads combined, the proposed action would also result in up to 18.3 acres of short-term (1-2 years) disturbance from pads. Because the proposed action is phased development, for the DMGAP as a whole, pad construction and drilling would occur periodically throughout the 4-year drilling period. The timing of pad work would be dependent upon the drilling schedule (**Table 2**); pads would be constructed or expanded periodically as needed for drilling.

In addition to the pads discussed above, there are expected to be seven staging areas strategically placed throughout the DMGAP area to aid in construction of pipelines and associated facilities (**Table 3, Figure 1**). Local vegetation and soil characteristics at these locations would determine the activities required to clear the staging areas. In some cases vegetation and topsoil removal may be required. The disturbance (3.2 acres) would be short-term (less than 1 year) because each staging area would be reclaimed upon completion of the construction phase of the pipelines serviced by the staging area.

Williams would completely reclaim all disturbed areas that are not needed for production operations through the BLM's reclamation COA (**Appendix C**) and the interim and final reclamation procedures presented in Section 2.10 Best Management Practices, Design Features, and Mitigation Measures.

## 2.6 Drilling Operations

All wells would be directionally drilled to locations within the Federal leases held by Williams (lease numbers COC05173, COC01524, COC06934, and COC06266B). **Figure 1** illustrates the boundaries of these leases.

Within this portion of the Piceance Basin, drilling wells from the surface to their total depth takes an average of 17 days using conventional rig technology and 12 days using efficiency rig technology.

Fresh water for use in drilling operations and dust control would be obtained from authorized sources, typically through contractors who have their own legal sources of water. Water would be trucked to the site. The actual volume of water used in drilling operations would depend on the depth of the well and any losses that might occur during drilling. Approximately 260 barrels of water (10,000 gallons) would

be needed to drill each well, for a total of up to 820,000 gallons (2.52 acre-feet) of water for the proposed drilling operations. This estimate also includes water needed for dust control on access roads.

No oil or oil-based drilling additives, chromium/metals-based mud, or saline mud would be used during drilling of the proposed wells. Only fresh water, biodegradable polymer soap, bentonite clay, and non-toxic additives would be used in the mud system. Any produced crude oil or condensate would be contained in on-site test tanks.

Depending on the location, each producing well would be drilled to an approximate depth of 7,000 feet to 10,000 feet (measured depth). Natural gas would be produced through perforations in the casing. The well control system would be designed to meet the conditions likely to be encountered in the hole and would conform to BLM requirements.

During the development phase, drill cuttings would be managed by burying them in the cuttings trench, as described above. Each well would generate approximately 385 cubic yards of cuttings. The cuttings are generally managed as they are generated so that once all the wells are drilled, all that remains is to cap the trench with native soils and recontour the area. If the size of the well pad is not sufficient to support a cuttings trench large enough to hold all of the cuttings, an off-site cuttings disposal site may be required.

## 2.7 Completion Operations

Completion operations are processes applied to the well bore after drilling has finished. These steps include running casing, perforating casing, and fracing.

Fracture stimulation is a method for stimulating a rock formation next to a well bore to increase production of oil, gas, and other fluids from the rock formation. Fracture stimulation consists of pumping a water and proppant (sand) mixture at high rates and pressures into the rock intervals that contain natural gas. The water is produced back leaving the proppant behind to keep the small fracture open. A fracture stimulation stage is the particular subsurface zone being fracture stimulated at any given time. Each proposed well would use approximately 170,000 gallons of water per fracture stimulation stage, and there would be five to seven fracture stimulation stages per well. The water used for completion operations would be recycled produced water from wells operated by Williams throughout the valley. It is not anticipated that other sources of water would be necessary.

### *2.7.1 Exploration Phase: Conventional Drilling*

Fracture stimulation and other completion operations during the exploration phase would be conducted on-site at each well pad. The fracture stimulations are typically conducted without a service rig and consist of pump trucks, sand trucks, and frac tanks. Mobile wireline trucks would be used to set plugs between zones and to set plugs in the wellbore to isolate the stimulations. Once the wells have completed all of the fracture stimulations, a mobile service rig (or coiled tubing unit or a snubbing unit) would be used to drill out all the plugs, clean out the wellbore, and land the production tubing.

Completion operations are expected to average 20 to 25 days per well, which includes all of the time to fracture stimulate each zone, drill out the plugs, and install the production tubing. During this time, natural gas is expected to be sold instead of vented or flared, as it is anticipated that gas gathering lines would be in place prior to the completion. If not, the well may be shut in or the gas may be vented for up to 30 days or until the gas gathering line is in place, whichever is less.

All water produced during this time would be recycled for use in subsequent fracture stimulations, and the condensate produced would be stored in tanks for sale.

### *2.7.2 Development Phase: Efficiency Drilling*

Using SIMOPS, the time to complete a well drilled with an efficiency rig would be the same as with a conventional rig; however, drilling and completion operations would be done simultaneously. **Figure 2** illustrates the process of SIMOPS drilling, completion, and production. As drilling for one well completes, the drilling rig moves either laterally or down the cellar to the next new well surface location. Once four drilled wells are exposed, completion procedures can begin on the exposed previously drilled well heads. Using SIMOPS, the completion operations do not need to wait until all wells have been drilled and the drilling rig moves off location.

Completion equipment would be located on the same pad as the drilling rig or at a centralized location, as noted in **Table 3**. Fracture stimulation during the development phase would be conducted at the well pad sites in Section 12 and at a proposed remote frac site for the well pads in Sections 1 and 2 (**Figure 1**).

Either temporary surface or buried pipelines would be used to transport completion fluids between the remote frac site and the well pad at which completion operations are being conducted.

Flowback fluids would be processed through Flowback Units on the well pad to separate the sand from the gas and liquids and subsequently processed in a three-phased separator to separate the gas from the produced water and condensate. The gas would be metered and delivered to the gas gathering system. The water and condensate would be separated and sent to tanks. Produced water would be recycled for subsequent fracture stimulations or transported by truck or pipeline to approved collection facilities. Condensate would be tank gauged and sold via truck.

The location of the completion facilities would be finalized once the development phase is initiated, and the information would be provided in the PODs. Wherever feasible, completion operations would be conducted using existing disturbed areas. Pipelines would be located adjacent to existing access roads wherever practical. In the event that equipment or temporary surface lines would need to be located in previously undisturbed areas (as identified in the POD), Williams would consult with BLM to ensure all facilities are placed in locations that would not adversely affect resource concerns.

## 2.8 Well Production Facilities

Production facilities would be designed and installed to accomplish the following objectives:

1. Separate well stream fluids into manageable products (gas, condensate, and water) from each well individually.

2. Deliver each product to its ultimate destination. Natural gas would be delivered to the gas gathering system via pipeline. Condensate would be pipelined or trucked to a point at which it can be sold, and water would be transported via pipeline or truck to its next destination (either the Rulison Evaporation Facility or the site of future fracture stimulation staging areas).

3. Accurately meter the volume of gas and condensate produced from each well/lease to assure mineral interest owners receive the correct value for these components. Each well can be controlled (choked) separately and production rates can be determined for each well every day. Natural gas would be metered prior to entering the gas gathering system. Condensate would be tank gauged or metered prior to sales.

To the extent feasible, Williams would consolidate the use of production facilities. The proposed system of gathering lines in the DMGAP is presented in **Figure 1** and **Table 3**, which consists of installation of new pipelines and upgrading of existing pipelines.

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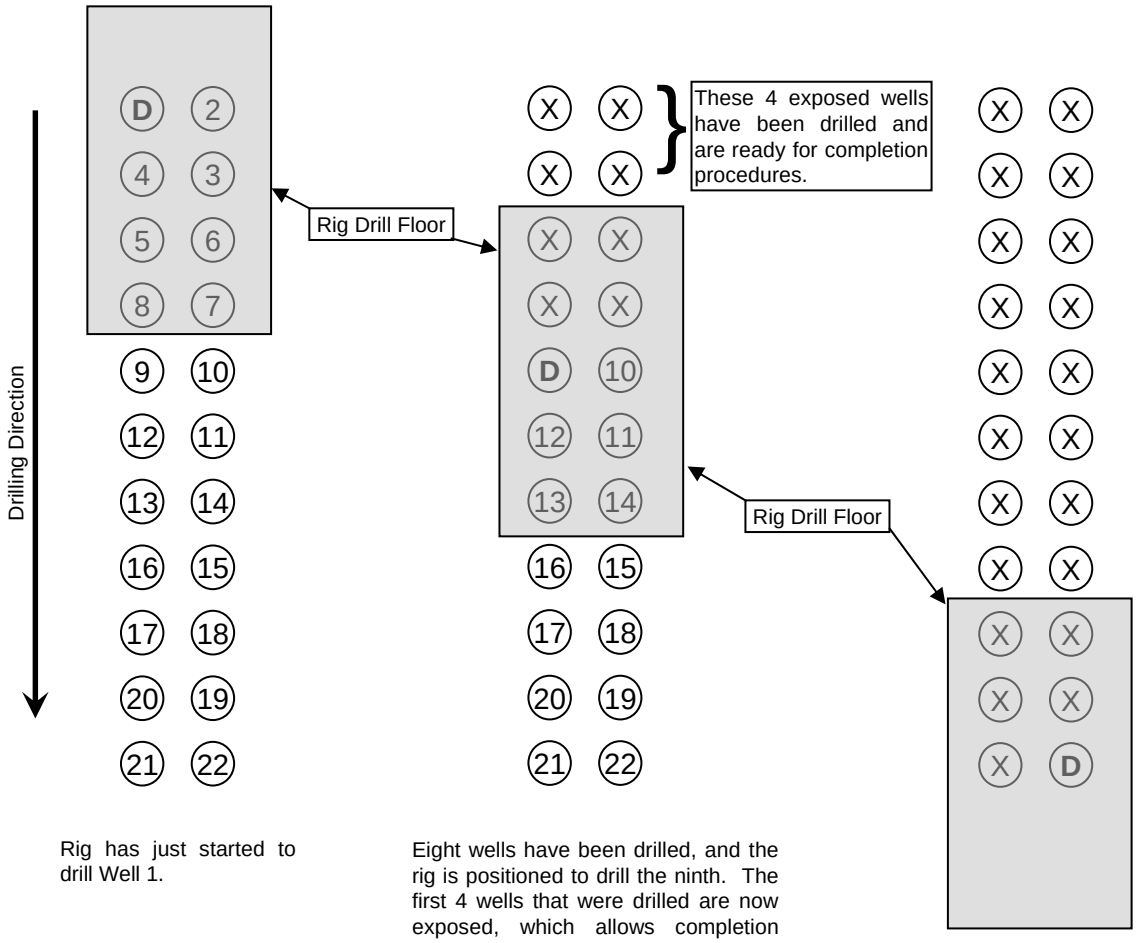


Rig has just started to drill Well 1.

Eight wells have been drilled, and the rig is positioned to drill the ninth. The first 4 wells that were drilled are now exposed, which allows completion procedures to begin.

All but Well 22 have been drilled. At this point, 16 well heads are exposed. While still drilling, 4 to 8 wells could be producing gas while the remaining 8 to 12 exposed wells are in various stages of completions.

**Figure 2 - SIMOPS Drilling, Completing, and Producing Williams Production – Parachute, CO.**

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### *2.8.1 Exploration Phase: Conventional Drilling*

During the exploration phase, the production equipment would be located on-site at each well pad and would consist of one separator per well, individual condensate tanks for each mineral interest, and two or more water tanks per pad (**Table 3**).

A gas gathering pipeline would be installed from each well pad site to transport gas to its final destination. The gas gathering pipelines would be constructed with steel pipe rated to handle the expected pressures and temperatures. This pipe would be buried where appropriate. Where possible, the gathering system would be located adjacent to access roads. Because the proposed action is phased development, for the DMGAP as a whole, installation of the gas gathering pipeline system would occur periodically throughout the 4-year period as pads are drilled and wells are brought on production.

During the exploration phase, installation of centralized production facilities is not anticipated; therefore pipelines to handle condensate and water are not expected to be in place initially.

Pipeline construction would occur within a 50-foot-wide easement, which is the maximum anticipated surface disturbance from this activity. The proposed action includes approximately 22,800 feet of gas pipeline construction and upgrades, resulting in a maximum of 26.2 acres of surface disturbance (**Table 3**). These impacts would be short-term, as pipeline corridors would be reclaimed to BLM specifications (**Appendix C**) as soon as practical after trenching and backfilling are complete (within 6 to 9 months). After construction, cut and fill slopes would be water-barred or regraded to conform to the surrounding topography and reclaimed to pre-disturbance appearance.

### *2.8.2 Development Phase: Efficiency Drilling*

The equipment required for production during the development phase includes one separator per well (usually bundled into units that can handle four wells each), multiple water tanks, and individual condensate tanks for each mineral interest per well pad (**Table 3**). Prior to the drilling of wells by the efficiency rig, production facilities would be installed for all four of the wells planned for efficiency drilling. Installation of these facilities prior to the drilling of the wells is necessary in order to perform SIMOPS.

During the development phase, gas would be metered at each separator and delivered down steel gas pipelines, as described for the exploration phase.

Once separated, the condensate would be trucked from an on-site condensate tank or conveyed down a dedicated condensate pipeline (installed in the same trench as the gas lines) to a central condensate tank facility, depending upon the location (as noted in **Table 3**). There would be a separate condensate pipeline for each mineral interest for royalty purposes. As the ownership of the condensate is the same for all of the wells sharing a condensate tank, individual production rates are not necessary for allocation of revenue; however, condensate production would be metered on each condensate convey line.

The produced water would be conveyed by a pipeline that terminates at a centralized collection facility (as noted in **Table 3**).

Condensate and water lines that are installed as part of this project would be collocated with the gas gathering system; therefore, these pipelines would not contribute to the total acres of surface disturbance. By transporting the condensate and water down pipelines to central locations, trucking to recover fluids (condensate and water) is substantially reduced.

No new compressor stations are anticipated within the DMGAP area.

## 2.9 Production Operations and Maintenance

Williams would operate all wells, pipelines, and ancillary production facilities in a safe manner, as set forth by standard industry operating guidelines and procedures. Routine maintenance of producing wells would be necessary to maximize performance and to recover all of the economic reserves possible. Critical data for each well would be accessible via telemetry with the host computer system in Williams' Parachute, Colorado office. Using this system, daily travel to each location is not necessary, as the parameters can be viewed and controlled remotely. Each well location would be visited several times per week to ensure that operations are proceeding in an efficient and safe manner. The visits would include checking separators, meters, valves, fittings, and on-site storage of produced water and condensates. The on-site equipment also would be routinely maintained, as necessary. Additionally, all roads and well locations would be regularly inspected and maintained to minimize erosion and assure safe operating conditions.

The exploration phase of the proposed action would be used to assess the productivity of the downhole resources accessed by each well pad and to select well pads for further development. Four well pads (PA 23-12, PA 34-12, W 37-1, and W 34-2) are proposed for both exploration and potential full development under this proposed action (**Table 2**). Six well pads (PA 34-12, Federal Rulison 14-95, SP 32-14, SP 44-13, SP 43-14, and SP 23-13) are proposed for solely the exploration phase under this proposed action (**Table 2**). Wells may be plugged and abandoned and well pads reclaimed if the wells are dry or non-producing. Other well pads may be selected for further development, which would be analyzed in a subsequent NEPA analysis.

## 2.10 Best Management Practices, Design Features, and Mitigation Measures

This section presents BMPs, design features, and mitigation measures that would be incorporated during implementation of the proposed action to minimize impacts to environmental or natural resources. Measures to be incorporated are also presented in the *Master APD* (Williams 2006a).

### *2.10.1 General*

- Williams would implement BMPs consistent with its environmental programs and in accordance with recommended state and Federal guidance and regulations. Wherever feasible, existing disturbed areas would be used to the maximum extent practical.
- Any spills or releases of regulated wastes or materials would be investigated, responded to, and remediated in accordance with BLM, Colorado Oil and Gas Conservation Commission (COGCC), and Colorado Department of Health and Environment (CDPHE) regulations and guidance.

### *2.10.2 Construction*

- Well pad locations, access roads, and ancillary facilities would be located, constructed, and maintained to avoid or minimize disturbance to natural and cultural resources, including perennial and intermittent streams, wetlands, and wildlife.
- All well pads, access roads, and ancillary facilities would be located in such a manner as to avoid or minimize wildlife habitat fragmentation.
- New roads would be constructed and existing roads maintained in accordance with the minimum standards for a BLM Resource Road, as outlined in BLM Manual 9113, and construction details outlined in the COAs.

- For all construction activities, stormwater controls would be placed to control erosion and sediment and materials runoff, in accordance with BLM requirements and state (CDPHE) stormwater regulations, permits, and plans.
- All construction activities that may affect "waters of the United States" as defined by Federal regulation would be evaluated to determine applicability of the U.S. Army Corps of Engineers (USACE) 404 permitting process, including Nationwide Permits.
- Water free of unacceptable contaminants, substances, or materials would be used for dust abatement, where deemed necessary. This water would be obtained from authorized sources, typically through contractors who have their own legal source of water.
- Signs would be posted as required by BLM to control traffic hazards and speed.

### *2.10.3 Drilling and Completion Operations*

- All materials used for drilling and completion operations would be managed to avoid or minimize the potential for an-offsite release. This may include berms, tarps, diversion ditches, and other acceptable methods. During the time that reserve pits are open, the pits would be closed off from wildlife and livestock by two strands of barbed wire above a woven wire fence.
- Water-based drilling muds would be used during the drilling process. MSDS sheets would be maintained on-site for both drilling and completion materials.
- All non-hazardous waste materials would be disposed of as required by state and county regulations.
- Closed loop drilling mud systems would be used with efficiency rigs. If reserve pits are used to contain fluids, they would be evaluated under Williams' Migratory Bird Management Plan to determine the need for netting or other exclusionary methods to protect wildlife.
- Completion fluids would be recycled as much as possible on the same location as the frac pumps to minimize trucking.

### *2.10.4 Production Equipment and Pipelines*

- Pipelines would be routed to avoid wetlands, wildlife, or other sensitive areas to the greatest extent practical. Topsoil and overburden material would be stockpiled and segregated.
- To minimize surface disturbance, wheel trenchers (ditchers) or ditch witches would be used where possible to construct pipeline trenches. Track hoes or other equipment would be used where topographic or other factors require their use.
- If trenches greater than 0.25 mile in length are open for the installation of pipelines, Williams would consult with BLM to determine the need for plugs and access bridges to allow livestock and wildlife to cross the trench.
- Pipelines will be reclaimed within 6 to 9 months with BLM prescribed seed mixes on Federal lands, and landowner prescribed seed mixes on private lands.

### *2.10.5 Production Operations and Maintenance*

- Production equipment would be equipped with solar panel-powered remote communications to monitor gas, water, and condensate levels so as to minimize traffic to and from well pads. Wherever possible equipment would be clustered in a single location.

- Following development of all wells within a prescribed area, gates and fences would be installed to allow for only required traffic to maintain production equipment and allow a workover rig every few years as dictated by maintenance needs. Public access would not be allowed.
- All tanks would be managed in accordance with Federal Spill Prevention Countermeasures and Controls (SPCC) and BLM regulations, including Onshore Order No. 7, as applicable.

### *2.10.6 Interim Reclamation*

After completion activities, Williams would reclaim all disturbed areas not needed for production. The areas that would undergo interim reclamation are presented in **Table 3** as short-term surface disturbance.

- Within 1 year of well completion, Williams would stabilize the disturbed area by recontouring, mulching, providing run-off and erosion control, seeding with BLM-prescribed native seed mixes (or sterile non-native grasses for seeding of topsoil piles), and conducting weed control, as necessary.

### *2.10.7 Abandonment*

Upon abandonment, each borehole would be plugged and abandoned and the associated surface equipment would be removed. Subsurface pipelines would be purged and plugged at specific intervals. A Sundry Notice would be submitted by the operator to the BLM that describes the engineering, technical, or 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. The BLM and COGCC standards for plugging would be followed. A configuration diagram, a summary of plugging procedures, and a job summary with techniques used to plug the well bore (e.g., cementation) would be included in the Sundry Notice.

### *2.10.8 Final Reclamation*

All surface disturbances would be reclaimed in accordance with the GSEO reclamation policies, including the COAs in (**Appendix C**) and the *Noxious and Invasive Weed Management Plan for Oil and Gas Operators* (BLM 2007a). Reclamation would include the following objectives:

- Recontour all disturbances to approximately the topography that existed prior to construction, and re-spread topsoil.
- Restore primary productivity of each site and establish diverse native vegetation that provides for natural plant and community succession.
- Establish native vegetation that is a vigorous and self-sustaining stand of desirable native plant species resistant to the invasion of noxious or undesirable species.
- Noxious weeds and other undesirable plant species inadvertently introduced due to soil disturbance during construction activities would be monitored and treated over the life of the project by methods approved by the authorized officer. Any herbicides needed for the control of noxious weeds and other undesirable species would be identified in a Pesticide Use Permit (PUP). The PUP would be placed on record with the BLM.
- In the long-term, reclaimed landscapes should have characteristics that approximate the original visual qualities and plant species composition of the surrounding area.

### *2.10.9 Big Game Habitat Mitigation and Enhancements*

Within the DMGAP area, openings/meadows within pinyon-juniper woodlands provide critical foraging habitat for deer and elk during winter. These openings, which are often dominated by decadent sagebrush, are slowly being replaced by young juniper. As the landscape loses this patchwork quality, the healthy balance (i.e., forage to cover) of habitat types is lost, and the overall value of the area to wildlife is diminished.

Williams, in conjunction with BLM and the Colorado Division of Wildlife (CDOW), proposes to contribute to the improvement of the habitat through the implementation of a *Habitat Mitigation Plan* (**Appendix E**) aimed at restoring a multi-age sagebrush community and increasing the diversity and abundance of native grasses and forbs in the DMGAP area. Williams proposes to accomplish this by:

- Promoting regrowth of sagebrush within identified openings in pinyon-juniper woodlands present on the lower slopes of the DMGAP area. This objective would be achieved by removing in-growth of young juniper and mowing unproductive decadent growth of sagebrush. Where practical, broadcast seeding of native grass species within these treated areas would be used to inhibit growth of cheat grass and allow reestablishment of native species.
- Where dense stands of Gambel oak and other species of the mountain shrub community are encountered, mowing and/or hydro-axing of old-growth would be utilized to encourage regrowth of understory species and provide enhanced access for big game.

Up to 75 acres are proposed for treatment. In areas degraded by encroaching pinyon-juniper, removal of trees would approach 100 percent, and approximately 20 to 25 percent of decadent sagebrush would be mowed. In areas dominated by decadent sagebrush, approximately 40 to 60 percent would be mowed. Approximately 25 to 50 percent of oakbrush would be mowed in treatment areas where dense stands of this vegetation type prevent the growth of herbaceous species. In some cases, large patches of existing vegetation would be left for cover.

Treatments would emphasize the creation of diverse edge patterns along the perimeter of each treatment area to create mosaic patterns. Borders of treatment areas would be irregular, with edges that “feather” from treated to untreated areas. Project timing would consider precipitation, temperature, land use including natural gas development, as well as seasonal impacts to wildlife that use the DMGAP area.

If needed, the treatment areas would be seeded to further promote the establishment of native species. Seed mixtures would include a mix of native species occurring on the site, whenever possible. Non-native species would not be used except where no appropriate native plants are available. If non-native species are used, they would be non-competitive and non-invasive.

In addition to the habitat treatments, Williams proposes to limit activity associated with the developmental aspects of the proposed action by:

- Reducing human disturbance in important habitat areas during critical times of the year by installing gates and closing roads,
- Using telemetry to collect well production data, and
- Accessing well site locations during the times of the day when wildlife is not likely to be present in the area.

The proposed habitat improvements would be carried out over multiple years as pad development occurs. This approach would allow monitoring and, if needed, adjustments necessary to achieve desired

outcomes. Initial improvements would occur during the late summer and fall of 2007. Reductions in access would occur as practicable and other limitations on activity in the area would be implemented as standard operating procedures.

## 3.0 NO ACTION ALTERNATIVE

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. The no action alternative constitutes denial of all of the APDs associated with the proposed action. All of the proposed well pads require Federal approval prior to implementation because all are located on Federal surface. For the purpose of the following comparative analysis, under the no action alternative the project area would undergo none of the development as described for the proposed action, including activities associated with pads, roads, pipelines, and staging areas. However, additional natural gas development could occur on private lands within the DMGAP area under APDs approved by COGCC, and other forms of surface disturbance could occur within the DMGAP area.

## 4.0 ALTERNATIVES CONSIDERED DURING DEVELOPMENT OF THE DMGAP

An alternative to the proposed action is considered reasonable if it is feasible and would achieve the purpose and need. This section describes the alternatives that were considered but eliminated from the DMGAP. Section 4.1 presents modifications that were made to the proposed project components as a result of consultation with resource specialists. Evaluation during the planning process determined that the components initially proposed did not sufficiently address the relevant resource issues. Similarly, Section 4.2 presents alternative access routes that were evaluated as part of the planning process but were not included in the plan because they did not meet the objectives of the proposed action. Alternative 4 was selected as the preferred access route alternative, and is included as part of the proposed action. The alternative presented in Section 4.3 was not included because it is not considered to be a practical option.

### 4.1 Project Component Modifications

The proposed locations of the various project components, including pads, roads, and pipelines, reflect the results of field visits conducted by BLM, Williams, and subcontractors to assess proposed well pad layout, proposed access routes and pipelines, erosion control, and reclamation potential. The primary purpose of the field visits was to assess potential resource impacts associated with the implementation of the proposed action, and revisions to the design of the proposed facilities were made to minimize potential impacts. This section presents a summary of the modifications made to the proposed action based on BLM comments. In addition, specific locations for some of these components may also be updated in required PODs and as stipulated in the APDs.

Notable modifications include the following:

- Pads, roads, and pipelines were relocated away from known cultural sites given buffers provided by BLM.
- Pads, roads, and pipelines were relocated away from known raptor nests.
- Two pad sites were moved to reduce visual impacts.
- Roads were rerouted to avoid and reduce visual impacts.
- Roads were rerouted to minimize impacts to riparian areas and minimize the associated impacts on big game.

- Pipelines were collocated and aligned with roads wherever possible to minimize surface disturbance.
- One pad was moved to avoid steep slope and erosion concerns.
- Wells were consolidated to eliminate one drilling pad.
- A consolidated tank battery was placed on private land to avoid Federal land.

## 4.2 Access Road Alternatives

Several alternative access routes were evaluated to meet the objectives of the proposed action. Access roads within the DMGAP area were selected based upon the following criteria:

- Use existing disturbance, if possible.
- Meet maximum grade limit of 10 to 12 percent.
- Accommodate pipelines and pipeline routes so as to deliver completion fluids and produced fluids to centralized locations as much as practical.
- Avoid areas of concern (cultural or paleontological sites, threatened and endangered species, BLM sensitive species, wildlife impacts, visual resources).
- If unable to avoid areas of concern, select the route that can be best mitigated to minimize the impact.
- All minerals in the DMGAP area are owned by the BLM; therefore, the disturbance should remain on BLM surface, where practical, to avoid economically adverse costs from private parties with no share of the mineral interest.

Four alternative access routes were evaluated to meet the objectives of the proposed action and the criteria described above:

- <u>Alternative 1: Use existing road from CR 302 to BLM tower.</u> This road has a grade of 12 to 22 percent, which is too steep. In order to develop an access route from this direction, the road would have to be lengthened significantly to get to an acceptable 10 percent grade. This eliminates the opportunity to use the existing disturbance in this area.

- <u>Alternative 2: Develop new road from Section 11 into Section 14 utilizing existing disturbance in Section 11.</u> This route would require at least three switchbacks from SW Section 11 to reach a point from which to access the proposed pad sites in Section 14 and 13 and maintain a maximum grade of 10 to 12 percent. There are three primary concerns with this route: 1) the surface in Section 11 is privately owned, and the minerals in Section 13 and 14 are owned by the BLM; 2) the mineral leases in Section 11 are pooled but not operated by Williams, and therefore Williams has little to no bargaining position to negotiate the construction of a road; and 3) these switchbacks could pose a visual concern.

- <u>Alternatives 3a, 3b, and 3c: Develop new road from CR 302 in SE Section 15 or NW Section 23 to a point from which to access the proposed pad sites in Sections 13 and 14.</u> Several routes were explored to develop a viable access road from the south and still meet the objectives. Only one of these alternatives met the maximum grade objective; however, operational concerns arose. The proposed development calls for centralizing production facilities in the northern half of Section 12 because this is near existing infrastructure (gas gathering system, water management system, and access roads). Developing the access road to the well sites located in Sections 13 and 14 from the south would then require additional infrastructure to be built near CR 302 where none

exists now. This would lead to greater impacts than if the access road were developed from the north.

- Alternative 4: Develop new road linking the proposed development and existing infrastructure in Section 12 into Section 13 or 14. A route was identified that 1) best met the criteria for maximum grade; 2) accommodated pipelines and other infrastructure; 3) avoided known cultural and paleontological sites; and 4) avoided impacts to threatened or endangered species or their occupied habitat.

Of these alternatives, Alternative 4 was selected to be incorporated into the proposed action because it best met the criteria presented above.

### 4.3 Development Using Conventional Drilling

An alternative to the proposed action could include conducting all well development via conventional drilling instead of using efficiency drilling. This alternative is not considered to be a practical option. Using conventional drilling technology, up to eight wells can be drilled at a single well pad, whereas, using efficiency drilling technology, up to 22 wells can be drilled at a single well pad. Development is proposed in Sections 1, 2, and 12 using four well pads. To fully implement the proposed development with the use of solely conventional rig technology, at least three more well pads would be required and possibly more depending upon topography, access, and other on-site conditions. In addition to the long-term disturbance that would result from these additional pads, this alternative would also require more road construction and pipeline construction.

## 5.0 SUMMARY OF LEASE AND GRANT STIPULATIONS

The Federal leases within the DMGAP area were all issued prior to any NEPA regulations and stipulations. Their effective lease dates are as follows: COC01524 – May 1951, COC06934 – February 1955, COC05173 – January 1953, and COC06266 – January 1955. Although no special stipulations or notices are included on the leases, any protective measures deemed appropriate by the BLM could be applied to developments on these leases through the application of COAs on individual APDs.

## 6.0 LAND USE PLAN CONFORMANCE REVIEW

The proposed action and no action alternative are subject to and have been reviewed for conformance with the following plan (43 CFR 1610.5, BLM 1617.3):

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

Date Approved: Amended in November 1991 – Oil and Gas Leasing and Development - Final Supplemental Environmental Impact Statement (BLM 1991); amended in March 1999 – Oil and Gas Leasing & Development Final Supplemental Environmental Impact Statement (BLM 1999a).

Decision Number/Page: Record of Decision, Glenwood Springs Resource Management Plan Amendment, November 1991, page 3 (BLM 1999a); Record of Decision, Glenwood Springs Resource Management Plan Amendment, March 1999, page 15 (BLM 1999a).

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...” (BLM 1991). 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) that describes a minimum of 2 to 3 years activity for operator-controlled federal 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 proposed for development is open for oil and gas leasing and development. In addition, the proposed action describes a multi-year development plan over a large geographic area and is in conformance with decision to require operators to submit GAPs.

## 7.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Section 7.0 provides a description of the human and natural environment resources that could be affected by the proposed action (Section 2.0) and no action alternative (Section 3.0). In addition, this section presents comparative analyses of the direct and indirect consequences on the affected environment stemming from the implementation of the various actions.

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, presented in **Table 6**. Not all of the critical elements that require inclusion in this EA are present or, if they are present, they may not be affected by the proposed action and no action alternative. The mandatory critical elements that were identified as present (**Table 6**) are described and analyzed in Section 7.1 Critical Environmental Elements. In addition to the mandatory critical elements, other resources that were identified as present and applicable (**Table 11**) are described and analyzed in Section 7.2 Other Affected Resources.

The analysis area is defined for each resource and is based on the nature of the resource. For some resources, the analysis area is the DMGAP area, and for other resources the analysis area encompasses a larger area. For example, a larger area is analyzed for wildlife species, which are mobile, versus plant species, which are stationary. The proposed facilities and activities are analyzed in terms of short-term and long-term effects, as described in the following paragraphs.

- Long-term impacts include surface conversion resulting from construction of well pads and roads, and production and maintenance activities that would extend for the life of the project. The life of the proposed project is estimated to extend up to 35 years because the reasonable productive life of a gas well completed in the Mesaverde Group is 30 to 35 years. Because phased development is proposed, activities resulting in long-term impacts would be initiated and terminated periodically throughout the course of the plan's implementation.
- Short-term impacts include temporary disturbance from the construction of pads, roads, and pipelines, including staging areas, and other impacts that would be limited to the drilling and completion activities. Generally, implementation of the short-term project activities would last for 1 to 2 years. However, because phased development is proposed, activities resulting in short-term impacts would be initiated and terminated periodically throughout the course of the plan's implementation, and the period of construction, drilling, and completion would extend for a total of 4 years for the DMGAP as a whole.
- The effect of a particular project activity may have short-term or long-term effects depending on the specific natural resource addressed; therefore, in the Environmental Consequences sections of this document the duration of impacts are evaluated on a resource basis and specifically defined where they differ from the durations described above.

The following two sections, 7.1 Critical Environmental Elements, and Section 7.2 Other Affected Resources, present the following information for each resource:

- Affected environment, which describes the existing resources in the analysis area. The existing baseline conditions in the DMGAP area are a result of past and present activities in the area. Aspects of the baseline condition that affect a specific resource are presented in the discussion for that resource. The major developments and uses that currently exist in the project area that are common to all resources include:
    - Oil and gas surface facilities in Sections 1, 2, 12, and 14
    - Pipelines: 0.2 mile in Section 1, 3.2 miles in Section 2, and 0.5 mile in Section 12
    - Two separate electrical transmission lines crossing the DMGAP area – one in Sections 12 and 14 and another in Sections 1 and 2
    - Cell tower in Section 14
    - 0.9 mile of County Road 309 (Rulison-Parachute Road) in Section 2 and 0.8 mile of County Road 301 (Morrisania Mesa Road) in Section 12
    - Other improved and unimproved secondary roads which are used to access the features listed above: 0.5 mile in Section 1, 3.2 miles in Section 2, 2.9 miles in Section 12, and 1.3 miles in Section 14
- Environmental consequences, which describes the potential impacts under the proposed action. The impact analyses take into account the BMPs, design features, and mitigation measures described in Section 2.10 of this EA, the *Master APD* (Williams 2006a), General Surface Use COAs (**Appendix C**), and Site-Specific and Downhole COAs (**Appendix D**). Additional, site-specific COAs would be established as appropriate during the APD process.

- Environmental consequences under the no action alternative

## 7.1 Critical Environmental Elements

Critical environmental elements are listed in **Table 6** and discussed in the following subsections.

| Table 6. Critical Elements of the Human Environment | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ***Critical Element*** | ***Present*** | | ***Affected*** | | ***Critical Element*** | ***Present*** | | ***Affected*** | |
| | Yes | No | Yes | No | | Yes | No | Yes | No |
| Air Quality | X | | X | | Prime or Unique Farmlands | X | | X | |
| 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 | X | | | X |
| Migratory Birds | X | | X | | Wilderness and Wilderness Study Areas (WSAs) | | X | | X |
| Native American Religious Concerns | X | | | X | | | | | |
| * Source: Public Land Health Standard (BLM 1997) | | | | | | | | | |

### *7.1.1 Air Quality*

Affected Environment: The analysis area for air quality is Garfield County, Colorado. This county 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 amounts are determined to be below NAAQS standards.

*Proposed Action:*

Environmental Consequences: The Roan Plateau RMP Amendment (RMPA) and Environmental Impact Statement (EIS) describe potential effects from oil and gas development (BLM 2006a: 4-26 to 4-37). Analysis was completed with regard to greenhouse gas emissions, a near-field and far-field analysis for carbon monoxide, particulate matter ($PM_{10}$ and $PM_{2.5}$), sulfur dioxide, and hazardous air pollutants including: benzene, ethylbenzene, formaldehyde, hydrogen sulfide, toluene, and xylenes. Sulfur and nitrogen deposition analysis, acid neutralizing capacity, and visibility screening-level analysis were also completed in the Roan Plateau RMPA and EIS (BLM 2006a). Findings indicate that no adverse long-term effects would result under that plan. Since the proposed action is within the scope of the reasonable foreseeable development (RFD) scenario analyzed in that document, it is anticipated that the proposed action would be unlikely to have adverse effects on air quality.

Activities described in the proposed action would result in localized short-term increases in vehicle and equipment emissions. Concentrations of emissions would be below applicable ambient air quality standards as analyzed in the Roan Plateau RMPA and EIS (BLM 2006a). However, it is anticipated that construction and production activities would likely produce high levels of dust in dry conditions without

dust abatement. To mitigate dust generated by these activities, the operator 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 BLM authorized officer (**Appendix C, Number 2**).

Williams would obtain approval from the GSEO to vent/flare gas, per the *Master APD* (Williams 2006a).

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, ongoing oil and gas production activities in the analysis area would be allowed to continue but the proposed project would not be implemented. Under this alternative, air quality would be impacted by emissions and dust from other oil and gas exploration projects, but no significant, adverse impacts to air quality would occur. Air quality in the analysis area would be slightly better under this alternative than it would be under the proposed action due to the reduced oil and gas production activities in the DMGAP area.

### *7.1.2 Areas of Critical Environmental Concern (ACECs)*

Affected Environment: Areas of Critical Environmental Concern (ACECs) are areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards (Federal Land Policy and Management Act [FLPMA] Section 103(a)). The ACEC designation is a BLM administrative designation that is accomplished through the land use planning process. The closest ACEC is the Lower Colorado River ACEC, which is located in a braid of the Colorado River approximately 0.75 mile north of the DMGAP area (BLM 2007b).

*Proposed Action:*

Environmental Consequences: The Lower Colorado River is designated as an ACEC because of the riparian habitat it contains (BLM 2004). The proposed action would not affect this value because there would be no activity at or near to the designated riparian habitat.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, there would be no impact to the Lower Colorado River that is designated as an ACEC because no development would occur.

### *7.1.3 Cultural Resources*

Affected Environment: Section 106 of the National Historic Preservation Act (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470) and its implementing regulations found at 36 CFR Part 800 require Federal agencies to take into account the effect of their actions on cultural resources for any endeavor that involves Federal monies, Federal permitting or certification, or Federal lands. Projects that extend on to private land from Federal land, or that involve Federal minerals, or that otherwise would not be feasible if all Federal involvement were eliminated, are required to consider the effects to historic properties over the entire area of potential effect of the project, regardless of surface ownership. Therefore, the analysis area for cultural resources is the entire DMGAP area, whether the surface ownership is Federal or private.

Cultural resource investigations have been conducted or are in the process of being conducted for all areas of proposed surface disturbance. The four inventories conducted to date are summarized below:

- Class III intensive cultural resource inventory; 40 acres intensively inventoried; T7S R95W Section 12 NWNW quarter (portion of the DMGAP area and adjacent area); identified one newly recorded site not eligible for listing on the National Register of Historic Places (NRHP) (Grand River Institute [GRI] 2006a).
- Class III intensive cultural resource inventory; 77 acres intensively inventoried; T7S R95W Section 2 northern half (portion of the DMGAP area); identified two newly recorded sites, one of which is eligible for NRHP listing; identified one isolated find not eligible for NRHP listing (GRI 2006b).
- Class III intensive cultural resource inventory, three block acreages, 2,940 acres total, 1,900 acres intensively inventoried; T7S R95W Sections 1, 2, 9, 10, 12, 13, 14, 15, 16 and 23 (portion of DMGAP area and adjacent area); identified eight newly recorded sites not eligible for NRHP listing; identified five newly recorded isolated finds not eligible for NRHP listing; identified one previously recorded site not eligible for NRHP listing; identified seven previously recorded sites that are eligible for NRHP listing, including two historic ditches and five prehistoric sites (GRI 2006c).
- Class III intensive cultural resource inventory, two blocks totaling 125 acres; T7S R95W Sections 2 and 12; identified two newly recorded sites not eligible to the NRHP, and one historic isolated find not eligible to the NRHP (GRI 2007).

In summary, the inventories conducted within and adjacent to the DMGAP area have identified 28 areas containing cultural resources:

- Eight sites eligible for NRHP listing/historic properties
- Thirteen sites not eligible for NRHP listing
- Seven isolated finds not eligible for NRHP listing

No formal consultation was initiated with the Colorado State Historic Preservation Office (SHPO), as all historic properties identified during the inventories would be avoided by various methods, including rerouting and/or relocation of facilities. Based upon the Class III inventories and the avoidance of all historic properties, the BLM made a determination of "**No Historic Properties Affected"** for Williams' proposed actions within the DMGAP. 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)].

One of the prehistoric open camps within the DMGAP area is identified as 5GF1323, and is eligible for the NRHP based on recent surface inventory, which identified several diagnostic Paleo-Indian and Archaic Period projectile points. As these early period sites are rare in this resource area, additional investigation is recommended for this site, and BLM will conduct testing in the near future.

*Proposed Action:*

Environmental Consequences: The proposed action was designed to avoid all sites eligible for NRHP listing and would not cause removal or project-related direct disturbance to these cultural resources.

The proposed action would cause increased human activity in the DMGAP area in the form of project workforce, particularly during construction. New roads also have the potential to increase access by the general public; therefore, the proposed action would increase the risk of disturbance, vandalism, collection, or excavation at known or undiscovered cultural resources sites in the project area.

The following mitigation measures would be implemented to minimize the potential for incidental impacts to cultural resources. A standard education/discovery COA for cultural resource protection would be attached to the APDs (**Appendix C, Number 3**). Barricades or a monitor during construction and completion activities may be required, which would be determined on a site-specific basis during the APD process.

Though project activity itself may not physically impact cultural resources, construction in proximity to a cultural resource may in fact adversely impact the significance of a cultural resource by changing the setting, location, association, and feeling, particularly for culturally sensitive Native American sites or areas of concern. These changes may not be quantifiable at the level of individual sites, but the cumulative effects of these changes over time and over the entire DMGAP will result in degradation of the condition and integrity of setting, location, association, and feeling for which the surrounding landscape is a part of the site's significance.

*No Action Alternative*:

Environmental Consequences: No development would take place on Federal surface in the DMGAP under this alternative; therefore, no direct impacts to cultural resources would occur. However, the no action alternative would not include the education/discovery COA designed to protect cultural resources. The lack of this mitigating measure could lead to illegal collection, excavation, or vandalism. Additionally, scientific excavation at 5GF1323 would still take place, as the funding for the work proposed at this site is not tied to/predicated on actions proposed in the DMGAP.

### *7.1.4 Floodplains*

Affected Environment: The analysis area for floodplains includes the floodplain system that occurs in, adjacent to, or downstream of the DMGAP area. No Federal Emergency Management Agency (FEMA) floodplain data are available for Garfield County, Colorado. However, **Figure 3** shows the Colorado River 100-year floodplain, as mapped by the U.S. Fish and Wildlife Service (USFWS) (BLM 2007a). USFWS has mapped the Colorado River and its 100-year floodplain as designated critical habitat for the Colorado pikeminnow and the razorback sucker. This floodplain extends east-west approximately 400 feet north of the DMGAP's northern area.

*Proposed Action:*

Environmental Consequences: Naturally functioning floodplains provide significant biological functions that include: floodwater and sediment storage, contaminant filtering capabilities, and riverine wetland habitat for many forms of life (National Wildlife Federation 1998 in California Department of Water Resources 2005).

No surface disturbing activities would occur within the Colorado River 100-year floodplain. In addition, the COAs (**Appendix C, Numbers 4-7**) designed to prevent and minimize erosion and runoff would also prevent sedimentation of the floodplain. Therefore, the proposed action would not affect the function of the Colorado River floodplain.

*No Action Alternative:*

Environmental Consequences: Under the no action alternative, no surface disturbing activities would occur within the Colorado River 100-year floodplain. Other oil and gas development adjacent to the floodplain would still occur. This alternative would not affect the function of the 100-year floodplain.

### *7.1.5 Invasive Non-native Species*

Affected Environment: Invasive non-native plants have been introduced into an environment where they did not evolve, and as a result, do not have any natural enemies (such as insects or other plants) to limit their production (Oregon Invasive Species Council 2007). Noxious weeds are a subset of invasive species that is commonly defined as a plant that grows out of place and is competitive, persistent, and pernicious (James et al. 1991 as cited in BLM 2007c). The analysis area for noxious weeds and other invasive non-native plant species is the DMGAP area.

Eleven invasive non-native species were commonly encountered during surveys in the DMGAP area (WestWater 2007a, b), nine of which are Colorado state-listed noxious weed species (Colorado Department of Agriculture 2005; **Table 7**). Cheatgrass was common in most areas. Houndstongue was abundant near streams and wetland areas. Canada thistle, burdock, plumeless thistle, musk thistle, and bull thistle were also found near wet areas, but were not very common. Mullein was frequently found throughout various habitats of the DMGAP area. Bindweed and yellow sweetclover were found in previously disturbed areas (WestWater 2007a, b).

**Table 7. Invasive Non-native Species in the DMGAP Area**

| Scientific Name [1] | Common Name | Colorado Noxious Weed List [2] |
|---|---|---|
| *Agropyron cristatum* | crested wheatgrass | Not listed |
| *Arctium minus* | common burdock | C |
| *Bromus tectorum* | cheatgrass, downy brome | C |
| *Carduus acanthoides* | plumeless thistle | B |
| *Carduus nutans* | musk thistle | B |
| *Cirsium arvense* | Canada thistle | B |
| *Cirsium vulgare* | bull thistle | B |
| *Convolvulus arvensis* | field bindweed | C |
| *Cynoglossum officinale* | houndstongue | B |
| *Melilotus officinalis* | yellow sweetclover | Not listed |
| *Verbascum thapsus* | common mullein | C |

[1] Source: WestWater 2007a, b
[2] Source: Colorado Department of Agriculture 2005

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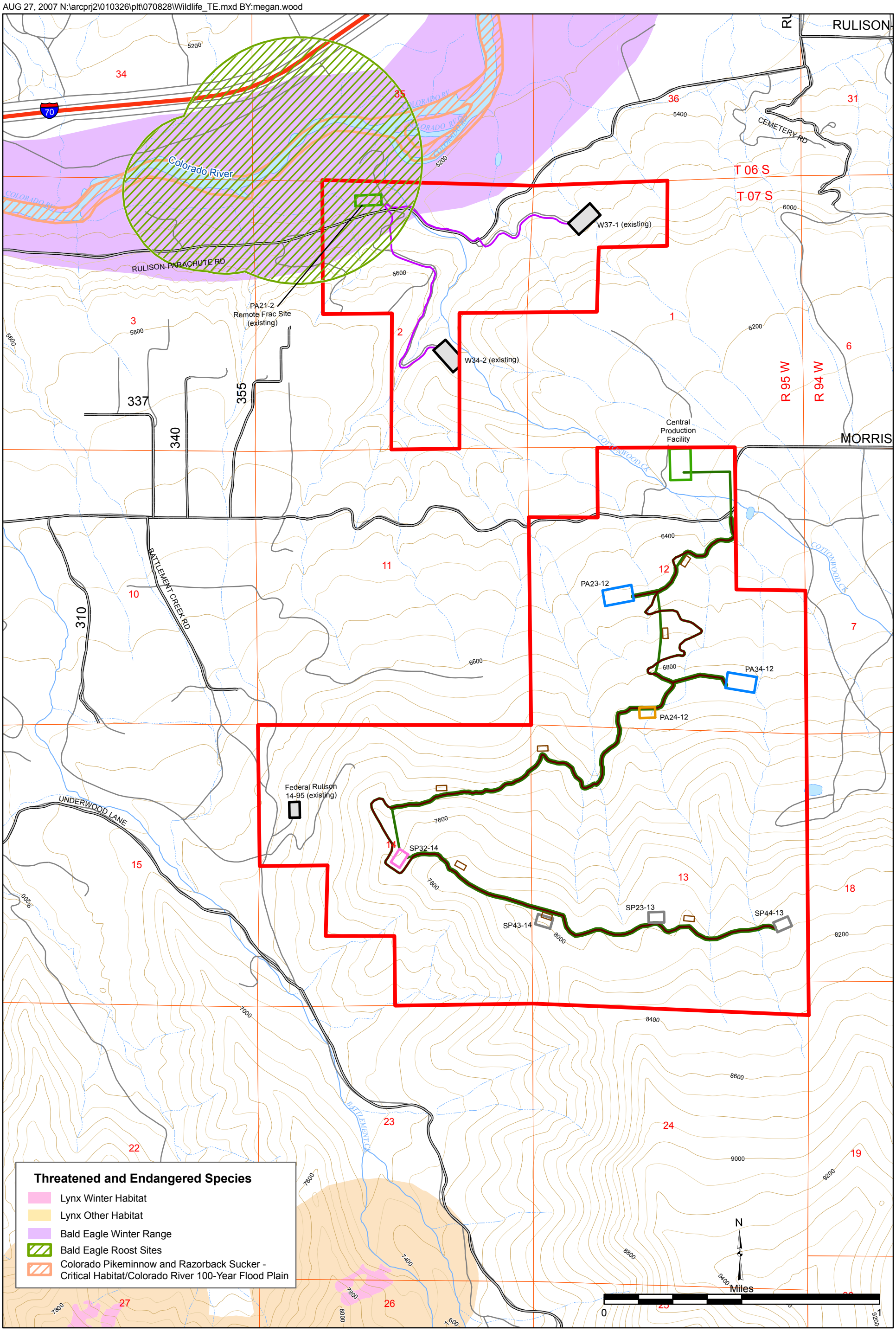


Highways
County Roads
Other Existing Road
**Proposed/Existing Pad**
Existing Pad
2007
2008
2009
2010
Proposed Frac Line
and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road
Offsite Facility
Proposed Staging Area
(Pipeline Construction)
DMGAP Boundary

AUG 27, 2007

**FIGURE 3**

**WILDLIFE RESOURCES**

**THREATENED AND ENDANGERED SPECIES**

**WILLIAMS PRODUCTION - PARACHUTE, CO**

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*Proposed Action:*

Environmental Consequences: Surface-disturbing activities create conditions favorable for the invasion and establishment of noxious weeds and other invasive non-native species, particularly when these species are already present in the surrounding area. In addition, roads provide a major conduit and an increase in traffic volume can contribute to the introduction or spread of these species, especially in arid and semiarid landscapes of the American West (Gelbard and Belnap 2003). Areas where vegetation removal occurs would be the most vulnerable to invasions. Clearing sites of existing native vegetation, disturbing and/or mixing soils, cut and fill, and grading for roads, pipelines, and well pads would leave soils exposed, making them susceptible to weed establishment (Trombulak and Frissell 2000). Equipment used to construct proposed well pads, roads, pipelines, and to conduct the proposed big game habitat mitigation activities could transport undesirable seeds and plant parts that could lead to the transport of weeds and non-native plant species throughout the DMGAP area.

The presence of noxious weeds and other invasive non-native species can negatively impact a variety of resources. These species compete with and can ultimately cause complete replacement of native plants, resulting in the loss of species diversity and ecosystem functions. Extensive infestations of these species can also reduce or fragment wildlife habitats, cause increased soil erosion, and reduce the overall visual character of an area.

Mitigation measures that would be implemented to minimize the potential for the establishment of invasive non-native species are presented in **Appendix C** (**Numbers 7 and 8**) and the *Master APD* (Williams 2006a). Williams would comply with the requirements of the GSEO *Noxious and Invasive Weed Management Plan for Oil and Gas Operators* (BLM 2007a) and the *Revisions to BLM Energy Office Revegetation Requirements* (BLM 2007d). Williams would implement a reclamation program that includes guidelines for seedbed preparation, seed application, erosion control, site protection, and reporting. Williams would also implement a weed control program that includes guidelines for monitoring, treating, and controlling noxious weeds, and a Pesticide Use Proposal.

The activities proposed under the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) would cause a minor increase in soil erosion and disturbance, and thus a minor increase in the potential for spread of invasive species. However, in the areas proposed for habitat treatments, the distribution of noxious weeds and other invasive species is low, and rubber tired vehicles (versus tracked equipment) would be used for vegetation treatments to minimize the potential for spread of invasive species. The following criteria were considered when developing the plan: invasive, non-desirable plant species need to be controlled; and identification and treatment of such plants is important prior to, during, and following ground disturbing projects. In development of the plan, the following guidelines were followed to minimize impacts from invasive species: if needed, the treatment areas would be seeded to further promote the establishment of native species; re-seeding mixtures would include a mix of native species occurring on the site, and, whenever possible local eco-types would be used; non-native species would not be used except where no appropriate native plants are available; and if non-native species are used, they would be non-competitive and non-invasive.

In summary, the proposed action may cause a low to moderate increase in invasive non-native species abundance in the plan area, but implementation of the mitigation measures would prevent extensive establishment of these species.

*No Action Alternative*:

Environmental Consequences: None of the proposed surface disturbance or traffic increase on Federal surface would occur in this alternative; therefore, the likelihood of the DMGAP area incurring invasion or

spread of invasive non-native species would remain at the current level. Because invasive species are already present in the area and portions of the DMGAP area would still be used to access the existing development, there would be potential for invasion and spread; however, the portions of the DMGAP area with a limited amount of activity would maintain a relatively low abundance of invasive species.

### *7.1.6 Migratory Birds*

Affected Environment: The analysis area for migratory birds includes the DMGAP area and a 0.5-mile buffer beyond its boundary. During surveys in and adjacent to the DMGAP area (WestWater 2007a, b), the dominant habitat types present were characterized and evaluated for their suitability to support raptors and other Birds of Conservation Concern (BCC) (USFWS 2002). Other data recorded during the surveys included observations of individual raptors and identification of raptor nests.

Modeled vegetation types used to determine habitats in the analysis area are presented in Section 7.2.10 Vegetation. The diversity of habitat types in the analysis area provides cover, forage, and nesting habitat for a variety of migratory birds (WestWater 2007a). Suitable raptor nesting habitats occur throughout the analysis area but tend to be concentrated in the mature stands of trees (WestWater 2007a).

Based on the habitat evaluations conducted in and adjacent to the DMGAP area (WestWater 2007a, b) and information provided in the Southern Rockies/Colorado Plateau BCC list (USFWS 2002) and the Colorado Breeding Bird Atlas (Breeding Bird Atlas Explorer 2007), five BCC raptor species may nest in the analysis area: flammulated owl (*Otus flammeolus*), golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), ferruginous hawk (*Buteo regalis*), and Swainson's hawk (*Buteo swainsoni*) (WestWater 2007a, b). In addition, nine other raptor species have the potential to occur in the analysis area: great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), northern saw-whet owl (*Aegolius acadicus*), American kestrel (*Falco sparverius*), northern goshawk (*Accipiter gentilis*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk (*Buteo jamaicensis*), and bald eagle (*Haliaeetus leucocephalus*) (WestWater 2007a, b). Thirty-eight stick nests were found during the surveys in and adjacent to the DMGAP area (WestWater 2007a, b). Because some of the surveys were conducted outside the breeding season, the activity status of all nests was not confirmed. However, based on the characteristics of the nests at the time of the surveys, 11 of the nests appeared to have been active during the 2006 breeding season, 20 appeared to have been inactive, and 7 were of unknown status (WestWater 2007a, b). Approximately half of the nests were found in mature Gambel oak stands (WestWater 2007a). Red-tailed hawks and Cooper's hawks are likely to be the most common raptor species in the analysis area (WestWater 2007a, b).

Based on the habitat evaluations conducted in the DMGAP area (WestWater 2007a, b) and information provided in the Southern Rockies/Colorado Plateau BCC list (USFWS 2002) and the Colorado Breeding Bird Atlas (Breeding Bird Atlas Explorer 2007), the analysis area provides suitable habitats for neotropical BCC species (USFWS 2002) that nest in Garfield County, Colorado, including Williamson's sapsucker (*Sphyrapicus thyroideus*), Lewis's woodpecker (*Melanerpes lewis*), pinyon jay (*Gymnorhinus cyanocephalus*), black-throated gray warbler (*Dendroica nigrescens*), and Virginia's warbler (*Vermivora virginiae*) (WestWater 2007a, b). Other species that are not on the BCC list but are associated with the habitat types in the analysis area include residents such as the juniper titmouse (*Baeolophus griseus*) and Townsend's solitaire (*Myadestes townsendi*) and migrants such as the common poorwill (*Phalaenoptilus nuttallii*), gray flycatcher (*Empidonax wrightii*), and blue-gray gnatcatcher (*Polioptila caerulea*).

*Proposed Action:*

Environmental Consequences: Direct effects to migratory birds may include mortality, disturbance, nest abandonment/nesting attempt failure, or site avoidance/displacement from otherwise suitable habitats. These effects may result from 67.9 acres of land type conversion activities, use of reserve pits, increased

noise from vehicles and operation of equipment, increased human presence, collisions between individual birds and vehicles, and damage to active nests if vegetation removal occurs during the period from April 1 to August 15. The majority of direct effects are most likely to occur during the proposed 4-year construction and completion periods but could also be expected to occur at a reduced level during the production and maintenance periods, which may extend up to 35 years.

The proposed action was designed to avoid raptor nests to the extent possible; however, in some cases other resource concerns or access to downhole resources precluded avoidance of identified raptor nests. Therefore, in cases where an active raptor nest is located within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility, a 60-day timing limitation will apply. The cases where this limitation will apply are presented in the site-specific COAs (**Appendix D**). A 60-day timing limitation would likely reduce the effects to nesting raptors, but nests within the distances mentioned above would maintain an increased potential for reproductive failure.

Mitigation measures such as exclusionary devices for reserve pits would be implemented to minimize direct impacts to migratory birds at all locations (**Appendix C, Number 9**).

Indirect impacts from the proposed action would include habitat loss, habitat fragmentation, or change in habitat type. Section 7.2.10 presents the long-term and short-term impacts to vegetation from the proposed exploration and development. Some raptor nesting habitat may be removed; however, areas known to have been used by nesting raptors would be avoided to the extent possible. Habitat fragmentation from the proposed exploration and development activities may reduce habitat quality for species that rely heavily upon large patches of continuous vegetation. Habitat fragmentation could, however, improve habitat quality for species that typically prefer to use patch and edge habitats. The latter species are often more common than the former, and typically do not contribute to species diversity as much as the less common species, which tend to require a narrower ecological niche. Habitat fragmentation can therefore lead to reduced species diversity. Approximately 67.9 acres in Sections 12, 13, and 14 would undergo land type conversion to accommodate roads, well pads, and staging areas. These sections currently contain contiguous undeveloped habitat and would consequently experience the greatest short- and long-term impacts. Long-term habitat conversion would occur anywhere mature woodlands are disturbed. There are a number of mature woodlands in the analysis area which, considering their age class, would experience long-term impacts beyond final reclamation. The proposed activities in Sections 1 and 2 would occur at locations of existing disturbance; therefore, physical alteration of habitat would be minimal in these areas but impacts associated with disturbance would occur for up to 4 years.

Up to 75 acres of habitat modifications proposed under the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) could also affect habitat availability and suitability for migratory birds. The activities proposed in the plan are described in Section 2.10.9 and **Appendix E**, and those most relevant to migratory birds are summarized here. The plan proposes implementing measures to maintain and increase the availability of sagebrush openings by removing a portion of encroaching juniper. The plan was designed to emphasize diverse edge patterns on the treated perimeter of each vegetation type. While these activities could affect certain species of migratory birds, the habitat treatments were designed to provide a balance of habitat types by incorporating mosaics of treated and untreated areas. Individual treatment units are small, generally less than 10 acres per unit, and are not expected to measurably impact distribution and abundance of migratory birds. The proposed treatments include consideration of diverse vertical structure, particularly in sagebrush and oak brush habitats. Finally, project timing would consider seasonal impacts to wildlife that are using the DMGAP area.

In summary, the changes to habitat structure resulting from implementation of the proposed action in its entirety may cause a change in the relative abundances and diversity of local populations of migratory bird species, as described above. However, portions of the watershed within which the plan area is

located are being impacted by extensive oil and gas development. Additional habitat fragmentation caused by the proposed action is of concern because large blocks of contiguous, intact habitat required by many species are being affected. Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms, and other surface facilities will continue to reduce habitat patch size and affect both habitat quality and quantity. Although impacts from the proposed action would occur on a relatively small scale, they would likely contribute cumulatively to larger scale impacts caused by energy developments within the watershed.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, none of the proposed habitat modifications would take place, and the availability and suitability of habitats would remain similar to that which currently exists in the plan area. In the areas where development and use are already present, the potential for direct effects to migratory birds would still exist, and in the areas with a limited amount of activity, a relatively low potential for direct impacts would be maintained.

### *7.1.7 Native American Religious Concerns*

Affected Environment: The DMGAP area is within a larger area identified by the Ute Tribes as part of their ancestral homeland. Cultural resource inventories (see Section 7.1.3 Cultural Resources) were conducted to determine if there were any areas that might be culturally sensitive to Native Americans.

*Proposed Action:*

Environmental Consequences: At present, no Native American concerns are known within the DMGAP area. The Ute Tribe (Northern Ute), Southern Ute, and Ute Mountain Ute Tribes were notified of the proposed DMGAP on June 19, 2007. No responses, questions, or requests for additional information have been received as of July 23, 2007. If new data are disclosed by the Ute Tribes, new terms and conditions may have to be negotiated to accommodate their concerns during the implementation phase. New construction always has the potential to damage or destroy unknown culturally sensitive sites. Standard COAs that would mitigate impacts to cultural resources are included in **Appendix C** (**Number 3**).

*No Action Alternative*:

Environmental Consequences: Under this alternative, there would be less development, and therefore a lower potential for impact to unknown Native American resources.

### *7.1.8 Prime or Unique Farmlands*

Affected Environment: The Natural Resources Conservation Service (NRCS) has mapped farmlands for Garfield County, Colorado (NRCS 2007a). The analysis of farmlands includes the system of farmlands occurring in the plan area and a 0.5-mile buffer. No farmlands of national importance occur in the analysis area. The following categories of farmlands occur within the northern portion of the analysis area: 1) Farmland of statewide importance: Irrigated land (water supply inadequate), 2) Prime farmland if irrigated, and 3) Prime farmland if irrigated and reclaimed of excess salts and sodium (NRCS 2007a).

*Proposed Action:*

Environmental Consequences: Within the approximately 6,250 acres that encompass the plan area and a 0.5-mile buffer, there are 825 acres of farmland of statewide importance. This represents 13.2 percent of

the analysis area. There are also 166 acres (2.7 percent) of prime farmland if irrigated and 104 acres (1.7 percent) of prime farmland if irrigated and reclaimed of excess salts and sodium.

The proposed action would have direct, long-term impact on farmlands in the plan area by constructing permanent facilities within this resource. However, given the limited extent of these prime and unique farmlands, it is unlikely that they would have been developed as farmland. Overall, given the percentage of the analysis area that includes prime or unique farmland, the proposed action would result in minor impacts to this resource.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, there would be no construction of facilities within prime or unique farmland in the DMGAP area. Therefore, there would be no impact to this resource.

### *7.1.9 Special Status Species (includes an analysis of Public Land Health Standard 4)*

This section presents discussions of the special status species that have suitable habitat in the analysis area. Species for which suitable habitat does not exist in the analysis area are not discussed in this document. The following categories of special status species are addressed, in the following order:

- Federally listed, proposed, or candidate plant species
- BLM sensitive plant species
- Federally listed, proposed, or candidate animal species
- BLM sensitive animal species

Affected Environment:

Suitable habitats for special status species were identified through field surveys conducted in and adjacent to the DMGAP area (WestWater 2007a, b), known population ranges, and geographic information system (GIS) spatial data analysis. The habitats present were characterized and then evaluated for their potential to support special status species.

The analysis area for plant species is the plan area. The determinations of habitat suitability were based on previous field observations of sites occupied by these species, consultation with agency specialists, and habitat descriptions provided by the Colorado Natural Heritage Program (CNHP) (Spackman et al. 1997, CNHP 2002). If required, additional site-specific special status plant surveys will be conducted in suitable habitat during the APD process.

The analysis area for terrestrial wildlife includes the plan area and a 0.5-mile buffer. The analysis area for fish species includes the populations occurring in the surface water systems that are located in and downstream of the DMGAP area. No aquatic inventories were conducted; however, CDOW aquatic biologists were consulted regarding fish populations and species diversity (WestWater 2007a).

Section 7.2.10 Vegetation presents the environmental baseline for vegetation conditions within the analysis area.

*Federally Listed, Proposed, or Candidate Plant Species*

According to the species list from the USFWS Mountain-Prairie Region (USFWS 2006a), three federally listed, proposed, or candidate plant species may occur within or be impacted by actions occurring in

Garfield County, Colorado: Parachute beardtongue (*Penstemon debilis*), Uinta Basin hookless cactus (*Sclerocactus glaucus*), and DeBeque phacelia (*Phacelia submutica*). However, no plants of these species nor suitable habitats for these species occur in the DMGAP area.

*BLM Sensitive Plant Species*

BLM sensitive plant species (BLM 2000b) with habitat and/or occurrence records in the area include adobe thistle (*Cirsium perplexans)*, DeBeque milkvetch (*Astragalus debequaeus)*, Naturita milkvetch (*Astragalus naturitensis)*, Roan Cliffs blazing star (*Mentzelia rhizomata*), Piceance bladderpod (*Lesquerella parviflora*), and Harrington's penstemon (*Penstemon harringtonii*).

One BLM sensitive plant species (BLM 2000b), Harrington's penstemon, has potential habitat in the DMGAP area (WestWater 2007a). Harrington's penstemon inhabits open sagebrush or, less commonly, pinyon-juniper habitats in soils that are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials (Spackman et al. 1997). Harrington's penstemon has been previously located near the DMGAP area, 2.5 miles east near Spruce Creek (WestWater 2004 in WestWater 2007a). One general area in Section 12 has similar habitat characteristics as these locations and is within the elevation range of this species, 6,500 to 9,200 feet (WestWater 2007a); however, no Harrington's penstemon were found during surveys conducted in the spring of 2007 within and adjacent to the DMGAP area (WestWater 2007b).

*Federally Listed, Proposed, or Candidate Animal Species*

According to the species list from the USFWS Mountain-Prairie Region (USFWS 2006a), the following Federally listed, proposed, or candidate animal species may occur within or be impacted by actions occurring in Garfield County, Colorado: Mexican spotted owl (*Strix occidentalis lucida*), yellow-billed cuckoo (*Coccyzus americanus*), bonytail chub (*Gila elegans*), humpback chub (*Gila cypha*), Canada lynx (*Lynx canadensis*), razorback sucker (*Xyrauchen texanus*), and Colorado pikeminnow (*Ptychocheilus lucius*). The analysis area contains potential habitat for the Canada lynx. The Colorado River and its 100-year floodplain, which lie approximately 400 feet north of the DMGAP area, are designated critical habitat for the razorback sucker and Colorado pikeminnow.

<u>Canada Lynx</u> – The USFWS listed the Canada lynx as threatened in the lower 48 states on March 24, 2000. Following listing of the species, biologists identified and mapped potential lynx habitat and designated lynx analysis units (LAUs) based on guidelines provided in the Lynx Conservation Strategy and Assessment Strategy (Ruediger et al. 2000). An LAU is a project-planning unit intended to provide the fundamental or smallest scale with which to begin evaluation and monitoring of the effects of management actions on lynx habitat (Ruediger et al 2000).

Statewide lynx habitat data maintained and updated by the CNHP (2002) do not depict an LAU or lynx habitat within the analysis area (**Figure 3**), and field surveys in the DMGAP area verified the lack of lynx habitat (WestWater 2007a, b). The Battlement LAU and suitable lynx habitat is located approximately 1 mile south of the plan area in Sections 25, 26, and 27 (CNHP 2002) (**Figure 3**).

<u>Colorado River Endangered Fishes</u> – Four members of the minnow and sucker families that occur in the Colorado River in western Colorado and eastern Utah are Federally listed as endangered: the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail chub (*G. elegans*). Designated critical habitat for both the Colorado pikeminnow and razorback sucker occurs within the Colorado River and its 100-year floodplain, approximately 400 feet north of the DMGAP's northern area (**Figure 3**) (BLM 2006a; USFWS 2006b, 2007a). Designated critical habitat for the humpback chub and bonytail chub occurs in the Black Rocks area near the Colorado-Utah border more than 60 miles downstream of the DMGAP area. All of these species require

a diversity of habitats within a large river. Low-velocity side channels, backwaters, oxbows, sloughs, and flooded bottomlands are important habitats for spawning and survival of young fish, particularly for the Colorado pikeminnow and razorback sucker (BLM 2006a).

*BLM Sensitive Animal Species*

The analysis area provides suitable habitat for the following BLM sensitive wildlife species: Great Basin spadefoot (*Spea intermontana*), midget faded rattlesnake (*Crotalus viridis concolor*), milk snake (*Lampropeltis triangulum taylori*), and bald eagle (*Haliaeetus leucocephalus*). BLM sensitive fish species that are known to inhabit the Colorado River in the vicinity of the plan area include the flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*C. discobolus*), and roundtail chub (*Gila robusta*). Also, the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) may occur in the vicinity of the DMGAP area. Habitat requirements and known distribution information for these species are as follows:

Great Basin Spadefoot – In Colorado, this species inhabits pinyon-juniper woodlands, sagebrush, and semi-desert shrublands. It ranges from the bottoms of rocky canyons to broad dry basins and stream floodplains (CDOW 2006a). Great Basin spadefoots prefer sagebrush communities below 6,000 feet in elevation, although they have been found at elevations of 9,200 feet. Habitat types required for their survival include: over wintering burrow sites, temporary breeding ponds and foraging areas, and safe passages between these areas. Suitable habitat in the analysis area occurs in pinyon-juniper and sagebrush habitat types.

Milk Snake – The milk snake occurs in a wide variety of habitats in Colorado, including shortgrass prairie, sandhills, shrubby hillsides, canyons, and open stands of ponderosa pine in the foothills, pinyon-juniper woodlands, and arid river valleys (CDOW 2006a). Suitable habitats in the analysis area include the pinyon-juniper habitats and the mountain shrubland habitats.

Midget Faded Rattlesnake – The midget faded rattlesnake is a small, pale-colored subspecies of the common and widespread western rattlesnake. The midget faded rattlesnake is endemic to a small area of southwestern Wyoming, northeastern Utah, and northwestern Colorado, including western Garfield County. Suitable habitats include sandy and rocky areas in pinyon-juniper and semi-desert shrub. The relatively densely vegetated and generally north-facing aspects of the plan area are less suitable than the more barren south-facing areas north of Interstate 70.

Bald Eagle – The bald eagle was recently removed from the Federal list of threatened or endangered species, but is now considered a BLM sensitive species and remains protected by the Bald and Golden Eagle Protection Act. Bald eagles occupy the Colorado River corridor year-round for nesting and wintering. The lower Colorado River riparian corridor provides extensive suitable roosting habitat in the form of mature cottonwood trees, and a portion of the northern area falls within bald eagle habitat (**Figure 3**). The closest suitable nest and roost trees were found approximately 0.2 mile from the remote frac site, and the closest mapped winter roost site is 1,600 feet (0.3 mile) from the remote frac site (WestWater 2007b). At the time of the surveys, the closest known active and inactive nests were located 4.5 miles and 2.5 miles from the remote frac site, respectively (WestWater 2007b). No bald eagle individuals, nest sites, or roost sites were identified during general raptor surveys conducted in and adjacent to the DMGAP area; however, upland foraging by bald eagles likely occurs in the analysis area (WestWater 2007a, b).

Colorado River Cutthroat Trout – Remaining populations of this species now occur mostly in headwater streams and lakes of the Colorado River drainage. This includes Battlement Creek, which is located generally southwest of the plan area and is within approximately 0.25 mile of the area in Section 14

(**Figure 4**). Of particular significance is that the Battlement Creek population is considered a core conservation population (Hirsch et al. 2006).

Flannelmouth Sucker – The flannelmouth sucker is restricted to larger streams and rivers in the middle and upper Colorado River Basin. In Colorado, this species is found only in large rivers, where it occupies all habitat types, including riffles, runs, eddies, and backwaters (Woodling 1985).

Bluehead Sucker – This species is found throughout the middle and upper Colorado River Basin, in a variety of areas from headwater streams to large rivers (Woodling 1985). The bluehead sucker prefers areas with a rock substrate and mid to fast flowing waters.

Roundtail Chub – The roundtail chub is found in the Colorado River mainstem and large tributaries (Woodling 1985). Adults inhabit slow-moving water near areas of faster water and swim into the faster water in small groups to forage. Young-of-the-year prefer shallow runs, while juveniles concentrate in eddies.

*Proposed Action:*

Environmental Consequences:

*Federally Listed, Proposed, or Candidate Plant Species*

There are no federally listed, proposed, or candidate plant species or suitable habitat for these species in the DMGAP area. Therefore, the proposed action would have "**No Effect**" on these species.

*BLM Sensitive Plant Species*

The DMGAP area contains potential habitat for Harrington's penstemon, but surveys failed to identify any plants of this species (WestWater 2007a). Therefore, no direct impacts to this species are anticipated. Possible indirect impacts could include habitat loss for the life of the project if well pads or roads are located in potential habitat, habitat expansion if suitable open habitats are created via clearing and subsequent interim reclamation, or a reduction in habitat quality via introduction of invasive non-native plant species.

*Federally Listed, Proposed, or Candidate Animal Species*

Canada Lynx – The analysis area does not provide quality habitats for Canada lynx (**Figure 3**) or snowshoe hares, and is located outside of a lynx analysis unit; therefore, the proposed action would have **No Effect** on Canada lynx.

Colorado River Endangered Fishes – Other than water depletions discussed below, the proposed action would not affect designated critical habitat for the Colorado pikeminnow or razorback sucker. The primary impact from the proposed project on the four endangered fish (the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub) is the depletion of water from the Colorado River Basin. Adequate flows are necessary to provide for the various life-stage requirements of these native fishes. In May 1994, BLM prepared a Programmatic Biological Assessment (BA) that addressed their water-depleting activities in the Colorado River Basin and the effects of these depletions on the endangered Colorado River fish species.

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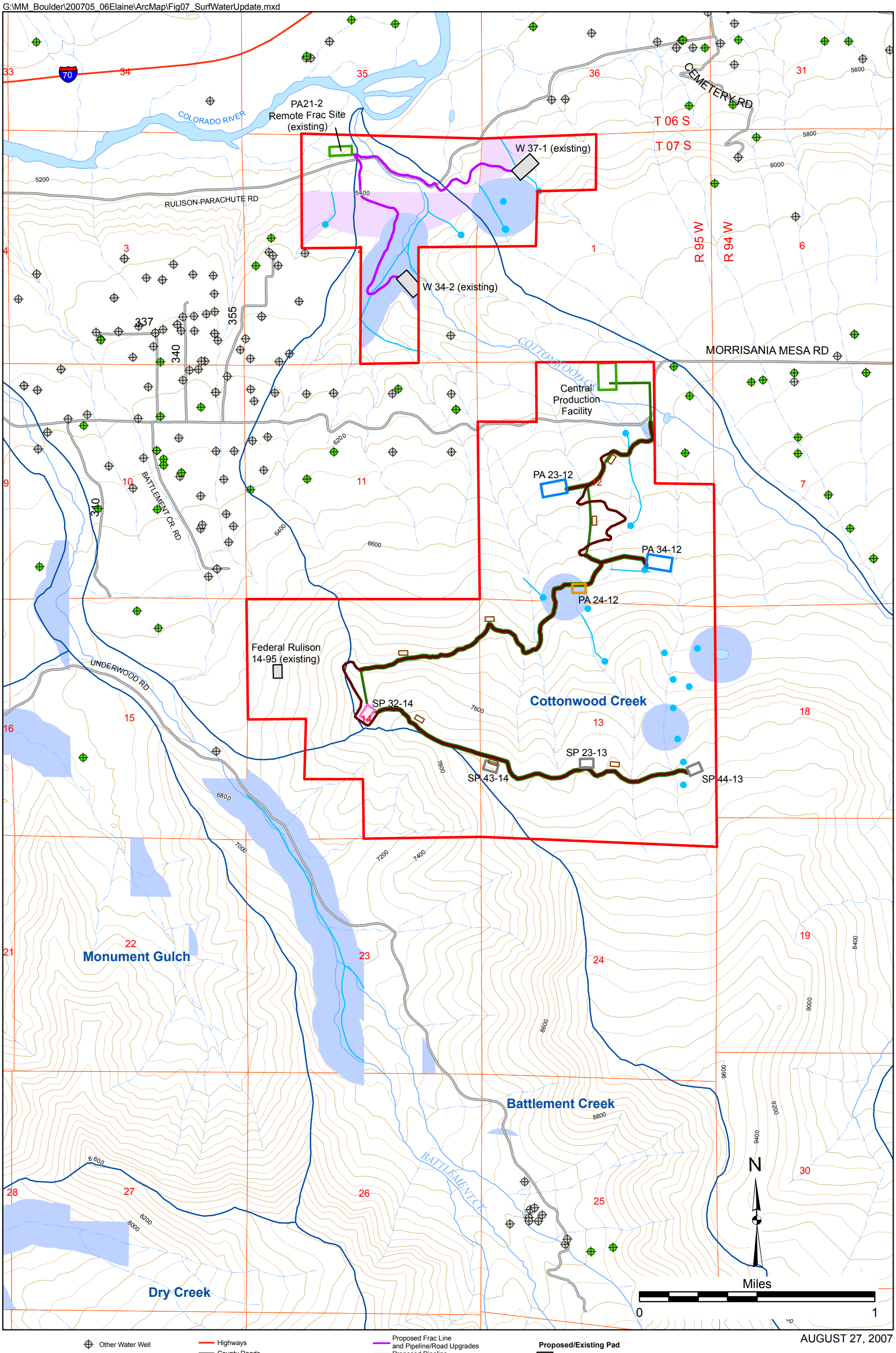


Other Water Well
Domestic Water Well
2007 Wetlands
2007 Wetlands and Streams
Ephemeral Stream
Perrenial Stream

Highways
County Roads
Open Water
Riparian and Wetland Zones (500 foot buffer)
Major River Corridor
6th Order Watershed

Proposed Frac Line and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road
Offsite Facility
Proposed Staging Area (Pipeline Construction)
DMGAP Boundary

**Proposed/Existing Pad**
Existing Pad
2007
2008
2009
2010

AUGUST 27, 2007

**FIGURE 4**
**SURFACE WATER, WETLANDS, RIPARIAN, AND GROUNDWATER RESOURCES**
**WILLIAMS PRODUCTION - PARACHUTE, CO**

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As part of a Programmatic Biological Opinion (BO) (#ES/GJ-6-CO-94-F-017, issued in 1994) in response to the Programmatic BA, the USFWS determined that any depletion of flows in the Colorado River would jeopardize the continued existence of the endangered Colorado River fish. All water depletions from the Colorado River Basin represent a "**may affect, likely to adversely affect**" determination for individual projects. The Programmatic BO included reasonable and prudent alternatives which allowed BLM to authorize projects with water depletions of less than 125 acre-feet per year. Under William's proposed plan of 82 wells drilled over 4 years, the acre-feet depletion estimate for Colorado River Basin water would be 15.5 (20.5 x 0.756 = 15.498) annually for 4 years, or 62 acre feet total, based on per well estimates of water use (BLM 2006a).

Except for water depletions discussed above, the proposed action would not have direct effects to the endangered Colorado River fish. The primary drainages in the analysis area are Battlement Creek and Cottonwood Creek, which are tributaries to the Colorado River (**Figure 4**). Battlement Creek would not be impacted by the project because the closest proposed activity would be expansion of existing well pad Federal Rulison 14-95 0.41 mile from the creek (**Figure 4**), and water from this pad flows northwest and not directly into Battlement Creek (WestWater 2007d). The proposed activities near Cottonwood Creek include:

- In Section 12, one new pipeline crossing of Cottonwood Creek, immediately adjacent to the existing County Road 301 (Morrisania Mesa Road)
- In Section 12, a new central production facility located 150 feet northeast of Cottonwood Creek
- In Section 2, expansion of existing W 34-2 pad 75 feet southwest of Cottonwood Creek
- In Section 2, upgrading of existing pipelines and existing roads near the creek

These project activities would increase the potential for soil erosion and sedimentation into Cottonwood Creek, which could cause a temporary increase in sediment transport to the Colorado River. It is not likely, however, that the increase in sediment to the Colorado River would be detectable above current background levels and is not likely to affect the endangered Colorado River fish, which are adapted to naturally high sediment loads.

Mitigation measures outlined **Appendix C** (**Numbers 4-7**) and in the *Master APD* (Williams 2006a) would be implemented to minimize impacts to surface waters. All construction activities that might affect waters of the U.S. as defined by Federal regulation would be evaluated to determine applicability of the USACE 404 permitting process. For all construction activities, stormwater controls would be placed to control erosion and sediment and materials runoff, in accordance with BLM requirements and CDPHE stormwater regulations, permits, and plans. New roads would be constructed and existing roads maintained in accordance with the minimum standards for a BLM road, as outlined in BLM Manual 9113, subject to site-specific COAs. Williams would also implement a reclamation and revegetation program for areas of surface disturbance. Pesticides would be managed by licensed applicators under Williams' integrated weed management program and direction of the GSEO *Noxious and Invasive Weed Management Plan for Oil and Gas Operators* (BLM 2007a).

Fresh water for use in drilling operations and dust control would be obtained from authorized sources, typically through contractors who have their own legal sources of water.

The proposed activities under the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) do not include creation of ponds that would support non-native fish that could enter the river.

*BLM Sensitive Animal Species*

Potential direct effects that are common to all BLM sensitive terrestrial animal species include mortality, disturbance, or site avoidance/displacement from otherwise suitable habitats if individuals are present in the analysis area. These impacts could result from increased noise from traffic and equipment operation, collisions with vehicles, use of reserve pits, and overall increased human presence. Direct effects are most likely to occur during the proposed 4-year construction and completion period. There is also the potential for these direct effects to continue during the production and maintenance activities, which may extend up to 35 years.

Potential indirect effects from the proposed surface disturbances that are common to all BLM sensitive terrestrial animal species include habitat loss, habitat fragmentation, or reduction of habitat quality/effectiveness. For habitats that are predominantly herbaceous vegetation, short-term disturbance may extend up to 5 years, which takes into account the 1 to 2-year implementation schedule and three subsequent growing seasons. For habitats that are predominantly shrubland, the timeframe for vegetation recovery may take up to 15 or 20 years under favorable conditions.

Suitable habitats for the Great Basin spadefoot that would be impacted by the proposed action include pinyon-juniper and sagebrush, as well as water sources, both natural and artificial. Suitable habitats for the milk snake that would be impacted by the proposed action include mountain shrubland mixes and pinyon-juniper habitats. Habitat for the midget faded rattlesnake that would be impacted is present in lower elevation xeric sites.

Overall, the direct and indirect impacts to BLM sensitive terrestrial species are likely to be minimal.

Bald Eagle – The project activities proposed within 0.5 mile of the centerline of the Colorado River include use of the existing remote frac site facility in Section 2, use and upgrading of portions of the existing roads in Sections 1 and 2, and upgrading of portions of existing pipelines in Sections 1 and 2 (**Figure 3**). The DMGAP's northern area may provide winter foraging habitat for bald eagles. However, all of the project activities would occur in areas of existing surface development and use, including a high use county road travel corridor, industrial oil and gas development, ranching, and farming; therefore, those locations do not provide high quality bald eagle habitat, and if bald eagles are present in the area they are habituated to activities similar to those that are proposed.

The potential effects to bald eagles from oil and gas drilling and production in T7S R95W Section 2 were analyzed in a BA in December 2006 (WestWater 2006). The BA included pad PA 21-2, which is the existing facility at the location of the remote frac site that is part of this proposed action. The USFWS determination for the drilling and production activities proposed in the BA was "may affect, not likely to adversely affect" the bald eagle (WestWater 2006). The activities proposed in the plan would occur in locations of existing disturbance and use and are likely to cause less general disturbance than the previously analyzed drilling and production activities. Furthermore, the proposed activities would take place primarily outside of the time period when bald eagles are most likely to be present in the analysis area, and mitigation measures would be implemented. Finally, the 2006 BA (WestWater 2006) noted that bald eagles continued to roost across the river from pad PA 21-2 and upstream within 0.5 mile while drilling for fee minerals was occurring at PA 21-2, demonstrating that habituation to drilling activities has occurred.

Based on previous analysis in the area (WestWater 2006) and the extent of the activities proposed in this EA, individual birds may alter behavior patterns during drilling but would not be prevented from using suitable habitat nearby and are not expected to be adversely affected by nearby project activities.

Colorado River Cutthroat Trout – The proposed action would not directly affect this fish species or Battlement Creek, which it inhabits. Battlement Creek would not be impacted by the project because the closest proposed activity would be expansion of existing well pad Federal Rulison 14-95 0.41 mile from the creek (**Figure 4**), and water from this pad flows northwest, not directly into Battlement Creek (WestWater 2007d).

Flannelmouth Sucker, Bluehead Sucker, and Roundtail Chub – The discussion of potential impacts and mitigation measures described above for the endangered Colorado River fishes is also relevant to the three sensitive nongame fishes listed as sensitive by BLM. Because mitigation measures would be implemented, it is not likely that the proposed action would cause sediment loads in nearby streams, including the Colorado River, above current levels.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved; therefore, impacts to special status species are not expected.

*Analysis on the Public Land Health Standard for Special Status Plant and Animal Species and Their Habitats:*

The conclusions of the *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a) as related to special status species are as follows. Suitable lynx habitats for Canada lynx in the assessment area were rated as achieving Standard 3 for healthy plant and animal communities; therefore, Standard 4 was also being met for this species. For bald eagles, other raptors, and big river fishes, while site specific locations were not achieving Standard 3, the overall habitat conditions indicate that the assessment area as a whole was achieving Standard 4 for these species. Riparian habitats in the assessment area were rated as properly functioning and water quality data related to Standard 5 showed parameters to be suitable to support and sustain fish species.

The fact that special status plant species were not found in the assessment area was probably a function of the lack of potential habitat rather than any management actions that may have created unsuitable habitat conditions; therefore, it was determined that Standard 4 was being achieved for special status plants in the assessment area. However, large portions of the landscape are being fragmented due to extensive oil and gas development. Continued habitat fragmentation is of concern, because large blocks of contiguous, intact habitat are required by many species. Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms and other surface facilities will continue to reduce habitat patch size and affect both habitat quality and quantity. The potential to impact some species would increase as development continues. The proposed action, in conjunction with similar activities throughout this watershed, would increase fragmentation and could increase sediment loads. Although the contribution of the proposed action would be minimal, it may further trend the area away from meeting Standard 4 for special status wildlife.

### *7.1.10 Wastes, Hazardous or Solid*

Affected Environment: BLM defines hazardous materials as any substance, pollutant, or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 USC 9601 et seq., and its regulations. Under CERCLA, the definition of hazardous substances includes any hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 USC 9601 et seq., and its regulations. The definition does not include petroleum including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCLA Section 101(14), 42 USM 9601 (14); it also does not include oil and gas. The Emergency Planning and Community Right-to-Know Act (EPCRA)

was passed by Congress in 1986. EPCRA was included as Title III of the Superfund Amendments and Reauthorization Act (SARA) and is sometimes referred to as SARA Title III. EPCRA provides for the collection of information regarding the use, storage, production, and release of hazardous chemicals, thereby helping to increase emergency planners, responders, and the public's knowledge and access to this information. States and communities, working with facilities, can use the information to improve emergency planning, chemical safety and protect public health and the environment.

The Environmental Protection Agency (EPA) has exempted certain waste materials generated in oil and gas exploration and production from regulation as hazardous wastes (EPA 1988). These materials must be intrinsic or uniquely associated with the production of oil and gas to classify as exempt waste. Examples of exempt wastes include produced water, drilling fluids, and drill cuttings. Although not regulated as hazardous wastes, these materials are considered to be solid wastes and must be disposed in ways that protect human health and the environment.

*Proposed Action:*

Environmental Consequences: A variety of materials typical of oil and gas development could be onsite during construction and operations. Other solid wastes associated with the proposed development would include human waste and trash.

**Table 8** describes the general types of materials typically used or resulting during each stage of oil and gas development.

**Table 8. Potential Material Outputs from Oil and Gas Extraction Processes**

| Stage of Development | Potential Materials |
|---|---|
| Exploratory Well Development | Drilling muds, organic acids, diesel oil, crankcase oils, and acidic stimulation fluids (hydrochloric and hydrofluoric acids). |
| Production | Heavy metals, dissolved solids, organic compounds, and high levels of salt. May also contain additives including biocides, lubricants, and corrosion inhibitors. |
| Maintenance | Completion fluids, well-cleaning solvents, paint and stimulation agents, The volume of associated wastes (wastes related to maintenance) is typically very small, about one barrel per well per year. |
| Source: Profile of Oil and Gas Extraction Industry (EPA 2000) | |

Potential impacts from hazardous materials include potential discharges of waste streams (e.g., drilling muds, produced water, and gas condensate) to soils and ultimately water resources. The severity of these impacts would depend on the content of the waste stream, amount released, location of the discharge, permeability of soils, and climactic conditions.

Drilling wastes are the primary waste byproduct from oil and gas extraction. During drilling, an average of 375 cubic yards of drill cuttings is produced per well. Drilling muds would be water based but may also contain bentonite clay and small concentrations of a variety of contaminants, including mercury, cadmium, arsenic, and hydrocarbons. No chromate additives would be used in the mud system without prior BLM approval. Drilling mud would be reconditioned and reused, and would be actively monitored throughout the drilling phase to ensure against accidental release. Drilling mud is also highly viscous, and any inadvertent discharges would have slow rate of overland flow that would be contained with spill containment procedures. Drill cuttings left onsite would be buried in place. Backfilling of the pit would be done in a manner to confine the mud in the pit and avoid incorporating the mud with surface soils.

The primary byproduct of the production phase is produced water (EPA 2000). Produced water is typically high in salinity and may contain other contaminants. While the disposal of produced water by approved underground injection or evaporation in reserve pits is common in some areas, produced water from the proposed wells would be self-contained by conveying it through a pipeline to a centralized collection facility, and trucked offsite for disposal. Releases of produced water could occur from wellheads, tanking, piping, reserve pits, and transport trucks as a result of an accident, tank or piping failure, or pit breach. Releases during the high-pressure fracturing (fracing) period due to poor well completion could contaminate groundwater. The risk of groundwater contamination would be small because drilling would occur to depths below 5,000 feet in the Wasatch Group Formation, which is below the usable depth of area groundwater wells. Production casing would be cemented to a depth extending 200 feet above the Wasatch Group Formation to further reduce lower the risk of flow contaminates entering the aquifer.

Gas condensate, which resembles light crude oil, is composed of hydrocarbons in a liquid state. Similar to produced water, condensate would be self-contained and conveyed by pipeline to a centralized collection facility. Releases of condensate could result from wellhead, pipeline, or tank integrity failures.

Protection of sensitive environments in the drilling area would be accomplished through the use of a liner in the reserve pit and the construction or installation of secondary containment facilities. All cuttings, drilling fluids, and chemicals would be contained in the lined pit. Pits are typically eight to 10 feet deep. Any hydrocarbons in the reserve pit would be removed as soon as possible and processed or disposed of at a permitted offsite facility, and excess liquids in the reserve pit evaporated. Upon well completion, any hydrocarbons in the reserve pit would be removed in accordance with 43 CFR 3162.7-1.

Tank batteries for the storage of produced water and condensate would be placed in secondary containment to prevent migration offsite and storage tanks would be surrounded by berms. Produced water and other byproducts would not be applied to roads or well pads for control of dust or weeds. Liquid hydrocarbons produced during completion operations would be placed in test tanks on the well locations and subsequently trucked offsite and sold or disposed of at a permitted disposal facility.

To reduce the potential of hydrocarbon contamination of soils, pipelines and associated collection piping for gas would be designed to minimize the potential for spills and leaks. Leaks or spills of saline water, hydrofracturing chemicals, fuels, and lubricants could also result in soil contamination. Depending on the size and type of spill, the effect on soils would primarily consist of the potential loss of soil productivity.

Williams would implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan prior to construction to minimize potential impacts from unintentional releases. The SPCC Plan would include accidental discharge reporting procedures, spill response, and cleanup measures. All potentially hazardous materials and substances would be handled in an appropriate manner that minimizes the risk of accidental contamination of soil and water resources. Any spills of gas, salt water, or other noxious fluids would be immediately cleaned up and removed to an approved disposal site. If a release of a hazardous substance in a reportable quantity occurs, a copy of the release report would be furnished to the BLM and all other appropriate Federal and State agencies. In addition, all releases to soil or water of 10 gallons or more of any substance would be immediately reported verbally to the BLM. Proof of cleanup would be provided for the project record. This mitigation would be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

Williams and its contractors would be required to collect and properly dispose of any human and solid wastes generated by the project. All trash, stakes, flagging, and cap leads would be picked up and disposed of at an approved site, most likely the Garfield County landfill.

No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount equal to or greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the drilling, testing, or completing of wells. Furthermore, extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, would not be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completing of wells, as established by 40 CFR, Part 117. Threshold quantities would be reported as required by the CERCLA of 1980. Under the proposed drilling plan, fuel and lubricants would be temporarily stored in transportable containment trailers or tanks on the proposed well pads, which would reduce the risk of impacts over the short and long term.

With the implementation of these precautionary measures, the risk of impacts to human health and natural resources from the accidental release of solid or hazardous materials is low.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition and there would be no new environmental consequences resulting from the use and disposal of hazardous materials and wastes as a consequence of selecting this alternative.

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

*Surface Water*

Affected Environment: The plan area is within two sixth-order Hydrologic Unit Code (HUC) watersheds: Battlement Creek and Cottonwood Creek (**Figure 4**; BLM 2007b). These two HUCs are within the Lower Colorado River Basin, which is in the Colorado Headwaters-Plateau Watershed (EPA 2007). The Colorado River extends east-west approximately 400 feet north of the DMGAP's northern area (**Figure 4**). The Colorado River has been mapped by the BLM as a major river corridor that includes BLM lands 0.5 mile from either side of the high water mark of the Colorado River, which extends into Sections 1 and 2 of the plan area (**Figure 4**; BLM 2007b).

The major perennial drainages in the analysis area are Battlement Creek and Cottonwood Creek, which are tributaries to the Colorado River (**Figure 4**). Battlement Creek runs approximately 4 miles from the Battlement Reservoirs and surrounding areas to southwest of the DMGAP boundary and then continues for approximately 3 miles to the Colorado River. Cottonwood Creek runs approximately 5 miles from Doghead Mountain to the DMGAP boundary, through the DMGAP area for approximately 1.5 miles, and then almost immediately reaches the Colorado River.

Drainages in the analysis area are listed on the CDPHE Water Quality Control Commission (WQCC) *Classifications and Numeric Standards for Lower Colorado River Basin* (Regulation No. 37; (CDPHE WQCC 2007a). The classifications identify the beneficial uses of the water. The numeric standards are assigned to determine the allowable concentrations of various parameters. Discharge permits are issued by the Water Quality Control Division to comply with standards and regulations so that all discharges to waters of the State protect the classified uses. **Table 9** presents the classifications for Battlement Creek and Cottonwood Creek.

The CDPHE WQCC (2006a) *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 implement water quality

standards. Battlement Creek is on the CDPHE 303(d) list based on the concern that tributaries to the Colorado River from the confluence with the Roaring Fork River downstream to the confluence with Parachute Creek may contain selenium (CDPHE 2006a).

**Table 9. CDPHE Classifications and Numeric Standards in the DMGAP Area**

| Surface Water | Aquatic Life Classification | Recreation Classification | Water Supply Classification | Agriculture Classification |
|---|---|---|---|---|
| Battlement Creek (within stream segment 7) | Cold 1: Waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions | Class 1a: Waters where primary contact uses have been documented or are presumed to be present | Water Supply: Where existing water quality is adequate to protect the use of future water supply, and in the absence of dischargers to these segments or testimony in opposition to such classification, the water supply use has been assigned because it is reasonable to expect that it may exist in the future in such cases | Agriculture: Suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock |
| Cottonwood Creek (within stream segment 4a) | Cold 2: Waters that are not capable of sustaining a wide variety of biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species | Class 2: Waters with no reasonable potential for Recreation Class 1 uses to occur within the next 20-year period (e.g., ephemeral or small streams that have insufficient depth to support any type of Recreation Class 1 use or very restricted access) | | |
| Sources: CDPHE WQCC 2007a, b | | | | |

*Colorado's Monitoring and Evaluation List* (Regulation No. 94, CDPHE WQCC 2006b) identifies water bodies where there is reason to suspect water quality problems but there is also uncertainty regarding one or more factors. The surface waters in the analysis area are not on this list.

Recent water quality data are not available for the analysis area; water quality data for Battlement Creek near Parachute, Colorado was collected from 1959 to 1977, and there are no records of water quality data collection for Cottonwood Creek (USGS 2007a).

*Waters of the United States*

Waters of the U.S. located in the DMGAP analysis area include numerous ephemeral and intermittent tributaries to Battlement Creek and Cottonwood Creek (**Figure 4**, WestWater 2007a). The line features on **Figure 4** indicate mapped drainages that were surveyed during DMGAP site visits (WestWater 2007a). General characteristics of the drainages in the DMGAP area were recorded during field surveys conducted in November and December 2006 and January 2007 (WestWater 2007a).

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 U.S. as defined by 33 CFR Part 328. A Section 404 permit is required for both permanent and temporary discharges into waters of the U.S. Due to the flashy

nature of area drainages and anticipated culvert maintenance, the USACE recommends designing drainage crossings for the 100-year event. Stream crossings within the project area would require USACE approval prior to construction.

*Groundwater*

The analysis area is in the lower Piceance Basin aquifer system (Colorado Geological Survey 2003). The Piceance Basin contains both alluvial and bedrock aquifers. Unconsolidated alluvial aquifers are the most productive aquifers in the Piceance Basin (EPA 2004). These alluvial deposits are narrow, thin deposits of sand and gravel formed primarily along stream courses. The most important bedrock aquifers are known as the upper and lower Piceance Basin aquifer systems (EPA 2004). These consolidated rock aquifers are lower Tertiary Eocene in age and occur within and above the large oil shale reserves. The upper and lower aquifers are separated by the Mahogany Zone of the Parachute Creek Member. The Mahogany Zone is a poorly permeable oil shale, which retards water movement but does not stop it (EPA 2004).

Both bedrock aquifers overlie the older Cretaceous Mesaverde Group where coal, coalbed methane, and natural gas resources are located (EPA 2004, BLM 2006a). The Mesaverde Group aquifer is at or near land surface in extensive areas and underlies the Uinta-Animas aquifer (USGS 2007b). The aquifer is of regional importance in the Piceance Basin, and portions of the Mesaverde aquifer contain coal beds that have been mined for at least a century. The hydrologic effects of mining have been of increasing concern in the areas underlain by the aquifer (USGS 2007b).

In the Piceance Basin, the Mesaverde Group predominantly consists of sandstone with interbedded shale and coal (USGS 2007b), and the groundwater exists in shallow, unconsolidated alluvium associated with the Colorado River (BLM 2006a). In the Piceance Basin, the top of the aquifer ranges in altitude from about sea level in the central part of the basin to between 5,000 and 7,500 feet above sea level near the margins of the basin (USGS 2007b). In the Piceance Basin, the thickness of the Mesaverde aquifer generally is between 2,000 and 4,000 feet. However, the thickness exceeds 7,000 feet locally in the eastern part of the Piceance Basin and is less than 1,000 feet near the margins of the basins (USGS 2007b).

Groundwater is recharged from snowmelt in upland areas that receive more precipitation than lower altitude areas (EPA 2004). In the Piceance Basin, recharge flows from recharge areas near the margins of the basins to discharge areas near principal stream valleys. In the region of the DMGAP, recharge areas include the northern flanks of Battlement Mesa and along the Roan Plateau. The groundwater moves laterally and/or upward discharging directly to streams, springs, and seeps by upward movement through confining layers and into overlying aquifers or by withdrawal from wells (USGS 2007b). The natural discharge areas generally are along the Colorado River and its tributaries (USGS 2007b).

The depth to the aquifer in these basins generally ranges from about 5,000 to 8,000 feet. Hydraulic conductivity is a measure of the ability of soil or rock to transmit fluids, measured as a velocity. Transmissivity is a measure of the volume of water that a given aquifer can transmit, and equals the average hydraulic conductivity times the average thickness of the aquifer. Transmissivity of the Mesaverde aquifer is less than 50 feet squared per day but exceeds 2,000 feet squared per day locally in the Uinta Basin and the Wasatch Plateau (USGS 2007b). Fracturing of rocks that form the Mesaverde aquifer locally increases the secondary permeability; as a result, the transmissivity also is increased locally to values as much as 100 times greater than those for the unfractured rock. In areas where the aquifer is deeply buried, such as in the Piceance Basin, overburden pressure, compaction, and cementation have caused hydraulic conductivity to be small. As a result, although the thickness of the aquifer generally is large in these areas, transmissivity is small (USGS 2007b).

The quality of the water in the Mesaverde aquifer is highly variable, with concentrations of dissolved solids ranging from less than 1,000 milligrams per liter in many of the basin-margin areas to more than 10,000 milligrams per liter in the central part of the Piceance Basin (EPA 2004). The minerals nahcolite (NaHCO3, sodium bicarbonate), dawsonite (NaAl $(OH)_2$ $CO_3$), and halite (NaCl) are present in the groundwater, and the circulation of the groundwater with these minerals in solution has caused enlargement of the natural fractures (Taylor 1987 as cited in EPA 2004). In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water.

However, water quality in the Piceance Basin is poor because of nahcolite deposits and salt beds within the basin (Graham 2001 as cited in EPA 2004). Only very shallow waters such as those from the surficial Green River Formation are used for drinking water (Graham 2001 as cited in EPA 2004). In general, the potable water wells in the Piceance Basin extend no further than 200 feet in depth, based on well records maintained by the Colorado Division of Water Resources (CDWR). South of the Colorado River, the upper Tertiary-age aquifers have largely been eroded off, exposing a thick basal confining unit of the lower Green River and Wasatch Formations. As such, most water supply wells in the southern portion of the Piceance Basin are completed in the alluvial aquifers associated with the Colorado and Gunnison River tributaries (Colorado Geological Survey 2003).

GIS data for locations of permitted water wells in Garfield County, Colorado were obtained from the CDWR (2006). No permitted domestic water wells are located in the plan area, but there are several adjacent to its northern portion (**Figure 4**). The closest domestic/municipal watershed is for the community of Rifle and is located approximately 6 miles east of the DMGAP area (BLM 2007b).

*Proposed Action:*

Environmental Consequences:

*Surface Water*

Potential impacts to surface waters include erosion and sedimentation of streams (**Table 10**). Surface waters would be most susceptible to these impacts during construction, particularly in areas of fragile soils (see Section 7.2.9 Soils). Construction of the proposed road and pipeline stream crossings has the greatest potential to cause impacts to surface waters, in addition to construction of other project components. Surface waters would also be affected after construction; drilling and completion are periods of heavy use within areas of maximum soil exposure. Implementation of interim reclamation would reduce soil exposure, reducing the potential for erosion and sedimentation. The access roads have the greatest potential to affect surface water over the life of the project because they would be maintained and used long term and could channel runoff during periods of precipitation. Restoration of the stream channels and other habitats would be initiated at project completion during final reclamation.

The proposed activities in Sections 1 and 2 may include surface disturbance within the Colorado River major river corridor (**Figure 4**), depending on where road and pipeline construction or upgrades are required. The RMP (BLM 1999a) includes a no surface occupancy (NSO) stipulation within 0.5 mile of either side of major river corridors, but the distance from the river may be reduced after the authorized officer has considered the proposed activities. Since the proposed activities in Sections 1 and 2 would occur within existing disturbances, the proposed action would not compromise management of the Colorado River major river corridor.

The existing W 37-1 well pad in Section 1 is adjacent to an unnamed ephemeral drainage, and the proposed access road upgrade would cross Cottonwood Creek and an unnamed ephemeral tributary to the Colorado River. The existing W 34-2 well pad in Section 2 is located approximately 80 feet southwest of

Cottonwood Creek. In addition, the proposed access road upgrade for the W 34-2 well pad would cross an unnamed ephemeral drainage approximately 1,300 feet upstream from its confluence with Cottonwood Creek.

The proposed PA 23-12 well pad would be located in Section 12 approximately 300 feet west of an unnamed tributary to Cottonwood Creek. The proposed access road to the PA 23-12 well pad would cross three unnamed ephemeral tributaries to Cottonwood Creek. The proposed PA 34-12 well pad would be located in Section 12 approximately 50 feet west of an unnamed ephemeral tributary to Cottonwood Creek. The proposed access road would cross an unnamed ephemeral tributary to Cottonwood Creek that is adjacent to the proposed PA 24-12 well pad approximately 950 feet upstream. In addition to the road crossings mentioned above, a proposed pipeline in the northeast corner of Section 12 would cross Cottonwood Creek.

The proposed access road from proposed well pad SP 23-13 to proposed well pad SP 44-13 would cross two mapped unnamed ephemeral tributaries to Cottonwood Creek. While the project map only shows two drainages, site visits in May of 2007 revealed three distinct drainages that would be crossed by the proposed access road. These drainages were observed to be flowing in May of 2007 and should more accurately be described as intermittent; especially in this area where they receive more precipitation than downstream reaches and are fed by numerous springs and seeps.

The habitat modifications proposed under the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) may affect surface waters in the analysis area. One of the criteria considered when developing the plan was the potential improvement of the watershed resulting in enhanced water quality, quantity, retention, and flow. Bare ground is negatively affecting the hydrology in the analysis area, and measures to encourage regrowth of understory species are proposed in the plan. A healthy sagebrush ecosystem, as proposed in the plan, promotes good soils and watershed conditions. However, a reduction in pinyon-juniper cover, as proposed in the plan, could affect the hydrology of an area and possibly reduce moisture levels in the affected watershed. Habitat modifications that involve removal of vegetation may cause a minor, temporary increase in soil erosion, resulting in additional sediment transport to nearby ephemeral or perennial streams. Williams would use appropriate erosion control measures to mitigate any possible impacts.

Mitigation measures to minimize impacts to surface water are presented in **Appendix C** (**Numbers 4-7**) and in the *Master APD* (Williams 2006a) and *Williams Stormwater and 404 Handbook of Best Management Practices* (Williams 2006c). Section 404 of the CWA requires a permit from the USACE prior to permanently or temporarily discharging dredged or fill material into waters of the U.S., as defined by 33 CFR Part 328 (**Appendix C, Number 10**). All construction activities that may affect waters of the U.S. would be evaluated to determine USACE jurisdiction. The USACE would be consulted on a site-specific basis during the APD process in accordance with 33 CFR 330 of the CWA.

Drainage crossings of jurisdictional waters of the U.S. within the DMGAP area would be designed in accordance with USACE requirements. Non-jurisdictional crossings would be designed in accordance with the *Surface Operating Standards for Oil and Gas Exploration & Development* (BLM and USFS 2006). For all construction activities, stormwater controls would be implemented for erosion control and sediment runoff, in accordance with BLM requirements and CDPHE stormwater regulations, permits, and plans. New roads would be constructed and maintained in accordance with the minimum standards for a BLM road, as outlined in BLM Manual 9113, subject to details outlined in the COAs. Williams would also implement a reclamation and revegetation program for areas of surface disturbance, and access roads would be reclaimed in accordance with the BLM reclamation COAs upon final abandonment and reclamation of the well locations.

The proposed exploration and development activities also increase the potential for contamination by drilling fluids, produced water, or condensate. These potential direct effects and mitigation measures that would be implemented to minimize these effects are discussed in Section 7.1.10 Wastes.

While the proposed action has the potential to affect surface waters, particularly during the short term, implementation of mitigation measures presented in **Appendix C** (**Number 4-7**) would minimize impacts and preserve the functions of surface waters in the long term.

*Waters of the United States*

Proposed crossings that would require the placement of fill material into ephemeral and intermittent drainages could result in additional sediment available for transport into and along these drainages, and potentially to perennial streams, including the Colorado River. Under the proposed action, flows in the drainages would be conveyed through fill material by use of corrugated metal pipe (CMP) culverts. Culverted crossings on jurisdictional drainages would require a USACE permit and would be designed to convey a 100-year flood event as recommended by the USACE to account for flashy runoff events and anticipated culvert maintenance. Methods that would avoid the placement of fill material in drainages and a USACE permit include bridges, bottomless arches, and low-water crossings.

Due to the proximity to the Colorado River, riprap may be required at some crossings to stabilize the fill material. Areas not armored with riprap would be revegetated to stabilize the fill material and any other areas of temporary surface disturbance associated with road and culvert construction. Improperly designed or improperly installed culverts could result in channel degradation, including excessive bank erosion at culvert outlets, ponding of flows and excess sedimentation at culvert inlets, and channel scour both at inlets and outlets.

Proposed crossings of waters of the U.S. are presented in **Table 10**. Information presented in **Table 10** is based on surveys conducted in November and December 2006 and January 2007 (WestWater 2007a). During the APD process, Williams would identify the boundaries and characteristics of waters of the U.S. that occur in areas of proposed surface disturbance and would design construction activities to minimize impacts to these features to the extent possible. Design plans for drainage crossings and details of the proposed temporary and permanent impacts and required permits would be determined at that time.

As shown in **Table 10**, impacts to waters of the U.S. during implementation of the proposed action would include long-term loss of up to 260 lineal feet of channel from the construction of five new culverted road crossings and the three existing culverted road crossings. An additional 170 lineal feet of temporary impacts to channels would result during these construction activities and would include the pipeline crossing of Cottonwood Creek in Section 12. Placement of fill material needed to construct the crossings would result in up to 2,600 square feet (0.06 acre) of channel area and another 17,500 square feet (0.4 acre) of adjacent riparian or wetland vegetation. These represent long-term impacts, while construction impacts in the remainder of the ROW width would be short-term.

Areas of temporary impacts would be restored to approximate pre-disturbance conditions following construction, while areas of long-term impacts are assumed to remain for the duration of area oil and gas development. The USACE would require impacts to riparian and wetland vegetation along jurisdictional drainages to be mitigated through one or more of the following actions: seeding, planting, mulching, weed control, enhancement of nearby wetlands, or (for permanent impacts) compensatory mitigation.

| Table 10. Proposed Crossings of Drainages in the DMGAP Area | | | | | | | |
|---|---|---|---|---|---|---|---|
| Location[1] | Project Component | Estimated Long-term Impacts[2, 3] | | | Estimated Short-term Impacts[2, 3] | | |
| | | Channel Length | Channel Area | Riparian Wetland Area | Channel Length | Channel Area | Riparian Wetland Area |
| Ephemeral tributary in NW Sec. 1 | Existing Road + Pipeline | 25 l.f. | 250 $ft^2$ | -- | 15 l.f. | 150 $ft^2$ | -- |
| Ephemeral tributary in NE Sec. 2 | New Road + Pipeline | 35 l.f. | 350 $ft^2$ | -- | 15 l.f. | 150 $ft^2$ | -- |
| Ephemeral tributary in SE Sec. 2 | Existing Road + Pipeline | 35 l.f. | 350 $ft^2$ | 2,500 $ft^2$ | 15 l.f. | 150 $ft^2$ | 2,500 $ft^2$ |
| Cottonwood Creek in NE Sec. 2 | Existing Road + Pipeline | 25 l.f. | 250 $ft^2$ | -- | 15 l.f. | 150 $ft^2$ | -- |
| Cottonwood Creek in NE Sec. 12 | New Pipeline | -- | -- | -- | 50 l.f. | 1,250 $ft^2$ | -- |
| Ephemeral tributary in NE Sec. 12 | New Road + Pipeline | 35 l.f. | 35 l.f. | 3,500 $ft^2$ | 15 l.f. | 150 $ft^2$ | -- |
| 3 intermittent tributaries in SE Sec. 13 | New Road + Pipeline | 105 l.f. | 1,050 $ft^2$ | 10,500 $ft^2$ | 45 l.f. | 450 $ft^2$ | 5,250 $ft^2$ |
| TOTAL ESTIMATE | | 260 l.f. | 2,600 $ft^2$ 0.06 ac | 17,500 $ft^2$ 0.4 ac | 170 l.f. | 2,450 $ft^2$ 0.56 ac | 7,750 $ft^2$ 0.18 ac |

[1] Source: WestWater 2007a
[2] Short-term = 1 to 2 years; long-term = up to 35 years; l.f. = lineal feet; $ft^2$ = square feet; ac = acre.
[3] Channel impacts based on 50-foot ROWs, maximum 25-foot road running width, 35-foot culvert length, 25-foot channel width for perennial streams, and 10-foot channel width for ephemeral and intermittent streams; riparian impacts based on maximum widths in vicinity of proposed crossings.

Based on the estimated impacts to waters of the U.S., the road and pipeline crossings of drainages within the DMGAP area could be authorized by USACE under Nationwide Permit (NWP) 14 for linear transportation and NWP 12 for utility projects. NWP 14 allows up to 0.5 acre of surface disturbance at each crossing, including both the channel and associated wetlands, while the largest area for an individual crossing in the proposed action is estimated to be 3,500 square feet (0.08 acre).

If more detailed road design indicates that an individual crossing would impact more than 0.1 acre of wetlands or other waters of the U.S., the general conditions of NWPs 12 and 14 require pre-construction notification to USACE. A condition of approval attached by BLM to any permit for road or pipeline construction strongly recommends the operator obtain a formal jurisdictional determination by USACE and verification that the impacts are authorized by NWP 14 (**Appendix C**, **Number 10**).

*Groundwater*

Potential impacts to groundwater resources from the proposed action would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents.

The proposed drilling activities would be drilled into the "tight sands" of the Mesaverde Group, at approximately 7,000 to 10,000 feet maximum depth, depending on location. The proposed action would incorporate hydraulic fracturing (fracing) to complete wells, which would include using produced water and freshwater to stimulate the formation to create fractures that extend from the well bore into the Mesaverde Group formation. These fractures would allow gas to travel more freely from the rock pores, where gas is expected to be trapped due to low permeability, to the well through a perforated casing (EPA 2004).

Produced water would be obtained from wells operated by Williams, and freshwater would be obtained from authorized sources. The proposed action would include fracing onsite at both exploration and development well pads in Sections 12, 13, and 14. Fluids used in fracing would also be transported between the well pads in Sections 1 and 2 and a remote frac site in Section 2 via temporary aboveground pipelines or buried pipelines. Pipelines would reduce potential spills that could otherwise occur with the trucking of large quantities in steep and uneven terrain. Produced water would be recycled, captured in tanks, and disposed offsite. While studies have shown that anywhere from 20 to 40 percent of fracing fluids may remain underground (EPA 2004), recycled produced water is the only fluid that could remain behind after the proposed completion activities; no oil, other oil-based additives, or potentially hazardous fluids would be used.

It has been demonstrated that the effects of hydrofracturing would not extend beyond 500 feet from the well bore in the Piceance Basin (Wright Water Engineers 2003). Hydrofracturing would be conducted at considerable depths (5,000 feet or more below ground surface), and would be unlikely to cause impacts to groundwater sources near the surface, such as springs and the shallow alluvium. However, additional protection measures to reduce potential impacts would be implemented, including cementing the production casing to 200 feet above the top of the Mesaverde Group.

Drilling cuttings, drilling muds, and spills of fuels, produced fluid, gas condensate, and other hazardous materials used in construction, development, and production have the potential to contaminate soils and drainages and could migrate downward to the groundwater table. Facilities located adjacent to ephemeral drainages would have the greatest potential to contaminate groundwater. Measures used to reduce potential impacts to groundwater are detailed under Section 7.1.10 Wastes. If a spill is detected, the SPCC plan would ensure that actions necessary to minimize, control, and remediate the affected area would be implemented. The SPCC plan would contain measures to minimize risk that spilled materials would enter surface waters and require a rapid response to any spill event.

Produced water would be recycled and stored in tanks so as not to allow flow onto ground surfaces. Tanks would be surrounded by berms to further minimize discharge to surface water drainages. Storm water control practices would be implemented as part of the SPCC plan to control runoff at each well pad and along all roads, reducing the risk of produced water entering and contaminating the shallow alluvial aquifer.

Overall, the proposed action, including implementation of the proposed design features and BMPs, would not result in any short-term or long-term impacts to groundwater resources.

*No Action Alternative*:

<u>Environmental Consequences</u>:

*Surface Water*

The proposed surface disturbances would not occur under this alternative; therefore, the likelihood of impacts to surface waters in the analysis area would remain at the current level. In the areas where

development and use are already present, the potential for erosion, sedimentation, and contamination would still exist, and in the areas with a limited amount of activity, a relatively low potential for impacts would be maintained.

*Waters of the United States*

Under the no action alternative, none of the proposed crossings of drainages presumed to be jurisdictional waters of the U.S. would be constructed. The wetland and riparian areas and drainage channels would remain in their current condition unless affected by changes in intensity of current uses of the roads. The current conditions that would continue under the no action alternative include the potential for periodic transport of sediments into and along the ephemeral, intermittent, and perennial streams—and potentially to the Colorado River—from existing disturbed areas at these crossings.

*Groundwater*

Under the no action alternative, the proposed action would not be approved. The environment would remain in the current condition, and there would be no new activities taking place that would affect groundwater resources.

*Analysis on the Public Land Health Standard for Water Quality:*

The *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a) found that Standard 5 was being achieved for all surface waters within the assessment area. The proposed action has the potential to increase sediment loads; however, provided that the required mitigation measures are implemented, the proposed action would not prevent Standard 5 from being met.

### *7.1.12 Wetlands and Riparian Zones (includes analysis on Public Land Health Standard 2)*

Affected Environment: The analysis area includes the wetland and riparian habitat types that occur within and downstream of the plan area. Wetlands and riparian zones were identified during biological surveys (WestWater 2007a). In addition, BLM has mapped 500-foot buffers along riparian and wetland zones on BLM surface ownership (**Figure 4**) (BLM 2007b).

Riparian zones in the analysis area include Battlement Creek, Cottonwood Creek, and their respective tributaries (**Figure 4**) (WestWater 2007a). The riparian habitat along Battlement Creek is dominated by willows, including mountain willow (*Salix monticola*) and coyote willow (*Salix exigua*). Associated species include quaking aspen (*Populus tremuloides*), red-osier dogwood (*Swida sericea*), thinleaf alder (*Alnus incana*), river hawthorn (*Crataegus rivularis*), Woods' rose (*Rosa woodsii*), virgin's bower (*Clematis ligusticifolia*), elk sedge (*Carex geyeri*), scouring-rush (*Hippochaete hyemalis*), and broadleaf cattail (*Typha latifolia*) (WestWater 2007a, d).

The habitat along Cottonwood Creek is dominated by narrowleaf cottonwood (*Populus angustifolia*), box-elder (*Acer negundo*),and the species listed above for Battlement Creek. Some of these species are found along the ephemeral and intermittent tributaries of Cottonwood Creek, along with species reflecting generally drier conditions, such as skunkbrush sumac (*Rhus trilobata*), Saskatoon serviceberry (*Amelanchier alnifolia*), Gambel oak (*Quercus gambelii*), and monument plant (*Frasera speciosa*) (WestWater 2007a, d).

Throughout the plan area, wetland vegetation also occurs at numerous seeps, wet meadows, and minor swales (**Figure 4**) (WestWater 2007a). Species characteristic of these areas include willows, broadleaf cattail, Baltic rush (*Juncus arcticus* spp. *ater*), beaked sedge (*Carex utriculata*), stinging nettle (*Urtica dioica*), watercress (*Nasturtium officinale*), and a variety of other wetland forbs, grasses, sedges, and

rushes typical of the area. Some of these additional wetlands are likely to be considered jurisdictional under Section 404 of the CWA. If so, impacts to these areas would also require verification by USACE that the impacts are authorized under NWP 14. At present, no impacts to specific non-riparian wetland areas are planned.

*Proposed Action:*

Environmental Consequences: Based on survey results (WestWater 2007a), riparian vegetation along Battlement Creek would not be affected by the project because the closest proposed activity would be the expansion of the existing Federal Rulison 14-95 well pad located 0.41 mile from the creek (**Figure 4**). Runoff from this pad flows northwest, not directly into Battlement Creek (WestWater 2007d).

Onsite surveys and analysis of aerial photography indicate that impacts to wetland and riparian vegetation would result from proposed new or upgraded road and pipeline crossings at multiple points along Cottonwood Creek and some of its tributaries. These impacts are presented in **Table 10.**

As shown in **Table 10**, long-term loss of wetland and riparian vegetation would include the following:

- Proposed road upgrade to the existing W 34-2 well pad in Section 2 – Approximately 2,500 square feet of long-term and 2,500 square feet of short-term impacts to riparian vegetation along an ephemeral tributary to Cottonwood Creek.
- Proposed new access road segment between the proposed SP 23-13 well pad and the proposed SP 44-13 well pad in Section 13 – Approximately 3,500 square feet of long-term impacts and 1,750 square feet of impacts to riparian vegetation along each of three unnamed intermittent tributaries to Cottonwood Creek.

These crossings represent a combined total of 17,500 square feet (0.4 acre) of long-term and 7,750 square feet (0.18 acre) of short-term impact to riparian vegetation from proposed road and pipeline construction. As mentioned above, the USACE would require impacts to riparian and wetland vegetation along jurisdictional drainages to be mitigated through one or more of the following actions: seeding, planting, mulching, weed control, enhancement of nearby wetlands, or (for permanent impacts) compensatory mitigation (**Appendix C, Number 11**).

The *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) does not propose any habitat treatments that target wetland and riparian zones. Habitat treatments in upland habitats would be designed to avoid causing additional impacts to wetlands and riparian zones.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, none of the proposed crossings of drainages and adjacent wetland or riparian zones would be constructed. The wetland and riparian areas and drainage channels would remain in their current condition unless affected by changes in intensity of current uses of the roads. The current conditions that would continue under the no action alternative include the potential for loss of sustaining hydrology for wetland and riparian vegetation due to downcutting, impacts to riparian vegetation and bank stability from grazing by cattle, and periodic transport of sediment from existing disturbed areas at the crossings.

*Analysis on the Public Land Health Standard for Riparian Systems:*

All riparian systems evaluated in the *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a) were found to be achieving or moving towards achieving Standard 2. The proposed action has the

potential to increase sediment loads; however, provided that the required mitigation measures are implemented, the proposed action would not prevent Standard 2 from being met.

### *7.1.13 Wild and Scenic Rivers*

Affected Environment: The analysis area for surface water includes the watershed system that encompasses the plan and downstream areas. The BLM Glenwood Springs and Kremmling Field Offices have initiated an assessment of river and stream segments under their management jurisdiction as part of the current RMP revision process. The first phase of the assessment is complete, which included conducting an inventory of all free flowing perennial streams within the field office boundary and identifying the segments that may be eligible for designation as a Wild and Scenic River (WSR). To be eligible for designation, a stream must contain at least one Outstanding Resource Value (ORV). In the analysis area, Cottonwood Creek and Battlement Creek were inventoried (**Figure 4**). The results are presented in the *Final Wild and Scenic River Eligibility Report for Kremmling and Glenwood Springs Field Offices, Colorado* (BLM 2007e) and are summarized below.

- No potential ORVs were identified for Cottonwood Creek; therefore, this creek was not determined to be eligible as a WSR.

- The following segment of Battlement Creek was assessed in the eligibility report: from the downstream end of BLM lands in T7S R95W Section 10 to the upstream end of BLM lands in T7S R95W Section 23 (BLM 2007e). BLM lands along Battlement Creek are divided into two parcels with approximately 1 mile of private land splitting the creek (BLM 2007e). The portions of Battlement Creek occurring on private land were not evaluated for eligibility, which includes a total length of 1.22 miles in portions of Sections 10 and 15 (BLM 2007e) (**Figure 4**). The portions of Battlement Creek occurring on BLM-administered land were determined to be eligible for WSR, which includes a total length of 1.66 miles in portions of Sections 10, 14, 15, and 23 (BLM 2007e) (**Figure 4**).

  The ORV identified for Battlement Creek is fish because the stream is inhabited by a population of self-sustaining, genetically pure, native Colorado River cutthroat trout, a BLM sensitive species (BLM 2007e). This population is considered a core conservation population (Hirsch et al. 2006). A core conservation population is a naturally reproducing and recruiting population of native cutthroat trout that is greater than 99 percent pure and representative of the historic genome of the native cutthroat trout and that is managed to preserve the historical genome and/or unique genetic, ecological, and/or behavioral characteristics (CDOW 2006b). The preliminary classification for Battlement Creek is Recreational because of a road parallel to the segment (BLM 2007e).

- During the next phase of the WSR evaluation, BLM will conduct a suitability study to determine which eligible stream segments should be added to the national WSR system (USFWS 2007b). Segments determined to be eligible are afforded interim protective management under BLM authorities until the suitability study is completed, which is anticipated to be the end of 2009 (USFWS 2007b). Therefore, Battlement Creek must currently be managed for the Colorado River cutthroat trout population (USFWS 2007b).

*Proposed Action:*

Environmental Consequences: The segments of Battlement Creek that are eligible as WSR are located generally southwest of the DMGAP area. The distance between the DMGAP area and these segments ranges from approximately 0.25 mile in Section 14 to 1 mile in Section 23 (**Figure 4**). The proposed action would not affect Battlement Creek because the closest proposed activity would be expansion of

existing well pad Federal Rulison 14-95 0.41 mile from the creek (**Figure 4**), and water from this pad flows northwest, not directly into Battlement Creek (WestWater 2007d); therefore, the proposed action would not affect Battlement Creek's ORV and would not preclude the creek's eligibility as WSR.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, BLM's management of Battlement Creek as an eligible WSR would be maintained.

## 7.2 Other Affected Resources

In addition to the critical elements, the resources presented in **Table 11** were considered for impact analysis relative to the proposed action and no action alternative.

**Table 11. Other Resources Considered in the Analysis**

| *Resource* | *Not Applicable 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 |
| 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 |
| *Source: Public Land Health Standard (BLM 1997) | | | |

### *7.2.1 Access and Transportation*

Affected Environment: The plan area is accessible from Parachute, Colorado by traveling approximately 5 miles east on Garfield County Roads 301 (Morrisania Mesa Road), 302 (Underwood Lane), or 309 (Rulison-Parachute Road) (**Figure 1**). These county roads are open for public use and are also considered by the county as the preferred haul routes for use by drilling, construction, and operations traffic (Garfield

County 2007). Average daily trips (ADT) in 2002 equaled for County Road 301: 600 (rank: 35th), County Road 309: 378 (rank: 44th), and County Road 302: 82 (Rank: 111th) (Garfield County 2007). Presumably, traffic volumes on these roads have been increasing, largely due to increased oil and gas exploration and production locally and countywide (BLM 2006a). However, the rate of increase is unknown and no recent transportation statistics have been published by Garfield County (Garfield County 2007). Garfield County requires a permit and fee for trucks and other vehicles that are oversized (restrictions on width, length, height, overhang) and overweight. County Roads 301, 302, and 309 have weight restrictions that cannot exceed 80,000 pounds gross vehicle weight (Garfield County 2007).

Roads in the Glenwood Springs Resource Area are classified based on the *USFS Travelway Classification and Operation Guide* (R2-7700-1, Feb 1994). The existing roads within the plan area include:

- 1.7 miles of class 3 road: light-duty road, constructed and regularly maintained
- 3.5 miles of class 4 road: unimproved road, primitive, constructed or user-created, sedan clearance, not regularly maintained (i.e., less frequently than every 3 years)
- 2.5 miles of unclassified road

*Proposed Action:*

Environmental Consequences: Garfield County's preferred haul routes would be used, and Williams would be restricted from using other county roads. The proposed action would cause periods of substantial increase in the volume of traffic on the preferred haul routes, other existing BLM roads, and newly constructed roads in the DMGAP area. The greatest increase in traffic would be during the construction, drilling, and completion activities, which would occur periodically during a 4-year period. Changes in the level of traffic and the type of traffic inevitably have secondary impacts on Garfield County and BLM, who primarily manages the transportation system in the DMGAP area. The increased traffic on county roads may cause temporary conflicts with normal traffic, including travel delays and increased vehicle collision rates. The project traffic would also cause an increase in fugitive dust and noise and an increased risk of collision with wildlife. Degradation of county roads may occur from heavy equipment travel, resulting in increased maintenance and safety management requirements.

**Tables 4** and **5** give the expected traffic estimates for the exploratory and development phases of the proposed action. Conventional rigs used during the exploration phase would require an average of 9.3 trips daily per well pad. By comparison, efficiency rigs used during the development phase would require an average of 7.8 to 8.5 trips daily per well pad, reducing traffic by approximately 8 percent (well pads W 34-2 and W 37-1) to 16 percent (well pads PA 23-12 and PA 34-12). The construction of new well pads would require more construction equipment and other vehicles compared to existing pads; however, the existing pads would require expansion. Trucking of drilling and production fluids would be used in some cases; however, pipelines and a centralized collection facility would be used where feasible, which would reduce traffic requirements.

The proposed action would include approximately 25,600 feet of new road construction and 9,700 feet of upgrades to existing roads (**Figure 1**, **Table 3**). New construction and improvements would initially require a 50-foot wide ROW. Interim reclamation in road construction ROWs would occur within 1 to 2 years and would reduce long-term disturbance (up to 35 years) to a maximum of a 25-foot wide running surface. Upgrading and constructing new roads would result in impacts to natural resources, including vegetation removal, soil disturbance and erosion, invasion of disturbed areas by noxious weeds and other invasive non-native plant species, sedimentation resulting from stream crossings, reduced visual quality, and habitat fragmentation.

BLM road construction standards would be applied to the design of access roads on BLM-managed lands. These standards have proven effective in mitigating soil erosion problems. Williams' Standard Operating Procedures would also incorporate BLM standards for limiting road grades as feasible, providing proper water drainage using culverts and ditches where necessary, applying appropriate surface materials such as gravel, avoiding excessive earthwork and sidecast of materials, and applying dust abatement techniques. Williams would also obtain the necessary road grading and hauling permits**.**

One of the most significant impacts on transportation would be the addition to the existing road network. Road maintenance would also include the necessary surface blading, culvert and ditch cleaning, spot surfacing, and weed control to meet BLM standards and requirements (BLM Manual 9113). BLM would require that Williams gate and close improved and newly constructed roads to reduce potential human disturbance from motorized vehicles to vegetation, soils, and wildlife.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed road construction and use would not be approved. The county roads would continue to receive heavy use. The extent of the road system in the DMGAP area and its use would continue to be very limited.

### *7.2.2 Geology and Minerals*

Affected Environment: The analysis area is generally located in west-central Colorado, on the northeastern edge of the Colorado Plateau physiographic province. More specifically, the analysis area lies at the southernmost edge of the Piceance Basin on the north side of Battlement Mesa. Battlement Mesa is a large prominent mesa that stretches for approximately 20 miles east-west and sits along the Garfield-Mesa county line between the Colorado River to the north and Plateau Creek to the south. The mesa is visible south of Interstate 70 between the towns of Rifle and Parachute, and similar in geology to the nearby Grand Mesa to the south, and to the Roan Cliffs to the north. It consists largely of a layer of basalt atop underlying layers of sedimentary rock, including a layer of the Green River Formation.

The topography is varied, from the mid-elevation, gentle grass/shrublands on the lower Morrisania and Holms mesas between the Colorado River and Doghead Mountain rising to steep, forested drainages and 1,000 foot-high shale cliffs at the head of Battlement and Cottonwood creeks. The low-elevation rolling landscape of the mesas support vegetation consisting of pinyon/juniper forests, sagebrush, and Gambel oak. Higher elevations are dominated by aspens and large stands of spruce and fir in steep drainages. Slopes in the drainages are up to 40 to 45 percent. Elevations in the vicinity of the analysis area vary from 5,400 feet above mean sea level (MSL) along Morrisania Mesa to 9,664 feet MSL on Doghead Mountain.

Joints and fractures in the bedrock cut across the Piceance Basin, but do not pose a seismic (earthquake) risk that would be hazardous to project development (BLM 2006a). A more common geologic hazard is the instability of soil and bedrock where mass wasting would be a potential hazard on steep slopes (USGS 2007c)

Mineral resources in the analysis area include oil and gas, oil shale, sand and gravel, and building stone. The mineral estate in the plan area includes 2,033 acres of Federal mineral interest administered by the GSEO and 94 acres of fee mineral interest (**Figure 1**). The target of drilling operations in the region of the DMGAP area is the Mesaverde Group, which lies unconformable below the Wasatch (DeBeque) Formation and for the last 10 years has been the major oil- and gas-producing formation in the GSEO planning area. The Wasatch Formation is the oldest of the bedrock units (others include the younger Uinta and Green River formations) exposed in the GSFO planning area and is 6,900 feet thick near Rifle (BLM 2006a). Exposed rocks include clays and shales with some interbedded sandstone found at the

lowest elevations. The Mesaverde Group includes informal late Cretaceous subdivisions based on gas productivity characteristics and is several thousand feet thick (BLM 2006a). These include the barren Ohio Creek; the sandstones, sandy shale, carbonaceous shale and coals of the Williams Fork Formation; and the underlying marine sandstones and shales of the Iles Formation.

The southern boundary of the DMGAP area is located approximately 2 miles north of the Project Rulison blast site. The Rulison site is the location where, in 1969, the Atomic Energy Commission (AEC) and the Department of Energy (DOE) detonated a nuclear device approximately 8,000 feet below ground surface (bgs) in an experimental attempt to fracture or "frac" the low-permeability sandstones of the Mesaverde Group of the Williams Fork Formation. The intent was to stimulate the gas reservoir enough to release commercially marketable quantities of natural gas. The experiment was successful in that approximately 455 million cubic feet (mmcf) of natural gas was produced, but elevated levels of radioactivity in the gas made it unacceptable for use. No radiation was released at the surface at the time of the blast.

All surface cleanup and decommissioning of the original surface disturbance has been completed, and the State of Colorado has accepted the surface closure report with no surface restrictions. However, due to concerns about the potential subsurface migration of radioactive contaminates, the COGCC instituted a series of drilling restrictions:

- Drilling is prohibited below 6,000 feet (beneath ground surface) within a 40-acre area surrounding the well surface.

- For an application for a permit to drill within a 3-mile radius of the surface site (known as "surface ground zero", or SGZ), the DOE is notified by the COGCC and given the opportunity to comment and conduct or request sampling and analysis of the well.

- An application to drill within a 0.5-mile radius around the SGZ would require a public hearing before the COGCC.

*Proposed Action:*

Environmental Consequences: The proposed wells would penetrate the Wasatch Formation and Mesaverde Group to explore and develop oil and gas in the Mesaverde Group if recovery and production prove feasible. Potential impacts to geological resources would include changes to the local topography, increased slope instability, and conflicts with development of other mineral resources. Surface disturbing activities from construction excavation for well pads, access roads, and pipelines would result in changes to the topography. The total working area disturbance, which includes short- and long-term disturbance, would be 99.2 acres, or 4.7 percent of the 2,127-acre plan area (**Table 3**). The effect of these impacts on geological resources would be minor, but long-term.

The potential for increased mass wasting (landslides) from the proposed action would be minor. Williams and BLM conducted field site visits to ensure well pads, roads, and pipelines were located out of areas with a high potential for mass movements. Some small slumps may occur in the cuts created for new access roads and well pads; however, these mass movements would be localized in extent. Implementation of BMPs, design features, and mitigation measures would further reduce the potential for mass movements. Potential erosion would be reduced by locating and constructing access roads and ancillary facilities in accordance with BLM Manual 9113, and any other construction details outlined in the COAs. Track hoes or other equipment used in pipeline trenching would only be used where topographic conditions (e.g., steep slopes) make it otherwise infeasible for wheel trenches or ditch witches. Open trenches necessary for pipeline construction would be limited to 0.25 miles in length,

utilize plugs to control water flow, and would be backfilled and covered immediately following pipeline installation to reduce instability and potential trench collapse below the surface. Disturbed areas would also be reclaimed and recontoured within 6 to 9 months to further reduce the potential for erosion and mass wasting.

The project would result in the depletion of oil and gas resources over the expected 35-year life of the project. Estimates of the total gas recovery were not available; however, depletions of recoverable gas from deep gas-bearing formations underlying the analysis area from the proposed action could be substantial. The irreversible commitment of resources would be economically beneficial to the general public. Oil and gas extraction would not increase seismic risk and the low seismicity of the analysis area also decreases the risk that earthquake activity would directly impact exploration, development, and production activities.

The favorability of oil shale production is low, based on the thin size of the beds and higher grade deposits located further north in the Piceance Basin (Russell 1990). Therefore, the proposed action would be expected to have minimal impacts on oil shale resources.

Potential impacts to salable mineral resources (sand, gravel, and building stone) would not occur, and there no known existing sand and gravel operations in the analysis area. Sand and gravel used in the construction of roads and well pads would be trucked in from sources outside the analysis area.

The subsurface investigation of the Project Rulison site is ongoing, with the DOE scheduled to study the adequacy of the exclusionary boundaries. Since 1972, the EPA has annually monitored groundwater at or near the Rulison Site as part of a long-term hydrologic monitoring program. Samples are taken from nearby municipal water supply springs, the water supply wells from several local ranches, and the three wells on the test site. No radioactive contamination associated with the Rulison test has been detected to date. EPA will continue to monitor the groundwater through 2007.

The BLM will request that DOE include as part of their long-term monitoring program at least one of the Williams wells to be drilled into the southern half of Section 13. If the DOE determines not to sample one of these wells, the BLM will collaborate with the COGCC regarding whether to require sampling by Williams. Accordingly, the APDs for the wells in the southern half of Section 13 will include a COA specifying that Williams may be required to sample one or more of these wells for tritium or other radionuclides prior to gathering and marketing of the gas (**Appendix C, Number 12**).

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition and there would be no new impacts on the analysis area geology and mineral resources as a consequence of selecting this alternative.

### *7.2.3 Noise*

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

The EPA has established an average 24-hour, day-night sound level (Ldn) of 55 decibels dBA to protect against activity interference and loss of hearing. In many residential neighborhoods, especially low density and rural areas, the nighttime noise level are frequently as low as 35 dBA and are occasionally

lower. In 2007, COGCC implemented a new rule requiring new oil and gas operations to meet an allowable residential noise level of 45 dBA at night, measured 350 feet from the oil and gas noise source. Previously, companies had to meet a 50 dBA night-time level. Existing oil and gas operations will be able to continue to meet the 50 dBA noise level. At 45 dBA, the noise will be perceived by many as being twice as loud as the ambient noise in the area.

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). The proposed action would be located in a rural, unpopulated area with few potential noise sources. Noise levels from human activity are mostly mechanical, consisting mainly of existing oil and gas wells, new exploration activities, and ranching/farming operations. Human noise is widely dispersed throughout the area, and there are few impacts associated with industrial noise sources and vehicular traffic.

Interstate 70 is the only high-speed road within the vicinity of the plan area, and it does not contribute to the existing noise levels because of its distance from the area. Roadway traffic on county roads and BLM roads in the DMGAP area contributes to noise, but this source is transient, produced primarily by vehicles used for exploration and maintenance.

Topography in the DMGAP area is dominated at lower elevations by relatively open areas and gently sloping terrain with juniper and shrublands. As elevations increase, the topography becomes steeper and the dominant aspen creates a more closed canopy. Upper elevations are also mixed with some flat, open areas dominated by shrubs and grasses, and also dense spruce-fir stands along the steepest and wettest drainages. Overall, the topography would tend to disperse noise generated by gas exploration and development activities.

Noise from oil and gas development comes from a number of sources: truck traffic, drilling and completion activities, well pumps, and compressors. **Table 12** summarizes the results of a study in La Plata County, Colorado, which reported noise levels for a number of oil and gas activities. **Table 13** summarizes typical construction noise.

Another study conducted by BLM concluded that at 50 feet from the source, the measured noise levels were: well drilling – 83 dBA; pump jack operations – 82 dBA; produced water injection facilities – 71 dBA; and gas compressor facilities – 89 dBA (BLM 2000c). In the same study, BLM also reported typical noise levels from construction equipment for oil and gas activity. Depending on the type of equipment used, sound levels taken at a distance of 50 feet varied from about 68 dBA to more than 105 dBA (BLM 2000c).

Noise levels experienced by a receptor depend on the distance between the receptor and the equipment, the topography, vegetation, and meteorological conditions (e.g., wind speed and direction, temperature, humidity).

Overall, ambient sound levels within the vicinity of the plan area are likely to be slightly elevated above the typical levels for rural recreational areas. Sensitive noise receptors include wildlife and recreationists and hunters visiting the area for solitude and a sense of remoteness.

| Table 12. Noises Levels Associated with Oil and Gas Production | |
|---|---|
| **Source** | **Reported Noise Level** |
| Typical compressor station | 50 dBA (375 feet from property boundary) |
| Pumping units | 50 dBA (325 feet from well pad) |
| Fuel and water trucks | 68 dBA (500 feet from source) |
| Crane for hoisting rigs | 68 dBA (500 feet from source) |
| Concrete pump used during drilling | 62 dBA (500 feet from source) |
| Average well construction site | 65 dBA (500 feet from source) |
| Source: La Plata County (Colorado) 2002 | |

| Table 13. Noise Levels Associated with Typical Construction Equipment | | | |
|---|---|---|---|
| **Equipment** | **Noise Level (dBA)** | | |
| | **50 feet** | **500 feet** | **1,000 feet** |
| Tractor | 80 | 60 | 54 |
| Bulldozer | 89 | 69 | 63 |
| Backhoe | 85 | 65 | 59 |
| Crane | 88 | 68 | 62 |
| Air Compressor | 82 | 62 | 56 |
| Dump Truck | 88 | 68 | 62 |
| Source: BLM 1999a | | | |

*Proposed Action:*

Environmental Consequences: Excessive noise can have adverse physical and mental effects on humans. Prolonged periods of exposure to 65 dBA can cause mental and bodily fatigue. Noise can affect the quantity and quality of sleep; cause permanent hearing damage; contribute to the development or aggravation of heart and circulatory diseases; and transform a person's initial annoyance into more extreme emotional responses and behavior.

Noise also affects wildlife in a variety of ways. These include temporary or permanent displacement of animals from specific areas; interference with wildlife communications used to attract mates and defend territories; and (at very high levels) physiological effects on wildlife health. Increased noise and activity levels during construction and development could result in nest abandonment and decreased reproductive success of birds if such activity occurs during the breeding season (BLM 2006b).

The proposed action would result in increased noise levels, particularly during construction, drilling, and completion activities, which would occur periodically throughout a 4-year period. Construction would result in short-term (30- to 45-day) increases in noise levels for each well pad site. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and an average construction site noise level of 65 dBA at 500 feet, construction noise would equal approximately 59 dBA at 1,000 feet. At a distance of 1,000 feet, noise levels would approximately those of an active commercial area (EPA 1974). Noise impacts from drilling and completion activities during the exploration phase would last up to 42 days per well. Drilling and completion during the development phase would last up to 37 days per well; however, the

employment of SIMOPS reduces the total period of noise exposure for a given number of wells because drilling and completion operations at various wells would occur simultaneously. Noise would occur continuously (24 hours per day) during the drilling and completion period. Based on a measured noise level of 68 dBA at 500 feet, actions associated with drilling and completion would generate approximately 55 dBA at 1,000 feet. This level of noise approximates that associated with light industrial activities (70 dBA; EPA 1974).

Traffic noise levels would also be elevated along Garfield County Roads 301, 302, and 309 and BLM access roads during the construction, drilling, and completion periods. Based on the La Plata County data presented in **Table 12**, approximately 68 dBA of noise (at 500 feet) would be created by each fuel and water truck that travels these roads (La Plata County 2002). Less noise would be created by smaller trucks and passenger vehicles such as pickup trucks and sport utility vehicles. Although the duration of increased noise from this source would be short, it would occur repeatedly during the drilling and completion phases.

Noise impacts would decrease during production. Pumping units and continued small truck traffic would generate somewhat less noise. These levels would be less than during the construction phase but greater than background noise levels. During maintenance and workovers, noise would increase above noise levels associated with routine well production.

These increased noise levels would have the most impact on the occupants of nearby residences. An efficiency rig would be used on well pad W 37-1, which would be located on an existing well pad less than 0.5 mile from the closest residence (SESE quarter of Section 35 T6S R95W). Well pad W 37-1 and pad PA 21-2, which is an existing pad that would be used to conduct remote fracing, would also impact this same residence. Noise impacts from drilling, fracing, and completion activities could occur for approximately 116 days. The juniper woodland surrounding W 37-1 would provide some minor screening that would reduce noise levels at the residence. A residence is also located approximately 0.75 mile from the proposed well pad PA 34-12 and 1 mile from the proposed PA 23-12 pad.

There would be unavoidable effects from noise with the use of roads and lands. Noise levels would be above the EPA-recommended noise level of 55 dBA at least 1,000 feet from any well construction site and the COGCC-recommended noise level of 45 dBA at least 375 feet away. These levels, while potentially annoying in the short-term, are not likely to affect the long-term health of nearby residents. It is reasonable to assume that noise would diminish the sense of remoteness provided in the DMGAP area, in an area where recreational opportunities for remoteness has been expected. The proposed noise would cause most wildlife to temporarily avoid or move away from the sources of disturbance to other habitats; however, some individuals may permanently disperse rather than habituate to the noise.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition and there would be no new noise impacts on the analysis area as a consequence of selecting this alternative.

### *7.2.4 Paleontology*

Affected Environment: The analysis area for paleontological resources is the plan area. Surficial geology consists of the Lower Green River Formation of Eocene age, which lies in southwestern Wyoming, northwestern Colorado, and extreme northeastern Utah. It is found in three different ancient lake basins, including Lake Uinta, a huge freshwater lake that encompassed the Piceance Basin. The Lower Green River Formation is a Class 2 formation and produces fossil invertebrates (e.g., ostracods) and plants (e.g., algae) vulnerable to surface-disturbing activities in areas with landslide deposits. The most significant

landslide deposits occur along the east face of Doghead Mountain, located approximately 1 mile south of the plan area. A smaller exposed area occurs along the short ridge in the northeast quarter of Section 14 and is situated above proposed well pad SP 32-14.

A paleontological site has been documented on private land within 0.5 mile of the plan area. The closest designated paleontological area on BLM lands is the Sharrard Park Paleontological Area, located approximately 2 miles northeast, north of Interstate 70 and at the foot of the Roan Plateau (BLM 2007b).

*Proposed Action:*

Environmental Consequences: Although no systematic field surveys have been conducted for the proposed project, potential impacts of the proposed action to paleontological resources would be primarily limited to the small exposed area in the northeast quarter of Section 14. Because the proposed well pad SP 32-14 and associated road and pipeline have been sited more than 300 feet from this site, impacts to any potential paleontological resources along the exposed ridge would be avoided. The larger landslide deposits that occur outside the plan area on the east face of Doghead Mountain would not be impacted by the proposed project activities. An additional COA designed to protect paleontological resources would be applied to the APDs (**Appendix C, Number 13**).

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition and there would be no impacts to paleontological resources as a consequence of selecting this alternative.

### *7.2.5 Range Resources/Management*

Affected Environment: The analysis area for range resources is the plan area. All of the BLM surface in the area is designated as grazing allotment and falls within two individual allotments (BLM 2007b). **Table 14** summarizes the permitted use on these allotments. Steep topography and dense, mature shrublands limit the extent of available rangeland. The primary source of forage for livestock occurs on sagebrush flats and open oakbrush areas.

*Proposed Action:*

Environmental Consequences: Because the availability of forage suitable for livestock grazing is limited, the proposed action would temporarily reduce the number of AUMs available. The rehabilitation of pipelines and well pads will replace lost forage over time. In addition to the loss of forage, an increase in human activity related to the development of the proposed plan would cause cattle to avoid certain areas of the allotments. However, livestock may also benefit from improved access. New roads and pipelines would open access to areas of the allotments that are difficult for livestock to access because of thick brush and/or steep slopes. Improvement in livestock distribution could improve forage utilization throughout the allotment.

Because portions of Section 12 are used for cattle grazing, impacts to allotments were considered when designing the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**). It is not anticipated that the impacts from implementation of the proposed action would require adjustment of the livestock stocking rate. The level of forage utilization will be monitored on the allotments and if necessary, adjustments in livestock use will be made to protect land health. **Appendix C** (**Number 14**) presents a standard COA related to range management resources.

| Table 14. Range Management Allotments | | | | | | |
|---|---|---|---|---|---|---|
| **Occurrence in DMGAP** | **Allotment** | **Authorization Number** | **Number (Cattle)** | **Period of Use** | **Percent Public Land** | **Animal Unit Months (AUMs)** |
| 300 acres in DMGAP northern area | 08123 Hoaglund | 0507581 | 10 | 6/1 – 7/31 | 85 | 17 |
| 1,507 acres in DMGAP southern area | 08124 Battlement Creek Common | 0507593 | 53 | 5/1 – 6/15 | 100 | 80 |
| | | 0507593 | 5 | 6/16 – 10/15 | 100 | 20 |
| | | 0507597 | 100 | 5/10 – 6/15 | 100 | 122 |

*No Action Alternative*:

Environmental Consequences: No project activities would occur on the Federal surface; therefore, the no action alternative would not affect the availability or quality of range resources in the plan area.

### *7.2.6 Realty Authorizations*

Affected Environment: About 1,807 surface acres, or 85 percent of the land within the plan area, is managed by BLM. Another 320 acres, or 15 percent, are private land. The information presented in **Table 1** shows that Williams holds subsurface leases on five Federal leases in the DMGAP area, including COC05173, COC06934, COC06266B, COC01524, and COC05173. Federal surface leases include COC05173 and COC01524.

Public Service Company of Colorado holds a ROW authorization for a 350 kV transmission line that falls within the DMGAP area, traversing Section 12 east to west.

Williams will negotiate access on private lands where needed, including to the planned remote frac pad site PA 21-2 and well pads W 37-1 and W 34-2.

*Proposed Action:*

Environmental Consequences: Under the proposed action, Williams would have legal access for the construction and development of the proposed well pads, roads, and pipelines. Standard reclamation measures would be required. Williams would also comply with the terms and conditions in the COAs of the BLM-authorized APDs and POD. Overall, Williams would have no impact on the BLM land and realty decisions and management. It is expected that BLM would retain these lands in BLM ownership and would not dispose or withdraw the plan area.

*No Action Alternative:*

Environmental Consequences: Under the no action alternative, the proposed action would not be approved and the current land status and ownership would remain unchanged from current conditions. There would be no impacts to lands and realty as a consequence of selecting this alternative.

### *7.2.7 Recreation*

Affected Environment: The analysis area for recreation is the DMGAP area and a 0.5-mile buffer. Recreation in the analysis area is best described as dispersed, consisting mainly of hunting and limited

off-highway vehicle (OHV) use. All BLM surface in the analysis area is designated as open to OHV use; however, OHV recreational use in this area is limited due to the steep topography and limited public access (BLM 2007b). No BLM-managed Special Recreation Management Areas (SRMAs) or Non-Motorized Uses/Recreation Management Areas (RMAs) are located in the analysis area (BLM 2007b). The closest recreation areas are the Mamm Peak Roadless Area (RA), which is immediately south of Doghead Mountain on the White River National Forest, and the City of Rifle's Rifle Mountain Park, which is approximately 20 miles northeast of the analysis area (BLM 2007b).

The analysis area falls within the CDOW Game Management Unit No. 42 (GMU 42) (CDOW 2007a). GMU 42 is a large unit, extending mostly into Garfield County and south into Mesa County. It is bound on the north by the Colorado River and the south by White River National Forest; the Colorado River on the west and on the east by the Divide Creek drainage and the Mesa-Pitkin county lines south of the intersection with the Garfield county line. Elk, mule deer, and black bear hunting seasons typically begin in late August (archery and muzzle-loading hunting) and continue from early October through mid-November (rifle hunting season). The spring turkey hunting season occurs from mid-April through May.

During the hunting seasons from 2002 through 2006, an annual average of 3,300 elk hunters spent 16,500 recreation days with a 21 percent hunt success (CDOW 2007a). During the same period, an annual average of 1,400 mule deer hunters spent an average of 5,846 recreation days with a 50 percent average hunt success (CDOW 2007a). During the 2005 and 2006 black bear hunting seasons, a total of 44 bears were harvested with an annual average of 74 recreation days spent (CDOW 2007a).

*Proposed Action:*

Environmental Consequences: Potential impacts to recreation from the proposed action would be the loss of recreational opportunities or diminished recreation experience. The greatest impacts would be felt by visitors seeking solitude or recreational opportunities in a relatively remote, rural, pristine landscape. The presence of oil and gas facilities and roads, increased traffic, and increased human activity in the analysis area would affect recreation in terms of visuals, noise, dust, and remoteness.

Project activities would diminish the primitive hunting experience due to increased development and human activity. Hunters utilizing GMU 42 would be affected by the temporary displacement of game species from analysis area habitats. However, the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) is intended to offset the effects of habitat loss by the proposed exploration and development.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition and there would be no new impacts on the recreational resources and opportunities as a consequence of selecting this alternative.

### *7.2.8 Socioeconomics*

Affected Environment: The area of analysis for socioeconomic resources is Garfield and Mesa Counties. Mesa County is included because many people working the oil and gas industry live in Mesa County.

Based on the most recent census data, population growth in Garfield County between 1990 and 2000 occurred at annual rate of 3.9 percent. This exceeded Colorado's 2.7 percent overall growth rate and was one of the fastest in the nation (U.S. Census Bureau 1990, 2000). Over the 10 year period, Garfield County grew 46 percent and Mesa County grew 25 percent. During the period from 1990 to 2000, the local communities closest to the DMGAP area exhibited substantial annual and overall changes. The communities affected include Rifle (3.9 percent annual; 54.5 percent total), Battlement Mesa (9 percent

annual; 137 total), Parachute (4.3 percent annual; 53 percent total), and Silt (4.7 percent annual; 59 percent total). Population growth in Garfield County is expected to more than double over the next 20 years from over 50,000 in 2005 to 115,000 in 2025 (BLM 2006a).

Total employment in Garfield County was just under 30,000 jobs in 2005, and is expected to increase to 45,000 to 60,000 jobs during the next 20 years (DOLA 2006 in BLM 2006a). Employment and income has largely been attributed to the construction boom that occurred in the Roaring Fork Valley during the 1990s (BLM 2006a). Construction jobs increased 210 percent and represents 19 percent of the employment sector. Wholesale and retail trade and the service industry (lodging, health care, and legal services) accounted for 22 percent and 28 percent of the Garfield County jobs in 2001, respectively. Since 2004, construction in Garfield County has begun to slow (BLM 2006a).

Personal income in Garfield County has also risen, growing from 120 percent from $513 million in 1990 to $1.1 billion in 2000. Annual per capita income has grown by 50 percent during the same period, from about $17,000 to $26,000 (BLM 2006a). 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 percent or more (BLM 2006a).

Activities on public land in the vicinity of the plan area are primarily ranching/farming, hunting, and the development of oil and gas resources. Hunters contribute to the economy because many require lodging, restaurants, sporting goods, guides and outfitting services, food, fuel, and other associated supplies. Big game hunting, in particular, is viewed as critical to Garfield County, and especially the local community economies that depend on BLM and Forest Service public lands where most hunting occurs (BLM 2006a). 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 in BLM 2006a).

The growth of the oil and gas industry in the past 10 years has been increasingly important to local economies (BLM 2006a). Oil and gas production in Garfield County has increased more than three-fold during the past five years from 70 billion cubic feet (BCF) in 2005 to more than 235 BCF in 2005 (COGCC 2006 in BLM 2006a). In addition, Garfield County is experiencing the fastest oil and gas development in Colorado with 1,800 drilling permits issued in 2005 (BLM 2006a). In 2005, 60 drill rigs were operating in Garfield County, and a new well was estimated to be drilled every 15 to 20 days (COGCC 2006 in BLM 2006a). While the number of workers employed in the mining and extraction industry in Garfield County has been shown to be only 1.7 percent, this number is considered misleading because some oil and gas employment has been incorporated as part of the construction sector statistics instead (BLM 2006a). For example, oil and gas operators surveyed for the Roan Plateau Plan indicated that 600 workers are required to construct, drill, complete, and conduct overhead work (Moore 2003 as cited in BLM 2006a). BLM estimates that as many as 1,000 workers are both directly and indirectly required to support oil and gas development. With an average annual salary of $48,000, the annual payroll for industry in central Garfield County is about $30 to $45 million, and depending on the particular activity, 30 to 90 percent reside in Garfield County.

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 2006a). Payments are based on federal acreage in the county for all land management agencies, including BLM, U.S. Forest Service, U.S. Fish and Wildlife Service, and National Park Service. The amount may also be adjusted based on population and as appropriated by Congress. PILT received by Garfield County was $656,372 in 1999; $768,526 in 2000; $1,097,202 in 2001; and $810,487 in 2002 (BLM 2006a).

In addition, to PILT payments, BLM shares revenue generated by commercial activities on public lands with state and county governments (BLM 2006a). Oil and gas lessees pay royalties equal to 12.5 percent 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 $5.5 million. In 2001, the amount was $14.1 million (BLM 2006a). 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 2006a). In 2002, the assessed value of oil and gas properties was $257 million, amounting to 28 percent of the county's total assessed value (Garfield County 2003 in BLM 2006a). Half of the revenues for the county's school districts came from oil and gas property tax revenues.

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 DMGAP area. In 2000, 16.7 percent of the residents of Garfield County identified themselves as Hispanic or Latino, and this is consistent across the state (17.1 percent). African Americans, American Indians, and Pacific Islanders account for less than one percent of the Garfield County population, which is below the state levels.

*Proposed Action:*

Environmental Consequences: While population growth in Garfield County is expected to double by 2025, the contribution of the proposed action would be negligible. By comparison, the expected contribution to population growth from oil and gas development in the Roan Plateau Planning Area is expected to be less than 2 percent by 2025 (BLM 2006a).

Vacancies in housing are insufficient in the most affordable local communities of Parachute, Rifle, and Silt; the proposed action would be expected to make a minor contribution to reducing the availability of affordable housing and exacerbate the existing housing crunch.

The proposed action would increase the number of jobs for people directly employed in the oil and gas industry and indirectly contribute to the number of jobs in the good and services industries that support the oil and gas industry. These jobs would have minor, long-term beneficial effects on the local communities of Parachute, Rifle, Silt, and Battlement Mesa. The relatively high-paying wages of oil and gas industry jobs could allow some workers to obtain higher cost housing without substantially reducing their living or housing standards.

PILT payments, resource royalties and severance taxes, and property taxes contributed by the proposed action would have a small but beneficial impact on the revenues of Garfield County, and the local communities of Parachute, Rifle, and Silt.

The proposed action could contribute both positively and negatively to the Latino and other low-income population segments in the socioeconomic analysis area. The jobs in the goods and services sector would grow to a small extent; however, there would also be minor reduction in available affordable housing. The proposed action would likely have some positive, indirect contribution to the availability of public services through PILT, royalty, and property tax revenues.

*No Action Alternative:*

Environmental Consequences: Under the no action alternative, the proposed action would not be approved the socioeconomic conditions would remain unchanged. There would be no additional jobs or PILT, royalty, or property tax revenues in Garfield and Mesa Counties and the associated local communities as a consequence of selecting this alternative.

### *7.2.9 Soils (includes analysis on Standard 1)*

Affected Environment: The analysis area for soils is the plan area. **Figure 5** and **Table 15** present the extent of the fifteen soil map units/associations in the DMGAP area (NRCS 2007b). The erosion potential of these soils ranges from low to very severe, but are primarily severe to very severe (NRCS 2007b, **Table 15**). The surface runoff rating of the soils ranges from slow to very rapid, but are primarily medium to very rapid (NRCS 2007b) (**Table 15**).

**Figure 6 and Table 16** show the extent of slope classes, as mapped by BLM (2007b). Highly erosive soils occurring on slopes of 30 to 50 percent typically carry a controlled surface use (CSU) stipulation (BLM 1999a, 2007b), and slopes greater than 50 percent, regardless of soil type, typically carry a no surface occupancy (NSO) stipulation (BLM 1999a, 2007b). No designated Erosion Hazard Zones or Debris Flow Zones are located within the plan area (BLM 2007b).

Several areas in Section 12 show evidence of soil loss that appears to be having a negative impact on the plant communities. Soil erosion is most apparent in the steeper terrain and in areas of deeper soils. Indications of long-term erosion are reflected by steep, sharp gullies and active head cutting. Additional indications of active erosion include the lack of perennial understory vegetation establishment in gully and rill bottoms, the lack of plant litter (dead remains of previous years' growth), and the presence of soil pedestals surrounding shrubs. In the proposed habitat treatment areas in Section 12, the extent of bare soil is high, and herbaceous cover, which is best at holding soils in place, is low.

*Proposed Action:*

Environmental Consequences: Ground-disturbing activities associated with grading, excavation, and maintenance of well pads, roads, and pipeline ROWs would be the principal activities resulting in impacts to soils. Potential impacts would include susceptibility of soils to increased water and wind erosion, mixing of horizons, soil compaction, and loss of topsoil productivity. Ground disturbance and soil removal would alter the biological, physical, and chemical properties of local soils and could indirectly affect water infiltration and permeability, soil biota, plant productivity, and sedimentation to streams and wetlands. The primary effect of surface disturbances on soil resources from the proposed action would be increased erosion and the resulting potential increase in sediment yield. Excavation during construction would remove vegetation, and the subsequent exposure of soils would increase erosion in the short term. Erosion potential would increase if construction were to occur during particularly wet and muddy periods.

The proposed action would result in short- and long-term disturbance to and modification of soils. **Tables 15** and **16** present the total maximum extent of direct disturbance to each soil type that would result from the proposed exploration and development activities. The acreages presented are for the working areas of the project components, which includes long-term and short-term disturbance from new roads, new pipelines, temporary or buried frac lines, new well pads, expansions of existing well pads, new central production facility, temporary staging areas, potential expansions of existing roads, and potential upgrades of existing pipelines, as presented in **Figure 1** and **Table 3**. The total acres of disturbance resulting from the proposed exploration and development activities would be 104.6 acres. The long-term impacts to soils would consist of the footprints of the project components that would be maintained for the life of the project (**Table 3**). Restoration of these disturbed habitats would be initiated at project

completion during final reclamation. The short-term disturbance to soils would occur during construction, drilling, and completion activities (**Table 3**). Long-term losses of habitat would be reduced by implementing interim reclamation in areas of short-term surface disturbance.

Additionally, the proposed exploration and development activities would impact 18.7 acres with slopes ranging from 30 to over 50 percent (**Table 16**). Activities that are proposed on slopes of 30 to 50 percent include upgrading some existing pads, upgrading road and pipeline corridors, constructing segments of new road and pipeline corridors, and establishing temporary staging areas (**Figure 6**). Activities that are proposed on sensitive soils of over 50 percent slopes include a small amount of upgrading road and pipeline corridors and constructing segments of new road and pipeline corridors (**Figure 6**).

The greatest potential for active erosion would occur along the proposed road upgrade segment between the existing PA 21-2 well pad and the existing W 34-2 well pad, along the proposed road segment between the proposed PA 24-12 well pad and the proposed SP 32-14 well pad, along a small portion of the proposed road segment between the proposed SP 32-14 well pad and the proposed SP 43-13 well pad, and at the existing Federal Rulison 14-95 well pad. In all of these areas, slope ranges from 30 to over 50 percent, and soils have severe erosion potential (NRCS 2007b) (**Table 16**, **Figure 6)**. More specifically the Potts-Ildefonso complex, Torriorthents-Rock outcrop complex, and the Ildefonso stony loam would be encountered along the proposed road upgrade segment in Section 2, the Bucklon-Inchau loam would be encountered along the proposed road segments of concern in Sections 13 and 14, and the Torriorthents-Rock outcrop complex would be encountered at the existing Federal Rulison 14-95 well pad (NRCS 2007b) (**Table 15**, **Figure 5**).

To reduce impacts to soils, particularly in the areas where roads and pipelines would be located on steeper slopes, Williams would implement BLM's *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*, the "Gold Book" (BLM and USFS 2006). These standards and guidelines require incorporation of the BLM Roads Manual 9113. Implementation of these design features and BMPs, along with those developed by Williams, and any site-specific BLM COAs attached to the APDs would ensure that very little of the eroded material would reach the ephemeral and perennial streams in the plan area. **Appendix C** (**Numbers 4-7**) and the *Master APD* (Williams 2006a) present mitigation measures that would be implemented to minimize impacts to soils. Williams would capture sediment and control runoff by crowning roads and constructing silt fences and culverts as necessary. Other construction and control methods would need to consider the natural effects of overland flow and availability, soil texture of eroded material, amount and type of ground cover, slope shape (convex versus concave), slope gradient and length, and surface texture. Reclamation activities to restore disturbed areas would focus on planting ground cover to reduce runoff and stabilize soils, while also improving permeability and infiltration.

Additional direct impacts to soils would result from the *Habitat Mitigation Plan* activities (WestWater 2007c, **Appendix E**), which would include a minor increase in soil erosion. However, Williams would use the erosion control measures presented above to minimize possible impacts. In addition, there appears to be sufficient grass and forbs available for natural reseeding in Section 12 if allowed to mature and go to seed, and reseeding, if necessary, would be implemented immediately following the proposed habitat manipulations.

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| Table 15. Soil Map Units in the DMGAP Area | | | | | |
|---|---|---|---|---|---|
| **Map Unit Number – Soil Association Name** | **Total Acres in DMGAP Area** | **Proposed Direct Impact (acres)[1]** | **Soil Description** | **Slope** | **Erosion Potential** |
| 12 – Bucklon-Inchau Loam | 901.0 | 38.0 | Shallow well-drained soils formed in sandstone and shale residuum at 7,000-9,000 ft. elevation above MSL. Found on ridges and mountainsides. Surface runoff is rated as medium. | 25 - 50% | Severe |
| 17 – Cochetopa Loam | 123.7 | 3.6 | Deep, well-drained rolling to steep soil found on mountainsides and alluvial fans formed in basaltic alluvium. Surface runoff is rated as slow. | 9 - 50% | Severe |
| 33 – Ildefonso Stony Loam | 21.4 | 0.4 | Deep, well-drained hill to steep soil on mesa breaks, sides of valleys, and alluvial fans at 5,000-6,500 ft. elevation above MSL; formed in mixed alluvium derived primarily from basalt. Surface runoff is medium. | 6 - 25% | Moderate to Severe |
| 34 – Ildefonso Stony Loam | 67.8 | 4.6 | Deep, well-drained hill to steep soil on mesa breaks, sides of valleys, and alluvial fans at 5,000-6,500 ft. elevation above MSL; formed in mixed alluvium derived primarily from basalt. Surface runoff is medium. | 25 - 45% | Severe |
| 44 – Morval Loam | 21.5 | 6.9 | Deep, well-drained soils formed in reworked alluvium derived from basalt and sandstone. Found on valley sides of mesas at 6,500-8,000 ft. elevation above MSL. Surface runoff is rated as medium. | 3 - 12% | Low to Moderate |
| 45 – Morval-Tridell complex | 175.8 | 13.8 | Deep, well-drained soils formed in reworked alluvium derived from basalt and sandstone. Found on alluvial fans and sides of mesas. Surface runoff is rated as medium. | 6 - 25% | Moderate |
| 55 – Potts Loam | 37.0 | 0.8 | Deep, well-drained soils formed in alluvium derived from basalt, sandstone, and shale. Found on valleys sides, benches, and mesas at 5,000-7,000 ft. elevation above MSL. Surface runoff is rated as medium. | 3 - 6% | Low |
| 56 – Potts Loam | 51.7 | 2.8 | Deep, well-drained soils formed in alluvium derived from basalt, sandstone, and shale. Found on valleys sides, benches, and mesas at 5,000-7,000 ft. elevation above MSL. Surface runoff is rated as medium. | 6 - 12% | Low to Moderate |
| 58 – Potts-Ildefonso Complex | 323.3 | 22.8 | Hilly to very steep soils on alluvial fans valley sides and mesas at 5,000-6,500 ft elevation above MSL. Combination of two soils. Potts soil (60%) formed in alluvium derived from sandstone, shale, or basalt; the Ildefonso soil (30%) formed in very strongly calcareous, basaltic alluvium and little eolian material. Surface runoff is medium to rapid. | 12 - 25% | Severe |

| Table 15. Soil Map Units in the DMGAP Area | | | | | |
|---|---|---|---|---|---|
| **Map Unit Number – Soil Association Name** | **Total Acres in DMGAP Area** | **Proposed Direct Impact (acres)[1]** | **Soil Description** | **Slope** | **Erosion Potential** |
| 59 – Potts-Ildefonso Complex | 53.0 | 5.6 | Hilly to very steep soils on alluvial fans and valley sides and mesas at 5,000-6,500 ft elevation above MSL. Combination of two soils. Potts soil (60%) formed in alluvium derived from sandstone, shale, or basalt; the Ildefonso soil (30%) formed in very strongly calcareous, basaltic alluvium and little eolian material. Surface runoff is medium to rapid. | 25 - 45% | Severe |
| 66 – Torriorthents-Camborthids-Rock outcrop complex | 12.7 | 0 | Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams and clay found on toe slopes and concave open areas on foothills and mountainsides at 5,000-8,500 ft. elevation above MSL. Runoff is very rapid. | 15 - 70% | Very severe |
| 67 – Torriorthents-Rock outcrop complex | 333.6 | 5.3 | Exposed sandstone and shale bedrock, loose stones, and shallow to deep stony loams and clay found on toe slopes and concave open areas on foothills and mountainsides at 5,000-8,500 ft. elevation above MSL. Runoff is very rapid. | 15 - 70% | Very severe |
| 69 – Vale Silt Loam | 0.3 | 0 | Deep, well-drained soils formed from calcareous eolian deposits. Found on alluvial fans, benches, and mesas at 5,000-7,200 ft. elevation above MSL. Surface runoff is rated as medium. | 6 - 12% | Moderate |
| 71 – Villa Grove-Zoltay loams | 1.8 | 0 | Deep, well-drained soils formed in mixed alluvium. Found on alluvial fans and mountainsides at 7,500-7,600 ft. elevation above MSL. Surface runoff is rated as slow. | 15 - 30% | Slight |
| 72 – Wann Sandy Loam | 2.9 | 0 | Deep, poorly-drained soils derived from alluvium formed from sandstone and shale. Found on terraces and valley floors at 5,000-6,500 ft. elevation above MSL. Surface runoff is rated as slow. | 1 - 3% | Low |
| TOTAL | 2,127.4 | 104.6[2] | | | |

[1] Includes long-term (duration >2 years) and short-term (duration < 2 years) surface disturbance.
[2] Rounding accounts for slight variations in total acres of disturbance.

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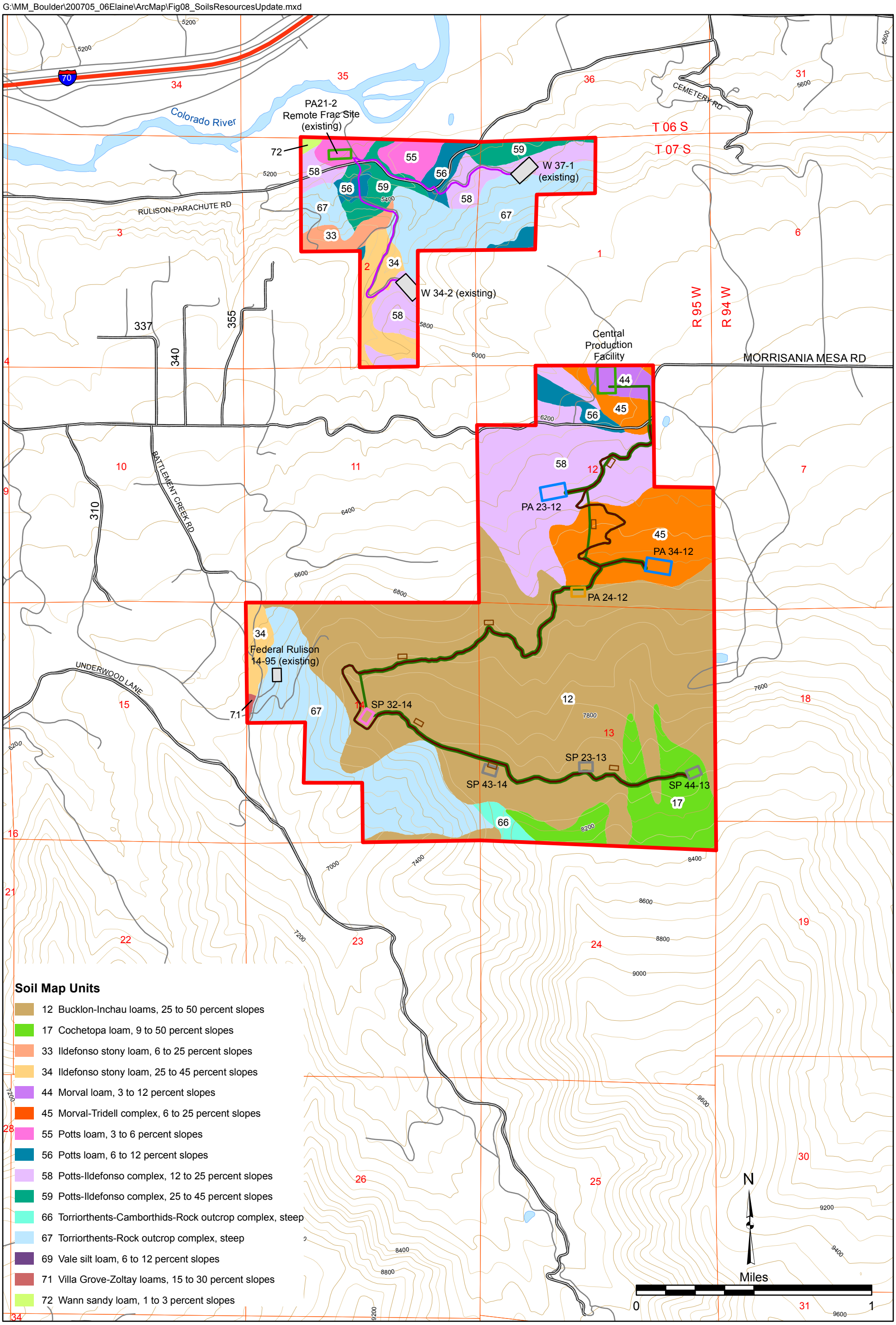


Highways
County Roads
Other Existing Road
**Proposed/Existing Pad**
Existing Pad
2007
2008
2009
2010
Proposed Frac Line and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road
Offsite Facility
Proposed Staging Area (Pipeline Construction)
DMGAP Boundary

AUGUST 27, 2007

**FIGURE 5**
**SOILS RESOURCES-SOIL MAP UNITS**
**WILLIAMS PRODUCTION - PARACHUTE, CO**

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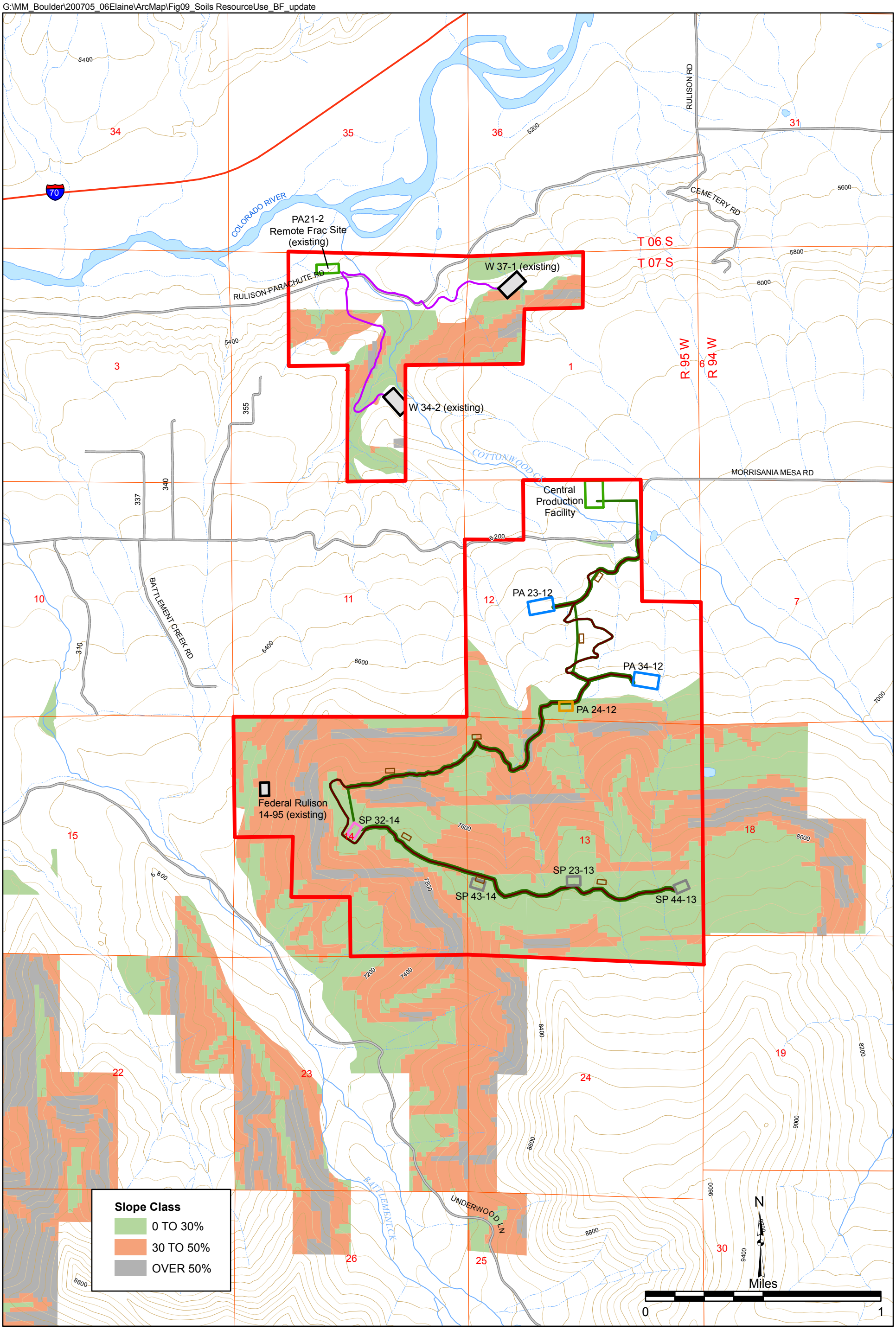


AUGUST 27, 2007

Highways
County Roads
Open Water
Perrenial Stream
Ephemeral Stream

**Proposed/Existing Pad**
Existing Pad
2007
2008
2009

2010
Proposed Frac Line and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road

Offsite Facility
Proposed Staging Area (Pipeline Construction)
DMGAP Boundary

**FIGURE 6**
**SOILS RESOURCES-SLOPE CLASSES**
**WILLIAMS PRODUCTION - PARACHUTE, CO**

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| Table 16. Slope Classes in the DMGAP Area | | |
|---|---|---|
| **Slope Class** | **Total Acres in the DMGAP Area** | **Proposed Direct Impact (acres)[1]** |
| 0 to 30% slope | 665.1 | 34.4 |
| 30 to 50% slope | 683.0 | 16.1 |
| Over 50% slope | 126.6 | 2.6 |
| TOTAL | 1,474.7 | 53.1 |
| [1] Includes long-term (duration >2 years) and short-term (duration < 2 years) surface disturbance. | | |

Other potential impacts to soils from the proposed exploration and development activities include contamination of topsoil and subsurface soils resulting from leaks or spills of natural gas condensate liquids from wellheads, conveyance pipelines, produced water sumps, and condensate storage tanks. Contaminants released on the surface could infiltrate the soil and migrate downward reaching the groundwater table. Depending on the size and type of spill, the primary effect would be the long-term loss of soil productivity. To reduce the potential for contamination of soils; wells, roads, pipelines, and collection facilities would be designed to minimize spills and leaks. Hazardous materials, such as saline water, hydrofracturing chemicals, fuels, and lubricants would be contained in storage tanks and surrounded by berms. Williams would develop and implement a SPCC Plan that would detail the spill containment, clean up, and reporting procedures. With successful revegetation and spill prevention procedures, the potential for increased erosion rates and sediment yield as a result of the proposed action would be minor. Minor impacts would occur over the long term due to increased human activity and presence. Implementation of the design, management, and protection methods discussed would minimize the effects of the proposed action on soil resources.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition, and there would be no new impacts on soil resources as a consequence of selecting this alternative.

*Analysis on the Public Land Health Standard for Soils:*

The *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a) assessed soil conditions at 35 upland sites. One of these sites, located in the Battlement Creek Common allotment, was not achieving Standard 1 for soils. The primary problems were the numerous water flow patterns and the extent of bare ground and pedestaling. These problems were being exacerbated by an existing road. Even though soils in the rest of the assessment areas were found to be properly functioning, poor vegetative conditions and road drainage problems were observed on a number of sites. The proposed action may contribute to increased erosion in the plan area, including the problem site described above. Provided that the required mitigation measures are implemented, the proposed action should not prevent other areas in the DMGAP area from meeting the standard for soils.

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

Affected Environment: The analysis area for vegetation is the plan area. **Figure 7** and **Table 17** present the extent of each vegetation community based on the Colorado Gap Analysis Program (GAP) vegetation coverage (CDOW 2007b). This section provides descriptions of the primary vegetation community types,

based on information provided in the *Land Health Assessment Battlement Mesa Area* (BLM 2000a) and the findings of biological surveys conducted in and adjacent to the DMGAP area (WestWater 2007a, b). The analysis area is predominantly mountain shrublands, pinyon-juniper woodlands, and Gambel oak woodlands, with interspersed sagebrush openings, cottonwood-dominated riparian areas, aspen pockets, and isolated Douglas-fir trees (WestWater 2007a, b) (**Figure 7**, **Table 17**).

The pinyon-juniper woodland is dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), with juniper dominant at the lower elevations. At higher elevations, the woodland becomes more evenly mixed (WestWater 2007a, b). Stands of pinyon-juniper are in various seral stages, but most are in the mid to older age classes (WestWater 2007c). Recruitment of young trees is occurring as sagebrush shrublands are encroached upon (WestWater 2007c). The understory includes older age-class big sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), native grasses such as Indian ricegrass (*Achnatherum hymenoides*) and various wheatgrasses, the non-native perennial grass crested wheatgrass, and the non-native annual grass downy brome or cheatgrass (BLM 2000a; WestWater 2007a, b). The pinyon-juniper appear to be out-competing the forbs, grasses, and shrubs for light, moisture, and belowground resources, resulting in more bare ground being exposed than in the other community types (WestWater 2007c).

On north- and east-facing slopes, pinyon-juniper woodlands are often mixed with mountain shrub communities that include Gambel oak, Saskatoon serviceberry (*Amelanchier alnifolia*), and Indian-apple (*Peraphyllum ramosissimum*). At the higher elevations, the mountain shrub community is less dense and consists of a greater percentage of Gambel oak. Some stands of Gambel oak are very dense and homogeneous. Oak/serviceberry shrublands are mostly in a late seral stage, many being in the 15- to 20-foot height class (WestWater 2007c). Other common species in the mountain shrub communities include roundleaf snowberry (*Symphoricarpos rotundifolius*), elk sedge (*Carex geyeri*), and mountain brome (*Bromus marginatus*) (BLM 2000a; WestWater 2007a, b).

Another upland community type is big sagebrush *(Artemisia tridentata*). This type often consists of a mix of sagebrush species (*Artemisia tridentata* and *A. vaseyana*), a variety of native forbs, and native perennial grasses such as western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Indian ricegrass, bottlebrush squirreltail (*Elymus elymoides*), and needle-and-thread grass (*Hesperostipa comata*) (BLM 2000a; WestWater 2007a, b). Most of the sagebrush in the plan area is in a late seral stage, in even-aged, mature stands (WestWater 2007c). Some of these plants have been browsed extensively (WestWater 2007c).

Small, dense pockets of quaking aspen (*Populus tremuloides*) and isolated individuals of Douglas-fir (*Pseudotsuga menziesii*) extend into the southern end of the plan area at the highest elevations. Aspen occurs at the heads of some small drainages, and Douglas-fir is typically interspersed within mountain shrub communities (WestWater 2007a, b).

Cottonwood-dominated riparian areas occur in Cottonwood Creek and smaller drainages and wet areas in Section 13. This community type consists primarily of narrowleaf cottonwoods (*Populus angustifolia*) and box-elder (*Acer negundo*) (WestWater 2007a, b).

| Table 17. Vegetation in the DMGAP Area | | |
|---|---|---|
| **Vegetation Type** | **Total Acres in the DMGAP Area** | **Proposed Direct Impact (acres)[1]** |
| Aspen | 12.2 | 0 |
| Conifer Riparian | 0.7 | 0 |
| Cottonwood | 12.8 | 0.4 |
| Douglas-fir | 27.5 | 1.0 |
| Douglas-fir/Aspen Mix | 11.6 | 0 |
| Non-native Riparian Shrubs | 2.5 | 0.8 |
| Gambel Oak | 795.8 | 30.1 |
| Greasewood | 0.7 | 0 |
| Irrigated Agricultural | 34.7 | 1.3 |
| Juniper | 261.7 | 14.0 |
| Juniper/Sagebrush Mix | 58.9 | 7.5 |
| Mesic Mountain Shrub Mix | 92.1 | 5.2 |
| Pinyon-Juniper | 166.0 | 3.6 |
| Pinyon-Juniper/Mountain Shrub Mix | 278.4 | 9.0 |
| Pinyon-Juniper/Oak Mix | 81.4 | 2.6 |
| Pinyon-Juniper/Sagebrush Mix | 73.0 | 5.4 |
| Sagebrush Community | 77.6 | 7.5 |
| Sagebrush/Grass Mix | 43.0 | 4.3 |
| Sagebrush/Mesic Mountain Shrub Mix | 64.1 | 3.7 |
| Saltbush Community | 0.9 | 0.7 |
| Shrub Riparian | 4.6 | 0.5 |
| Sparse Juniper/Shrub/Rock Mix | 9.3 | 0.9 |
| Sparse Pinyon-Juniper/Shrub/Rock Mix | 8.5 | 0 |
| Talus Slopes and Rock Outcrops | 3.5 | 0.7 |
| Willow | 5.7 | 0 |
| TOTAL | 2,127.0 | 99.2[2] |

[1] Includes long-term (duration > 2 years) and short-term (duration <2 years) surface disturbance.
[2] Rounding accounts for slight variations in total acres of disturbance.

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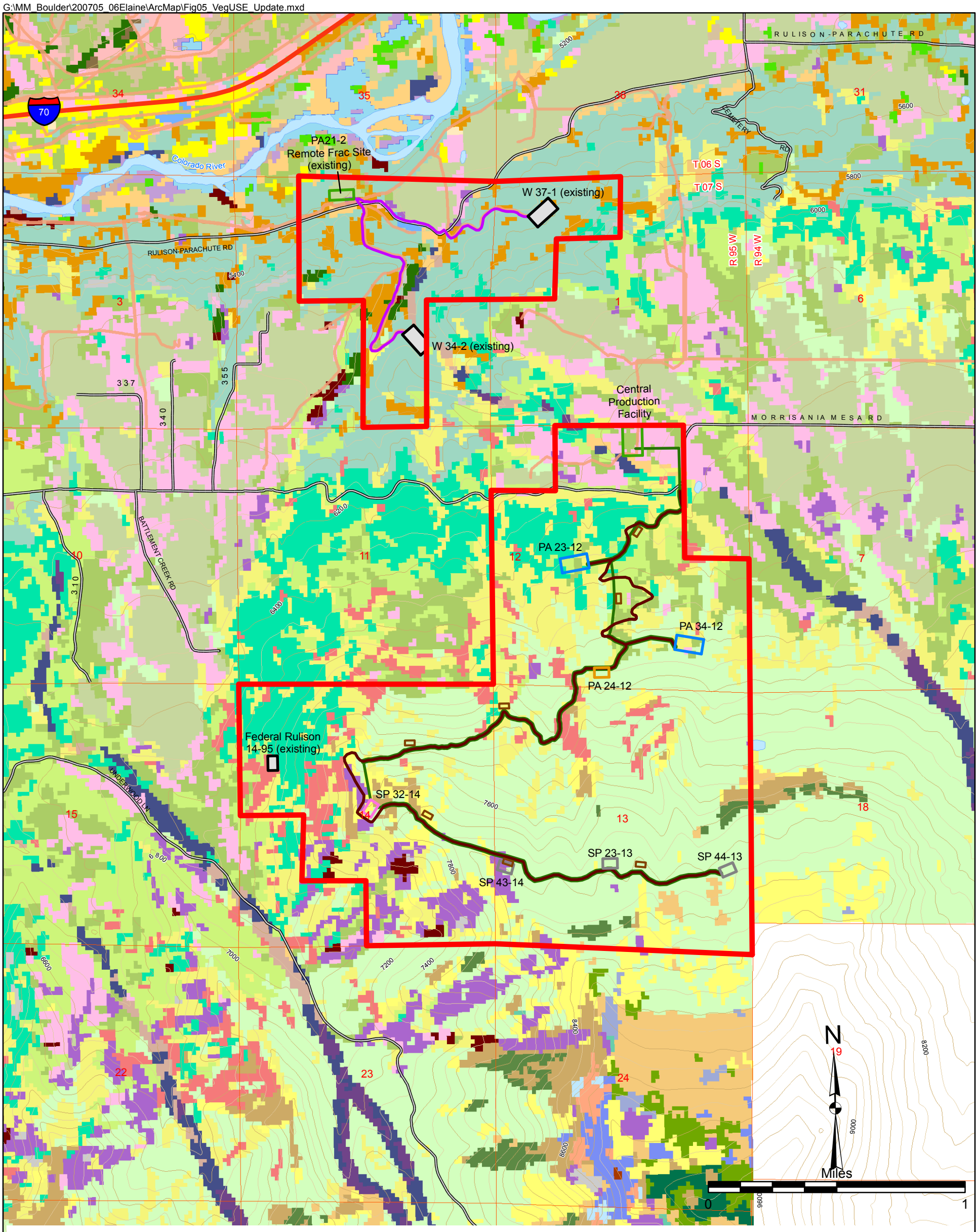


**Vegetation Type**

- Aspen
- Aspen/Mesic Mountain Shrub Mix
- Conifer Riparian
- Cottonwood
- Disturbed Rangeland
- Douglas Fir
- Douglas Fir/Aspen Mix
- Douglas Fir/Englemann Spruce Mix
- Englemann Spruce/Fir Mix
- Exotic Riparian Shrubs
- Fir/Lodgepole Pine Mix
- Forested Riparian
- Gambel Oak
- Grass Dominated
- Greasewood
- Irrigated Ag
- Juniper
- Juniper/Sagebrush Mix
- Mesic Mountain Shrub Mix
- PJ-Mtn Shrub Mix
- PJ-Oak Mix
- PJ-Sagebrush Mix
- Pinon-Juniper
- Sagebrush Community
- Sagebrush/Grass Mix
- Sagebrush/Mesic Mtn Shrub Mix
- Saltbush Community
- Sedge
- Shrub Riparian
- Shrub/Brush Rangeland
- Snowberry
- Snowberry/Shrub Mix
- Soil
- Sparse Juniper/Shrub/Rock Mix
- Sparse PJ/Shrub/Rock Mix
- Spruce/Fir/Aspen Mix
- Subalpine Grass/Forb Mix
- Talus Slopes & Rock Outcrops
- Willow

- Highways
- County Roads
- Proposed Frac Line and Pipeline/Road Upgrades
- Proposed Pipeline
- Proposed Road

Proposed/Existing Pad
- Existing
- 2007
- 2008
- 2009
- 2010

- Offsite Facility
- Proposed Staging Area (Pipeline Construction)
- DMGAP Boundary

AUGUST 27, 2007

FIGURE 7

**DOGHEAD MOUNTAIN GAP**
**VEGETATION RESOURCES**
**WILLIAMS PRODUCTION**

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Previous development in the analysis area has fragmented habitats. In the plan area, fragmentation has occurred mostly in Sections 1, 2, 12, and the western half of Section 14, which are predominantly juniper woodland habitats such as homogeneous juniper, juniper/sagebrush mix, pinyon-juniper, pinyon-juniper/mountain shrub mix, pinyon-juniper/oak mix, and pinyon-juniper/sagebrush mix (**Figure 7**). Section 13 and the eastern half of Section 14 are currently relatively intact mountain shrub, Gambel oak woodland, sagebrush/mountain shrub, and pinyon-juniper/mountain shrub mix habitats (**Figure 7**). In Section 13 there are also three drainages with aspen and Douglas-fir/aspen mix components (**Figure 7**). The 1976 Battlement Creek wildfire burned extensive areas in Sections 13, 14, 23, and 24 (WestWater 2007a). Vegetation has recovered in most areas burned by the fire (WestWater 2007a). In the portions of these sections that were not burned, lack of disturbance has resulted in old age-class woody vegetation (WestWater 2007a).

In some areas, sagebrush and serviceberry have declined to a point where significant mortality has occurred. Much of the mountain shrub vegetation, particularly serviceberry, has been heavily browsed in the past by mule deer and elk, resulting in a hedged appearance (WestWater 2007a). In addition, agricultural development in portions of the DMGAP area has altered the composition and structure of the dominant vegetation types, particularly in the northern portions of Sections 2 and 12 (WestWater 2007b). Agricultural modifications to these areas have included land leveling and an irrigation ditch system for the production of native and non-native grass species for domestic livestock pasture and hay (WestWater 2007b). In the sagebrush communities, grazing has resulted in overuse of the herbaceous understory (WestWater 2007c).

In Section 12, habitat mitigation and enhancement is proposed, as described in the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**). An improvement in vegetative species composition and age structure is desired to meet ecosystem restoration objectives. The openings, often dominated by decadent sagebrush, are slowly being replaced by young juniper and losing the patchwork quality. Bare soil appears to be increasing as herbaceous cover decreases.

*Proposed Action:*

Environmental Consequences: Direct effects to vegetation under the proposed action would include short- and long-term loss of vegetation and long-term modification of community structure and composition. **Table 17** presents the total maximum extent of direct disturbance to each vegetation type that would result from the proposed exploration and development activities. The acreages presented are for the working areas of the project components, which includes long-term and short-term disturbance from new roads, new pipelines, temporary or buried frac lines, new well pads, expansions of existing well pads, new central production facility, temporary staging areas, potential expansions of existing roads, and potential upgrades of existing pipelines, as presented in **Figure 1** and **Table 3**. The total acres of disturbance resulting from the proposed exploration and development activities would be 104.6 acres.

Long-term impacts would occur in the footprints of project components to be maintained for the life of the project (**Table 3**). Restoration of these disturbed habitats would be initiated at project completion during final reclamation. Short-term impacts would occur during construction, drilling, and completion activities (**Table 3**) and would be restored during interim reclamation. Impacts in areas of interim reclamation are considered short term because reclamation would be initiated within 2 years. However, a substantially longer period, typically more than 5 years, would be required for the establishment of a self-sustaining native plant cover that meets reclamation standards for cover and species composition (BLM 2007f). For habitats dominated by shrubs, several decades may be required for restoration to suitable conditions, depending on site-specific factors such as soil type, soil moisture, topography (slope, aspect, and elevation), and exposure to grazing by wild or domestic herbivores.

Direct impacts to vegetation would be minimal for most of the plant communities (**Table 17**). The proposed exploration and development would primarily affect Gambel oak woodlands and juniper community types, and sagebrush communities to a lesser extent (**Table 17**). The proposed action would result in an increase in the relative proportion of herbaceous, non-woody species in the areas of disturbance.

Mitigation measures that would be implemented to minimize impacts to plant communities are provided in **Appendix C (Numbers 7 and 8)** and in the *Master APD* (Williams 2006a). Williams would implement a reclamation program that includes guidelines for seedbed preparation, seed application, erosion control, site protection, and monitoring.

Williams also proposes to conduct up to 75 acres of voluntary offsite mitigation as part of the proposed action. In this context, BLM defines "offsite" as occurring somewhere other than the point of impact, although within the DMGAP boundary. Onsite mitigation consists of required interim reclamation of short-term habitat loss and final reclamation of long-term habitat loss. Details of the proposed habitat treatments and the direct effects to vegetation are provided in the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**). The objectives and activities for each community type are summarized below.

- Sagebrush – Sagebrush habitat would be improved by increasing plant diversity and developing a multi-aged sagebrush community. The development of a healthy understory of grasses and forbs is a primary objective in this habitat type. It is estimated that the removal of 40 to 60 percent of the sagebrush in selected areas would maintain the sagebrush community but increase the herbaceous ground cover (WestWater 2007c).

- Pinyon-Juniper – Pinyon-juniper removal would approach 100 percent in the selected areas. In some cases, large trees would be left for cover. In addition, approximately 20 to 25 percent of the sagebrush would be treated (WestWater 2007c).

- Oak/Serviceberry – Treatment would approach removal of 25 to 50 percent of the standing brush in these areas. In some cases, large patches of mature oak would be left for cover (WestWater 2007c).

Indirect effects to vegetation that may result from implementation of the proposed action are as follows. Surface disturbance would increase the potential for noxious weed invasion and spread. Soil erosion and sedimentation may increase at locations of pads and access roads, but soil conditions would improve in the long-term in the treated areas. The proposed exploration and development would increase the potential for contamination. Changes to habitat quantity and quality would occur throughout the plan area. Habitat treatments may change the level of use by big game and livestock. Negative impacts would be minimized by implementing mitigation measures as presented in **Appendix C** (**Numbers 7 and 8**) and the *Master APD* (Williams 2006a).

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, none of the proposed vegetation modification would occur. Barring the potential for a large scale fire, the general characteristics of the vegetation communities in the DMGAP area are expected to be similar to the current condition. Under this alternative, the level of browsing by big game is expected to remain concentrated in the areas that currently provide suitable habitats.

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

Of the 35 upland sites visited for the *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a), approximately half were failing to meet Standard 3. Indicators that the standards were not being achieved were based on native plant species distribution, abundance, diversity, and vigor. Surface disturbance associated with the proposed action has the potential to encourage expansion of invasive non-native species; however, provided that the required mitigation measures are implemented and reclamation is successful, the impacts of the proposed action would be lessened but would likely contribute to the decline of land health that is occurring in some portions of the assessment area. Furthermore, in the Battlement Creek Common allotment, the one site (of four sites sampled) that was failing to meet Standard 3 was composed of sagebrush that was old, decadent, moderately to severely hedged, with no evidence of reproduction, and undergoing invasion by juniper. Similar areas would be treated as part of the proposed *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**), potentially improving habitat conditions.

### *7.2.11 Visual Resources*

Affected Environment: The analysis area for visual resources includes the Interstate 70 viewshed south of Interstate 70, which includes a 16.5-mile stretch between Rifle and Parachute. The plan area lies at the southernmost edge of the Piceance Basin on the north side of Battlement Mesa. Battlement Mesa is a large prominent mesa that stretches for approximately 20 miles east-west and sits along the Garfield-Mesa county line between the Colorado River to the north and Plateau Creek to the south. The topography is varied, from the mid-elevation with gentle grass/shrublands on the lower Morrisania and Holms mesas between the Colorado River and Doghead Mountain, rising to steep, forested drainages and 1,000-foot-high shale cliffs at the head of Battlement and Cottonwood Creeks. The rolling, low-elevation landscape of the mesas supports primarily pinyon/juniper, sagebrush, and Gambel oak communities. Higher elevations are dominated by aspens and large stands of spruce and fir in steep drainages. Slopes in the drainages are up to 40 to 45 percent. Elevations in the vicinity of the analysis area vary from 5,400 feet above MSL along Morrisania Mesa to 9,664 feet above MSL on Doghead Mountain.

This viewshed area provides mostly open, fully exposed views of Battlement Mesa and most of the north-facing landscape within the area. Battlement Mesa is the dominant topographic feature on the south side of Interstate 70 and has considerable topographic relief. This viewshed is considered to be important because it is viewed by a large number of people, including residents of the adjacent communities of Battlement Mesa, Holms Mesa, and Morrisania Mesa (BLM 2006a). Actual annual traffic counts in 2002 on this segment of Interstate 70 were more than 5.5 million vehicle-trips (Garfield County 2007). Public sensitivity to landscape modification is high, and the viewshed is considered outstanding (BLM 20006a).

The foreground slopes subtly downward away from the top of the mesa and higher peaks located on Forest Service public lands. The vegetation and few overhead utility lines do not interfere with the views in the analysis area. Composition of this viewshed is also varied in texture and form, and the foreground includes multiple roads and some landscape modifications, mostly on private lands. Existing gas facilities and supporting infrastructure, including drilling rigs and support equipment, roads, and pipelines have been made discernible by vegetation removal, creating contrast in color, line, and texture.

Lands with high visual sensitivity are those within 5 miles of Interstate 70, of moderate to very high visual exposure, where details of vegetation and landform are readily discernible and changes in visual contrast can be easily noticed by the casual observer on Interstate 70 (BLM 1999a). The DMGAP area contains 803 acres that are mapped as high visual sensitivity, with Interstate 70 viewshed visibility ratings of moderate, high, and very high (**Figure 8**, BLM 2007b).

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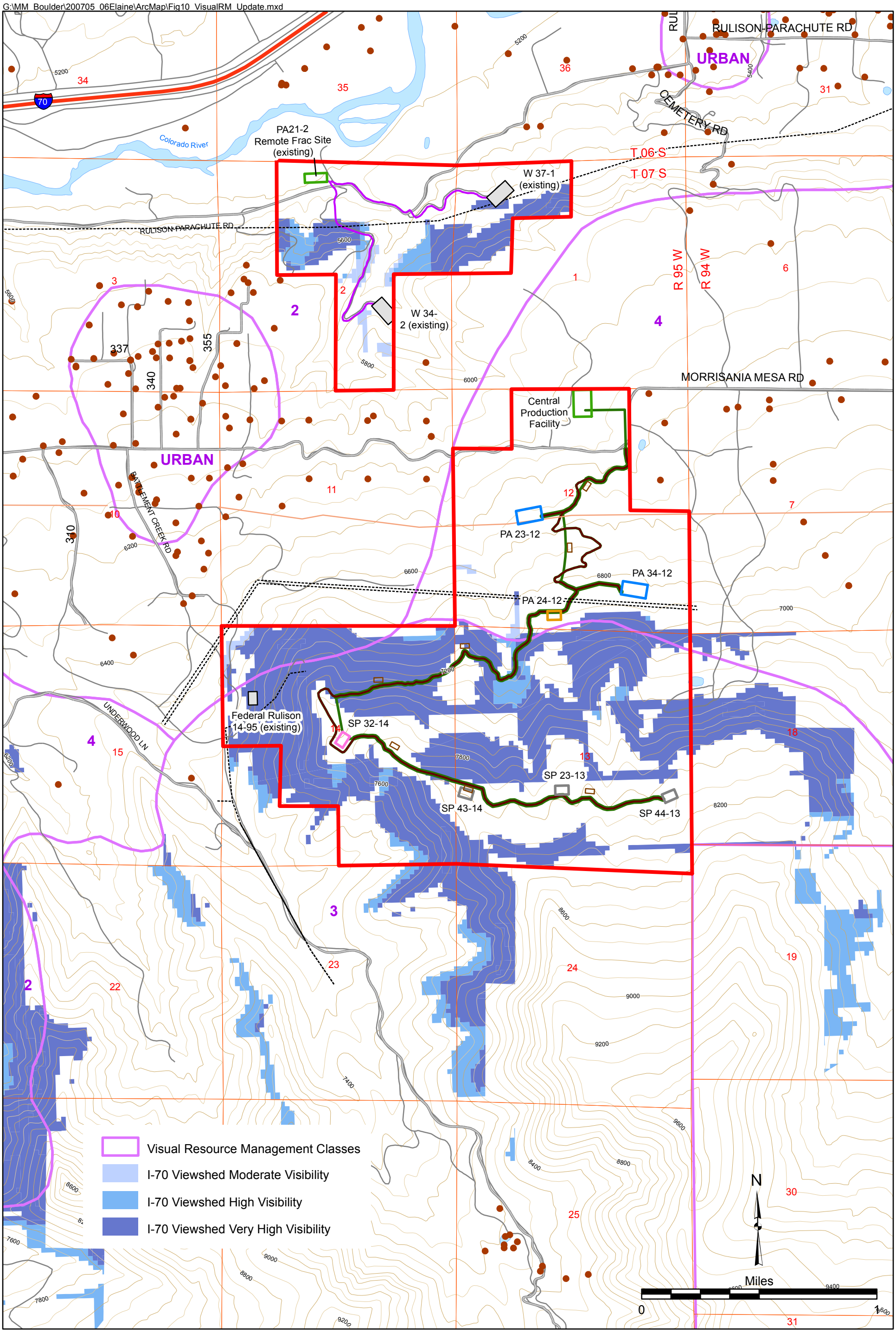


Highways
County Roads
Other Roads
Oil / Gas Well
Transmission Line
Pipeline
DMGAP Boundary
Proposed Frac Line and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road

**Proposed/Existing Pad**
Existing Pad
2007
2008
2009
2010
Offsite Facility
Proposed Staging Area (Pipeline Construction)

AUGUST 27, 2007

**FIGURE 8**

**VISUAL RESOURCES MANAGEMENT**

**WILLIAMS PRODUCTION - PARACHUTE, CO**

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**Figure 8** also shows the Visual Resource Management (VRM) classes in the plan area (BLM 1999a, 2007b). The proposed action would take place within areas classified by the BLM as VRM Classes II, III, and IV. The extent of these VRM classes and their management objectives are:

- VRM Class II (490 acres) – The management objective of visual resources on Class II areas is to retain the existing characteristic landscape. The level of change in any of the basic landscape elements (line, form, color, texture) should be low and not evident.

- VRM Class III (1,100 acres) – Management in Class III areas allows for a moderate level of change to the characteristic landscape. The objective of this class is to partially retain the existing character of the landscape. In these areas, alteration may attract attention but should not dominate the view. Changes in the landscape in Class III areas should repeat the basic elements found in natural features of the landscape.

- VRM Class IV (537 acres) - The management of visual resources in Class IV areas allows major modifications to the existing character of the landscape. In these areas, alteration may dominate the view and may be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

VRM objectives do not apply to non-BLM lands, but visual concerns may be addressed on split estate where Federal minerals occur. VRM classes shown for non-public lands are an indication of the visual values for those lands, and those values are only protected by landowner discretion. The management of VRM classes, landscape character, and scenic quality of private and public lands and split estate and visual impacts associated with well pad development and operation are discussed in the *Oil & Gas Leasing and Development FSEIS* (BLM 1999a: 3-41 to 3-45, 4-49 to 4-54). The portion of the DMGAP area that is split estate where Federal minerals occur, generally the southern quarter of Section 13, is classified as VRM Class III.

The plan area is dominated visually by native plant communities, but some modifications to the natural environment due to human activities have also occurred. These include electrical transmission lines, a mobile phone communications tower, multiple two-track roads, oil and gas facilities, and fences and gates for livestock.

- Key Observation Point (KOP) 1 (photo below) – Located on Interstate 70 2.8 miles east of Parachute, Colorado, KOP 1 looks to the south and represents the view while traveling east on Interstate 70. The foreground is comprised of the frontage road, oil and gas development, agricultural lands, and the Colorado River. The middle ground is comprised of the rising benches and hills up to Doghead Mountain, the very top of which forms the background.

- KOP 2 (photo below) – Located on the frontage road to the south of Interstate 70 4.6 miles east of Parachute, Colorado, KOP 2 represents the view while traveling west on Interstate 70 or from the frontage road. The foreground is comprised of the frontage road, oil and gas development, agricultural lands, and the Colorado River. The middle ground holds agricultural properties and rolling hills that rise up to Doghead Mountain, the very top of which forms the background.

*Proposed Action:*

Environmental Consequences: Short-term visual impacts from construction, drilling, and completion activities would occur on all new pads, as well as on existing pads with proposed expansion. The existing landscape would be changed by the introduction of new elements of line, color, form, and texture. New pads and other surface facilities, new roads, and new pipelines would increase the presence of drilling rigs, heavy equipment (e.g., dozers, graders, etc), and vehicular traffic, with an associated increase in dust, light pollution, and well flaring.

Long-term impacts of the proposed action would consist of reduced visual character within portions of the landscape where new pad facilities, pipelines, and roads cannot be screened from sight. The visibility of new areas of surface disturbance and production equipment would increase the visual contrasts associated with human modification already present in the area. Interim reclamation, site-specific mitigation, as well as the use of natural colors on production equipment would largely mitigate long-term impacts.

Exploration and development activities proposed within the Interstate 70 viewshed and VRM classes are discussed below (**Figure 8**).

*Interstate 70 Viewshed*

The proposed action would result in 18.6 acres of total disturbance in the Interstate 70 viewshed with high visual sensitivity.

The proposed activities in these areas include upgrades to existing roads and pipelines in Sections 1 and 2, work at existing pads Federal Rulison 14-95 and W 37-1, segments of new road and pipeline corridors in Sections 13 and 14, and temporary staging areas in Sections 13 and 14. Total avoidance of the Interstate 70 viewshed on 30 percent or greater slopes is not possible. However, field visits with Williams, BLM, and a visual resources consultant working on behalf of the BLM helped determine where proposed project components should be located to avoid the most visually sensitive areas, taking into account project logistics and other resource concerns.

*VRM Class II*

The proposed action includes 30.2 acres of surface disturbance in the Class II area, approximately 5 acres of which would be new disturbance.

- PA 21-2, existing remote frac site: No new disturbance is proposed.
- Existing pad W 37-1: The location is constrained by a drainage and property line running along the southeast side of the pad; the proposed expansion is primarily towards the southwest; previous disturbance has been revegetated and has sagebrush mixed in with rabbitbrush. This pad has exposure from Interstate 70.

- Existing pad W 34-2: Expansion is primarily towards the southeast; previous disturbance has been revegetated; there is partial exposure from the Interstate 70 corridor.

Because of steep terrain and high visibility of portions of the DMGAP area and the level of detail currently available from Williams, it is not possible at this time to determine whether some project components would meet VRM objectives. Making this determination would require site-specific information such as the limits of disturbance, cut-and-fill heights, and potential visual mitigation measures. Therefore, approval of expansion of the existing W 37-1 and W 34-2 pads is deferred until information sufficient for a VRM determination has been submitted to, and analyzed by, the BLM (**Appendix D**).

*VRM Class III*

The proposed exploration and development would result in 39.6 acres of surface disturbance in VRM Class III.

- Surface disturbance would not occur in the portion of the plan area that is split estate.

- Existing pad Federal Rulison 14-95: Minor pad expansion that is topographically constrained; previous disturbance has revegetated. This site is not expected to require additional cut and full during construction. Care shall be taken not to cast excess down the western slope of the existing pad during construction.

- New pad SP 32-14: This pad location was moved to reduce visibility from Interstate 70; the new location is partially hidden and requires fewer cuts and fills.

- New pad SP 43-14: This pad location was moved to reduce visibility; new location is in a relatively flat meadow with reduced visibility.

- Access road length between PA 24-12 and SP 32-14: Multiple alternatives were evaluated for this road, as discussed in Section 4.2; the road was routed along the slopes to minimize cut and fill impacts. This road alignment has high visibility from the Interstate 70 corridor and potentially large cut- and-fill slopes that will need to be mitigated to meet VRM objectives. For example, a 14-foot running surface on the road plus 4 feet of drainage ditch (18 feet total) across a slope of 48 percent (approximately the steepest slope to be crossed by this road) would require a cut with a length of 37 feet and a vertical height of 16 feet, assuming a 1.5 to 1 (vertical to horizontal) cut angle. Using a 1 to 1 angle would reduce the cut to a length of 23 feet and a vertical height of 10 feet but would require more aggressive stabilization techniques. Most of this road would cross a slope angle closer to 30 percent, which would require a cut with a length of 31 feet and a vertical height of 9 feet at 1.5 to 1, and a length of 15 feet and vertical height of 4.3 feet at 1 to 1.

- Access road between SP 32-14 and SP 43-14: This segment should be designed to avoid surface disturbance extending into existing vegetation outside the footprint of the road and required slope regarding. Vegetation should be left in place to provide screening for portions of the fill slopes.

Because of the steep terrain and high visibility of portions of the DMGAP area and the level of detail currently available from Williams, it is not possible at this time to determine whether some project components would meet VRM objectives. Making this determination would require site-specific information such as the limits of disturbance, cut-and-fill heights, and potential visual mitigation measures. Therefore, approval of new pads SP 32-14 and SP 43-14, and the access road between the PA

24-12 and SP 32-14 pads is deferred until information sufficient for a VRM determination has been submitted to, and analyzed by, the BLM (**Appendix D**).

*VRM Class IV*

The proposed exploration and development would result in 35.0 acres of disturbance within the Class IV landscape. In addition, all of the habitat modifications that are proposed as part of the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) would occur in VRM Class IV.

- BMPs should be utilized to minimize disturbance and impacts within VRM Class IV.
- PA 23-12: Pad location was moved downslope to minimize visibility from Interstate 70.
- PA 24-12: Access between 23-12 and 24-12 was routed to avoid a cultural site.
- PA 34-12: Located in thick oak brush; location is constrained by cultural and biological resources.
- Proposed road is located in a heavily vegetated area. The slope is moderate and the heavy vegetation would likely help screen impacts.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The existing environment would remain in its current condition and there would be no new impacts to visual resources.

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

This section discusses aquatic wildlife species not addressed in Section 7.1.9 Special Status Species.

Affected Environment: The analysis for aquatic wildlife includes the populations occurring in the surface water systems in and downstream of the DMGAP area. Section 7.1.11 Water Quality describes the surface waters in the analysis area. The perennial drainages in the analysis area are Battlement Creek and Cottonwood Creek, which are tributaries to the Colorado River (**Figure 4**). No aquatic inventories were conducted in the analysis area as part of this project; however, CDOW aquatic biologists were consulted regarding fish populations and species diversity in the area (WestWater 2007a). Within the analysis area, Battlement Creek and the Colorado River contain fisheries resources, but Cottonwood Creek does not (WestWater 2007a).

CDOW conducted fish sampling in Battlement Creek during 2004 as part of their fisheries management program, which included a sampling point just southwest of the DMGAP area, in the SWSW quarter of Section 14. These surveys documented the presence of viable populations of Colorado River cutthroat as wells as non-native brown trout (*Salmo trutta*) and brook trout (*Salvelinus fontinalis*) (WestWater 2007a).

The Colorado River, located approximately 400 feet north of the DMGAP's northern area (**Figure 4**), supports native nongame fishes, introduced gamefishes, and a variety of aquatic macroinvertebrates.

According to the CDPHE WQCC (CDPHE 2007a), Cottonwood Creek is classified as Aquatic Life Cold 2, which represents waters that are not capable of sustaining a wide variety of biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

*Proposed Action:*

Environmental Consequences: The proposed action would not directly affect Battlement Creek, the Colorado River, or the species that inhabit these waters. Fresh water for use in drilling operations and dust control would be obtained from authorized sources, typically through contractors who have their own legal sources of water. Indirect impacts to Battlement Creek are not expected because the closest proposed activity would be expansion of existing well pad Federal Rulison 14-95 0.41 mile from the creek (**Figure 4**), and water from this pad flows northwest, not directly into Battlement Creek (WestWater 2007d).

The project activities would increase the potential for soil erosion and sedimentation into Cottonwood Creek, which could cause a temporary increase in sediment transport to the Colorado River. However, mitigation measures presented in **Appendix C** (**Numbers 4-7**) and the *Master APD* (Williams 2006a) would be implemented to minimize impacts to surface waters such that it is not likely that the proposed action would cause a sediment load increase in the Colorado River that would be detectable above current background levels.

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, the proposed action would not be approved. The environment would remain in the current condition, and there would be no new activities taking place that would affect aquatic wildlife.

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

The *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a) only addressed upland habitats for Standard 3. Riparian habitats in the assessment area were rated as properly functioning and water quality data related to Standard 5 show parameters to be suitable to support and sustain fish species. Provided that the required mitigation measures are implemented, the proposed action would not prevent the standard for aquatic wildlife from being met.

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

This section discusses terrestrial wildlife species that were not addressed in Section 7.1.6 Migratory Birds and Section 7.1.9 Special Status Species.

Affected Environment: The analysis area for terrestrial wildlife includes the plan area and a 0.5-mile buffer. Terrestrial wildlife habitats present and the baseline conditions that affect habitat availability and quality are presented in Section 7.2.10 Vegetation and Section 7.1.12 Wetlands and Riparian Zones. Habitats present are predominantly mountain shrubland, pinyon-juniper woodlands, and Gambel oak woodlands, interspersed with sagebrush openings, cottonwood-dominated riparian areas, and aspen/Douglas-fir stands (WestWater 2007a). The analysis area also contains several small but important seeps and springs that likely provide water and minerals for several species of wildlife (WestWater 2007a). Elevations in the DMGAP area range from approximately 5,300 feet on the north side to approximately 8,300 feet on the south side (WestWater 2007b). The analysis area provides habitats for various species of big game, small game, and non-game mammals and birds that are found in low- to mid-elevation habitats of west-central Colorado.

Habitat conditions and use by big game in Section 12 is described in the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) and Section 7.2.10 Vegetation. Portions of the sagebrush community in Section 12 appear decadent and do not reflect a healthy overstory/understory ratio that would benefit wild

ungulates. The encroachment of juniper into sagebrush shrublands is reducing the amount of herbaceous vegetation available to big game through vegetation type conversion. The mountain shrubland communities of Gambel oak, serviceberry, and mountain-mahogany are likely to be the most important habitat types for big game in Section 12 due to the amount of winter forage that is available. Big game trails are common in these shrubland communities. Big game use of serviceberry is high throughout Section 12, particularly along the periphery of this habitat type and in areas where the plants are scattered in other vegetation types. Big game use in some areas of the oak vegetation type is limited by the density and the height of the vegetation, which restricts movement (WestWater 2007c).

*Big Game Ungulates*

The analysis area contains winter range and severe winter range for both mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus nelsoni*), as mapped by CDOW (2006a) (**Figure 9**). Winter range is that part of the overall range of a species where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each data analysis unit (DAU) (CDOW 2006a). Severe winter range is that part of the range of a species where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten (CDOW 2006a). Field surveys indicate that the DMGAP area is occupied winter range for elk and that mule deer occupy on a year-round basis with increasing numbers during winter months (WestWater 2007c). In addition, the periphery of an elk calving area is mapped immediately southeast of the area (**Figure 9**).

The area immediately southwest of the analysis area is designated as a Wildlife Seclusion Area (**Figure 9**, CDOW 2006a). Wildlife Seclusion Areas are areas that provide high wildlife value; they provide several unique qualities, such as an optimum mix of quality forage, cover, and water, proximity to natural migration corridors, birthing areas, topographic features which moderate severe winter conditions, and seclusion from human intrusion (BLM 1999a).

Habitat effectiveness for big game is related to road density (BLM 1999b). The average road density in the analysis area is currently 2.8 miles per square mile.

*Black Bear*

CDOW (2006a) has mapped all of the analysis area as black bear (*Ursus americanus*) overall range. In addition, the southeastern portions of the analysis area are at the periphery of a black bear fall concentration area (CDOW 2006a).

*Wild Turkey*

CDOW (2006a) has mapped approximately the northern half of the analysis area as wild turkey (*Meleagris gallopavo*) winter range. In addition, a small portion in Section 2 is mapped as a wild turkey winter concentration area (CDOW 2006a). A wild turkey production area is located approximately 0.75 mile east of the DMGAP area, along Cache Creek (CDOW 2006a).

*Proposed Action:*

<u>Environmental Consequences</u>: Direct impacts to terrestrial wildlife from the proposed exploration and development activities may include mortality, disturbance, nest abandonment/nesting attempt failure, or site avoidance/displacement from otherwise suitable habitats. These effects may result from 67.9 acres of land type conversion activities, use of reserve pits, increased noise from vehicles and operation of equipment, increased human presence, and collisions between individuals and vehicles. These effects are

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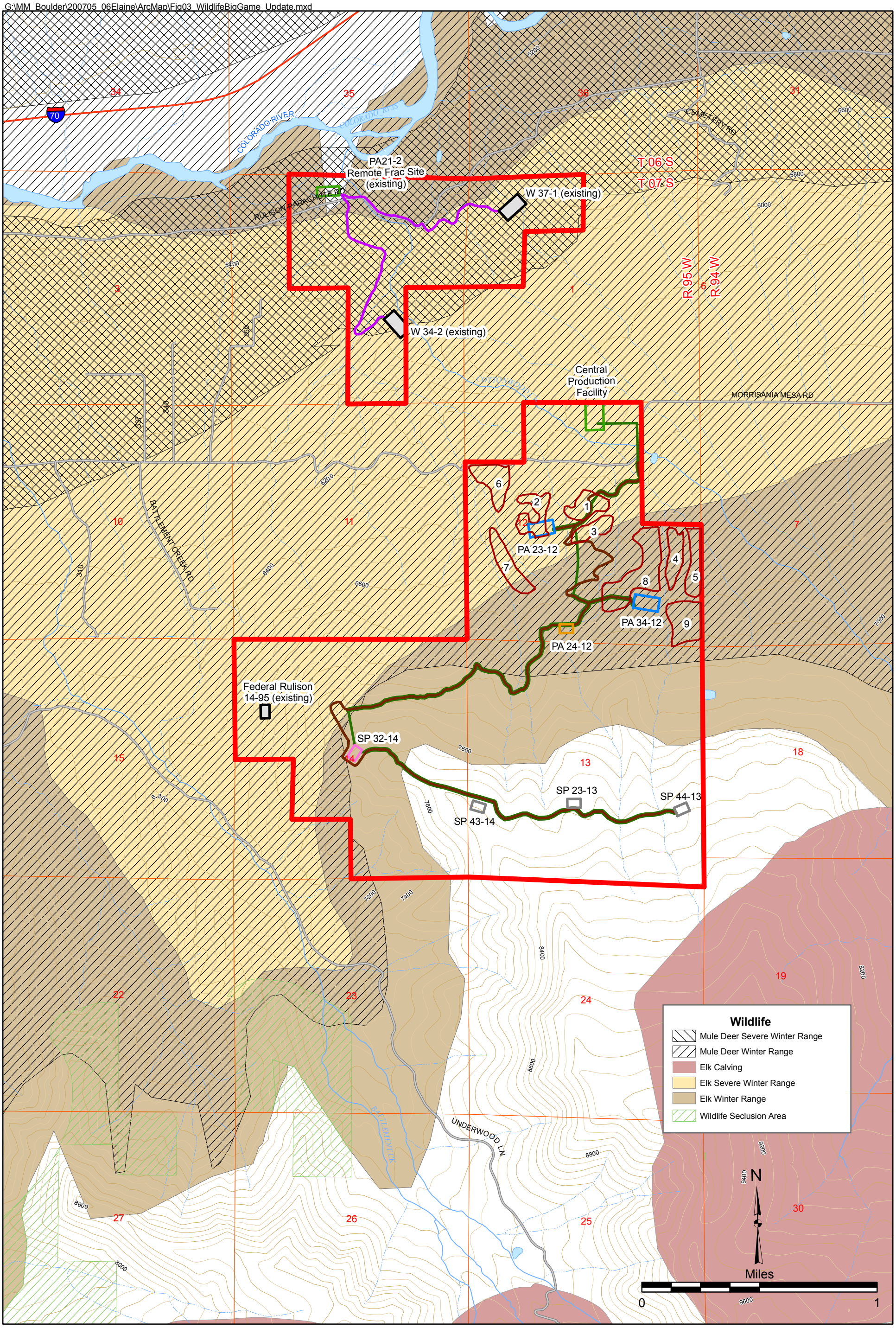


Highways
County Roads
Open Water
Perrenial Stream
Ephemeral Stream

**Proposed/Existing Pad**
Existing Pad
2007
2008
2009

2010
Proposed Frac Line and Pipeline/Road Upgrades
Proposed Pipeline
Proposed Road

Offsite Facility
Proposed Staging Area (Pipeline Construction)
DMGAP Boundary
Habitat Mitigation and Enhancement Treatments

AUGUST 27, 2007

**FIGURE 9**
**WILDLIFE RESOURCES:**
**BIG GAME ACTIVITY**
**WILLIAMS PRODUCTION - PARACHUTE, CO**

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most likely to occur during the proposed 4-year construction and completion activities, but could also occur during the production and maintenance activities, which may extend up to 35 years.

During the construction phase, the most important direct impact is the habitat loss resulting from construction of facilities (well pads, roads, pipelines, compressor stations, and storage yards). Revegetation sufficient to return the disturbed area to productive wildlife habitat (proper species composition, diversity, and age) could require up to 20 years (BLM 1999b). During the operational phase, the direct impact would continue, unless offset to some extent by enhancement of other habitat. In addition, during "workover" periods, some of the revegetated portions of the pad would be disturbed again.

Indirect impacts from the proposed exploration and development activities would include impacts to wildlife habitats, including habitat loss, habitat fragmentation, or a change in habitat quality. Section 7.2.10 Vegetation presents the impacts to vegetation from the proposed exploration and development.

The greatest indirect impact on wildlife, especially big game and raptors, is the disturbance caused by increased human activity, including people movement, equipment operation, vehicle traffic, harassment by dogs and noise related to wells and compressor stations. In this case, the physical alteration of habitat is not the issue, but the presence of these activities. Most species of wildlife are relatively secretive and distance themselves from these types of disturbance or move to entirely different areas sheltered by vegetation screening or topographic features. This avoidance is referred to as displacement and results in underuse of habitat near the disturbance. Avoidance of forage and cover resources adjacent to disturbance reduces habitat utility and the capacity of the affected acreage to support wildlife populations (BLM 1999b).

Oil and gas road networks are of particular concern as they often remain open to unregulated use throughout the life of the well and beyond. The *Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement* (BLM 1999b) states that habitat effectiveness for big game may diminish as much as 30 percent when road densities are greater than about 3 miles per square mile. The average road density in the analysis area would be 3.3 miles per square mile with the construction of proposed roads.

In order to decrease impacts during the operations and maintenance periods, roads developed for this project would be gated and closed to public access. An exception to this occurs in Section 12 where public access in the form of a two-track road currently exists. This road currently provides public access to the high voltage transmission line that traverses the southern portion of this section. A site-specific COA requires that this two-track be reclaimed and that public access is allowed on the new road up to the existing access point, where a gate will be installed to prevent public access on the remainder of the road in Sections 12, 13, and 14 (**Appendix D**). In addition to the gate, any additional means necessary to prevent public motorized access such as boulders or fencing will be installed by Williams, if necessary.

Because the proposed exploration and development activities would include removal of suitable big game habitats, Williams is proposing to include as part of the proposed action voluntary mitigation of up to 75 acres. This number was derived using the method presented in the *Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement* (BLM 1999b) for calculating direct and indirect impacts to deer and elk. That method uses an average area of direct habitat loss for each pad and associated road, assumed widths of reduced wildlife use adjacent to roads and pads, and estimated percentages of pads in deer and elk winter range.

The *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**) is intended to offset the effects to winter range from construction of the proposed action. The plan was developed as a cooperative effort by BLM,

CDOW, and WestWater Engineering, and is designed to meet CDOW goals for ecosystem health and enhancing the capability of the habitat to sustain big game species on an annual basis. The proposed treatment areas are essential wildlife habitats that are not meeting the needs of the ecological community and are likely in vegetative decline because of previous or current management practices. The areas determined to be suitable for treatment include portions of Section 12 where the vegetation and soils are currently in a degraded condition, with characteristics such as over-browsing by big game; sagebrush stands that are even-aged, mature, and of poor vigor; sparse herbaceous understory; and a large extent of bare soil. The proposed management practices would promote a healthy overstory/understory ratio and would benefit domestic and wild ungulates. Habitat improvements would involve phased treatments that would be implemented at intervals (multiple years), such that recovery is occurring as new areas are treated and multiple age classes of vegetation are created.

In addition to the *Habitat Mitigation Plan* (WestWater 2007c, **Appendix E**), other mitigation measures would be implemented to protect big game species. Under standard lease terms, BLM can restrict gas development for up to 60 days. BLM would use this authority to attach a winter timing limitation prohibiting construction, drilling, and completion activities during January and February in all areas mapped by CDOW as deer or elk winter range (**Appendix C, Number 16**).

*No Action Alternative*:

Environmental Consequences: Under the no action alternative, none of the proposed habitat modifications would take place. If the plan area went untreated, eventually the sagebrush openings/meadows would be replaced by juniper, the landscape would continue to lose the patchwork quality, and overall value of the area to big game and some other species of wildlife would be diminished. In the areas where development and use are already present, the potential for direct effects to wildlife would still exist, and in the areas with a limited amount of activity, a relatively low potential for direct impacts would be maintained.

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

The *Land Health Assessment for the Battlement Mesa Area* (BLM 2000a) found that sites failing to meet Standard 3 were located in pinyon-juniper, sagebrush, and shadscale communities. The majority of proposed exploration and development affects Gambel oak communities and would not substantially impact these vegetation types. However, portions of the watershed where the developments would occur are being impacted by extensive oil and gas development and physical habitat alterations. Sustained development and the proliferation of roads, well pads, pipelines, compressor stations, tank farms, and other surface facilities will continue to fragment habitat and affect both habitat quality and quantity. Although impacts from the proposed action would occur on a relatively small spatial scale, they would likely contribute cumulatively to other energy development impacts occurring within the watershed and may further trend the area away from meeting Standard 3 for terrestrial wildlife.

## 8.0 CUMULATIVE IMPACTS

This assessment includes an analysis of impacts of past, present, and reasonably foreseeable future actions. BLM has identified the area for cumulative impact analysis based on watershed boundaries (**Figure 10**). The cumulative impacts area includes the 5$^{th}$ order watershed "Colorado River below Rifle Creek", which consists of the 6$^{th}$ order watersheds Battlement Creek, Cache Creek, Cottonwood Creek, Monument Gulch, and an unnamed watershed.

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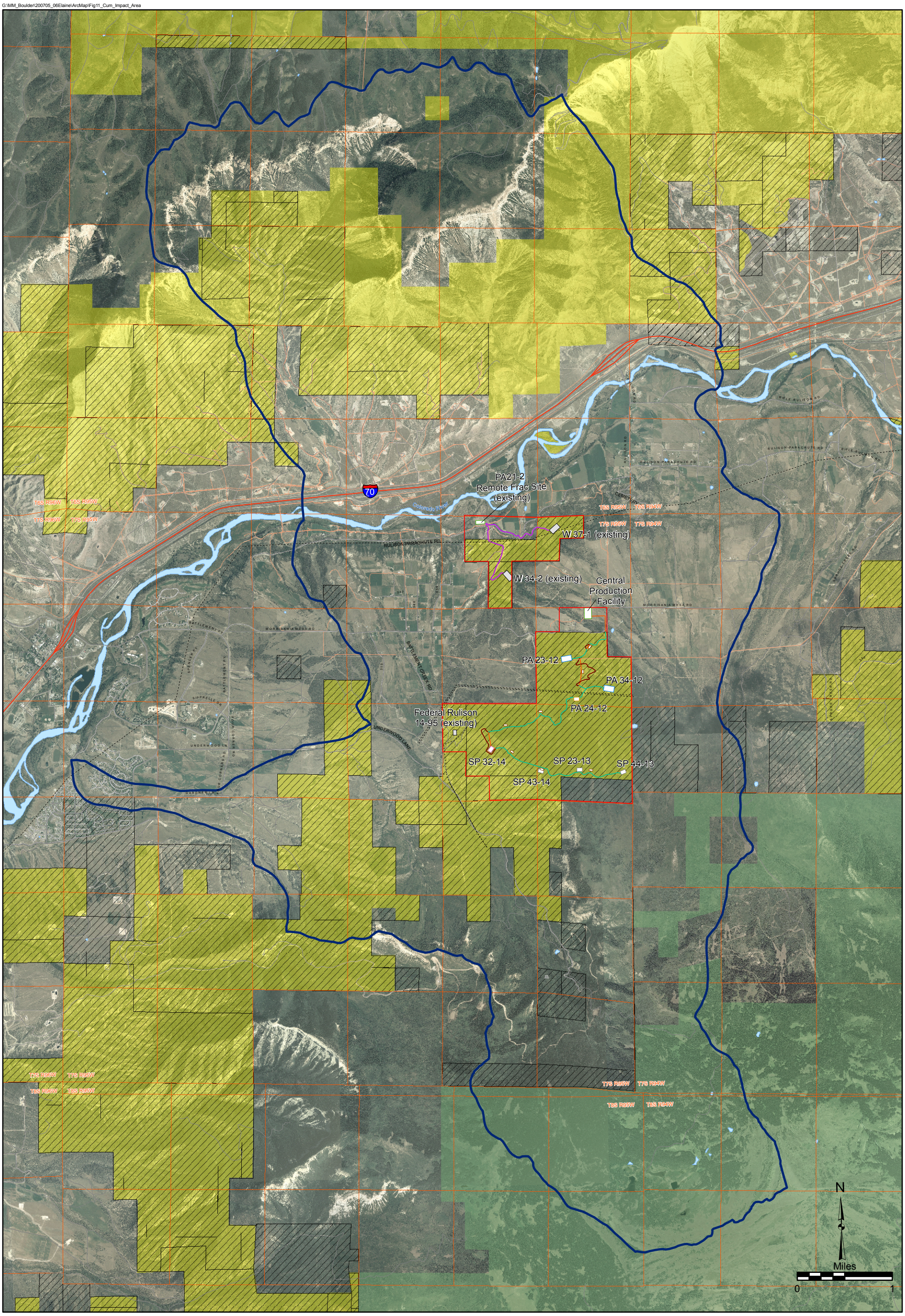


Highways
Other Road
County Roads
Pipeline
Transmission Line

**Proposed/Existing Pad**
Existing Pad
2007
2008
2009
2010

Proposed Frac Line and Pipeline/Road Upgrades
Co-located Proposed Road and Pipeline
Proposed Pipeline
Proposed Road
Offsite Facility
Proposed Staging Area (Pipeline Construction)

Cumulative Impacts Assessment Area
Federal Mineral Lease
DMGAP Boundary

**Surface Ownership**
BLM
USFS

AUGUST 27, 2007

**FIGURE 10**
**DOGHEAD MOUNTAIN GAP**
**CUMULATIVE IMPACTS AREA**
**WILLIAMS PRODUCTION**

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Within the analysis area, there are approximately 9,700 acres of BLM surface ownership, 3,400 acres of USFS surface ownership, and 19,100 acres of private surface ownership. Within this area, the following development currently exists:

- An estimated 150 miles of road including 6 miles of the Interstate 70 corridor, 24 miles of county roads, and 120 miles of other roads
- Approximately 70 miles of existing pipelines
- An estimated 60 well pads, most north of Interstate 70
- One residential area, in the southwest of the analysis area
- Approximately 20 to 30 rural residences

Foreseeable future development includes:

- Additional unspecified oil and gas development
- Additional unspecified rural residential development

Land management in the analysis area is diverse, most notably:

- The USFS land in the southern portion of the analysis area is designated as a roadless area.
- The majority of development in the analysis area is occurring on private lands where protective measures are not in place.

Historically, development in the analysis area consisted of agricultural and ranching lands with some oil and gas development. Within the past 10 years, residential, commercial, utility corridors, and oil and gas developments have dominated area growth. Growth of the oil and gas industry in the past 10 years has been increasingly important to local economies, increasing more than three-fold during the past 5 years (BLM 2006a).

These increasing activity levels have accelerated the accumulation of impacts in the area. These impacts have included: (1) direct habitat losses; (2) habitat fragmentation and losses in habitat effectiveness; (3) elevated potential for runoff, erosion, and sedimentation; (4) expansion of noxious weeds and other invasive species; and (5) increased noise and traffic and reductions in the scenic quality of the area (BLM 1999b: 4-1 to 4-68).

The proposed action would contribute to the collective impact of increasing growth and development in the analysis area. Given the amount of regional development, the relative acreage of the proposed action surface disturbance is minor. However, the proposed action would provide access to a previously inaccessible area, which may facilitate further development of the area. The impacts of the proposed action would contribute toward increasing the cumulative impacts toward a level of significance. The proposed action was developed to minimize these impacts. In addition, COAs and mitigation measures would further reduce impacts stemming from the proposed action.

## 9.0 FUTURE IMPLEMENTATION ACTIONS USING STATUTORY CATEGORICAL EXCLUSIONS

Section 390 of the Energy Policy Act of 2005 established statutory categorical exclusions (SCEs) under NEPA that apply to five categories of oil and gas exploration and development on Federal oil and gas leases. The purpose of these SCEs is to streamline the approval process for relatively minor actions in areas where environmental analysis had previously been conducted. The SCEs apply to the following:

- Individual surface disturbance of less than 5 acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document pursuant to NEPA has been previously conducted,

- Drilling an oil or gas location or well pad at a site at which drilling has occurred within 5 years prior to the date of spudding the well,

- Drilling an oil or gas well within a developed field for which an approved land use plan or any environmental document prepared pursuant to NEPA analyzed drilling as a reasonably foreseeable activity, as long as such plan or document was approved within 5 years prior to the date of spudding the well,

- Placement of a pipeline in an approved ROW corridor, so long as the corridor was approved within 5 years prior to the date of placement of the pipeline,

- Maintenance of a minor activity, other than any construction or major renovation of a building or facility.

In reviewing an APD, Surface Use Plan of Operations, or pipeline application involving a proposed activity that fits into one of the five categories, the appropriate SCE would be applied, and no further NEPA analysis would be required. However, a structured, interdisciplinary review and approval process, including onsite examinations of all proposed well and road locations and the application of appropriate mitigation and BMPs, would apply. The use of these SCEs would allow Williams to seek expedited approval of future actions that constitute minor alterations of the proposed DMGAP (e.g., changes in pad configuration or location, minor changes in access routes, changes in the number of wells or pads, alterations in pipeline length or location, etc). However, new implementation actions beyond the scope and intent of the SCEs would require addition environmental analysis prior to approval.

## 10.0 ORGANIZATIONS CONSULTED

The following organizations were consulted during the development of this EA:

- Williams Production RMT Company (Williams)
- Colorado Division of Wildlife (CDOW)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Army Corps of Engineers (USACE)

## 11.0 LIST OF PREPARERS AND INTERDISCIPLINARY REVIEW

This EA was prepared by an interdisciplinary team of consulting resource specialists serving as a third-party NEPA contractor to the BLM. Tetra Tech was the primary contractor, and collaborating individuals and firms are noted in **Table 18**. Resource management direction and final EA review was provided by BLM resource specialists as noted in **Table 19**.

| Table 18. List of Preparers | |
|---|---|
| **Resource Parameter/Area of Responsibility** | **Responsible Persons** |
| Project Management | Tisha Schuller (Tetra Tech) and Allen Crockett (BLM) |
| Areas of Critical Environmental Concern, Floodplains, Invasive Non-native Species, Migratory Birds, Special Status Species, Water Quality, Wetlands and Riparian Zones, Wild and Scenic Rivers, Soils, Vegetation, Aquatic Wildlife, Terrestrial Wildlife | Van Graham (WestWater Engineering, Inc.) and Elaine Porter (Tetra Tech) |
| Cultural Resources and Native American Religious Concerns | Carl Conner (Grand River Institute) and Tisha Schuller (Tetra Tech) |
| Visual Resources | Kate Schwarzler and Lindsey Utter (Otak) and David Kane (Tetra Tech) |
| Air Quality, Prime and Unique Farmlands, Wastes, Access and Transportation, Geology and Minerals, Noise, Paleontology, Range Resources/Management, Realty Authorizations, Recreation, Socioeconomics | David Kane (Tetra Tech) |
| Cumulative Impacts | Tisha Schuller (Tetra Tech) |

| Table 19. List of BLM Interdisciplinary Team Reviewers | |
|---|---|
| **Resource Parameter/Area of Responsibility** | **Responsible IDT Member** |
| Project Lead | Bridget Kobe Clayton |
| Air Quality | Jeff O'Connell |
| Areas of Critical Environmental Concern | Allen Crockett |
| Cultural Resources | John Brogan |
| Floodplains | Jeff O'Connell |
| Invasive Non-native Species | Beth Brenneman |
| Migratory Birds | Jeff Cook |
| Native American Religious Concerns | John Brogan |
| Prime and Unique Farmlands | Allen Crockett |
| Special Status Species | Jeff Cook, Beth Brenneman |
| Wastes, Hazardous or Solid | Allen Crockett |
| Water Quality | Jeff O'Connell |
| Wetlands and Riparian Zones | Jeff O'Connell |
| Wild and Scenic Rivers | Kay Hopkins |
| Access and Transportation | Mark Ennes |
| Geology and Minerals | Karen Conrath |
| Noise | Mark Ennes |
| Paleontology | Karen Conrath |

| Table 19. List of BLM Interdisciplinary Team Reviewers | |
|---|---|
| **Resource Parameter/Area of Responsibility** | **Responsible IDT Member** |
| Range Resources/Management | Isaac Pittman |
| Realty Authorizations | DJ Beaupeurt |
| Recreation | Kay Hopkins |
| Socioeconomics | Allen Crockett |
| Soils | Jeff O'Connell |
| Vegetation | Beth Brenneman |
| Visual Resources | Kate Schwarzler, OTAK |
| Wildlife, Aquatic | Jeff Cook |
| Wildlife, Terrestrial | Jeff Cook |
| NEPA compliance | Mark Ennes |

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# APPENDIX A GLOSSARY

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# GLOSSARY

**Application for a Permit to Drill (APD)**: An application document submitted to the Bureau of Land Management (BLM) for each well or well cluster.

**Best Management Practice (BMP)**: A standard practice in developing leases that is a measure or procedure to avoid or mitigate anticipated impacts to resources or other land uses.

**Cellar:** A pit in the ground to provide additional height between the rig floor and the well head to accommodate the installation of blowout preventers and other equipment necessary for safe drilling operations.

**Centralized production/collection facility**: A facility to which produced water and condensate are conveyed via pipeline and collected.

**Completion (operations)**: Processes applied to the well bore after drilling has finished. These steps include running casing, perforating casing, and fracing, steps necessary to produce hydrocarbons from a well.

**Compressor station**: Facility that moves natural gas through transmission lines or into storage by creating pressure differentials.

**Condensate**: Liquid hydrocarbons separated from gas production.

**Condition of Approval (COA)**: Site-specific COAs may be attached to APDs (see above) at the time of actual lease development. As appropriate, the BLM will add COAs to mitigate environmental consequences of the proposed action or to ensure compliance with applicable rules, regulations, and BMPs (see above).

**Conventional (drilling, rig)**: A traditional drilling rig designed to drill one to eight wells per well pad. These rigs are generally easier/quicker to transport between drilling sites but have a larger footprint than efficiency rigs.

**Cuttings trench**: A location used to dispose of drill cuttings.

**Development (well):** Well drilled after exploration wells have been completed and produced. Well drilled to a known producing formation in a previously discovered field.

**Directional (drilling)**: A method of drilling by which the well bore is steered to a location away from the surface location. This allows multiple wells to be drilled from one well pad.

**Downhole:** Refers to equipment or operations that take place down inside a borehole.

**Drill cuttings:** Rock fragments produced by drilling.

**Drilling (operations)**: Drilling is the process of penetrating rock formations with a drill bit from the surface to a target formation below the surface.

**Efficiency (drilling, rig)**: A drilling rig specifically designed to drill multiple wells (up to 22) and allows for Simultaneous Operations (see below). The time to drill and complete wells with efficiency rigs is greatly reduced from using conventional rigs.

**Environmental Assessment (EA)**: A NEPA (see below) document prepared to determine if a proposed action or alternative will significantly affect the quality of the human environment. If the impacts are determined to be insignificant, a Finding of No Significant Impact (FONSI) is prepared and is made a part of the decision. If the impacts are determined to be significant, an environmental impact statement (EIS) must be prepared.

**Environmental Impact Statement (EIS):** A NEPA (see below) document prepared when the impacts of a proposed action will significantly affect the quality of the human environment.

**Exploratory/exploration (well):** An well drilled for the purpose of securing geological or geophysical information to be used in the exploration or development of oil, gas, geothermal, or other mineral resources.

**Flowback Unit:** A series of pressure vessels designed to separate solids (sand) and liquids (water and condensate) from the gas stream during the well completion process. This allows for the sale of gas during this period instead of venting it to the atmosphere.

**Frac Pad**: A surface location with sufficient space to temporarily hold equipment required to perform fracture stimulation services.

**Fracture Stimulation**: A method for stimulating a rock formation next to a well bore to increase production of oil, gas, and other fluids from the rock formation.

**Fracture Stimulation Stage**: The particular subsurface zone being fracture stimulated at any given time.

**Gathering (line, system)**: Pipeline that transports oil or gas from a central point of production to a transmission line or mainline.

**Material safety data sheet (MSDS)**: A compilation of information required under the OSHA Communication Standard disclosing the identity of hazardous chemicals, health and physical hazards, exposure limits, and precautions.

**Mud:** Drilling fluid used to lubricate the drill string, line, walls of the well, flush cutting to the surface, and create enough weight to prevent blowouts.

**National Environmental Policy Act (NEPA)**: NEPA assures that the BLM (and other federal agencies) will consider the impact of an action on the human environment before decisions are made and the action is taken. It requires that NEPA documents concentrate on issues that are significant to the action in question. The NEPA process is intended to help public officials make better decisions based on an understanding of environmental consequences, and take actions that protect, restore, and enhance the human environment. When an activity or action is proposed on BLM-administered public lands in Colorado, BLM conducts an interdisciplinary review of the environmental effects of the proposal so that the relevant environmental information is available to citizens and public officials.

**Plan of Development (POD)**: A document providing detailed information for construction, drilling, and well field operations. Submitted to BLM with the APD.

**Production (operations)**: Production is the process of bringing produced fluids/gases up the well bore for transportation via pipelines to central collection facilities.

**Production Pad**: A surface location which consists of sufficient tankage to manage water and condensate production.

**Reclamation**: The process of restoring a disturbed area to a more natural state.

**Remote frac**: A situation in which completion equipment and operations are located off-site from the drilling operations.

**Reserve pit**: Pit used to collect spent drilling fluids, cuttings, and wash water during drilling operations.

**Resource Management Plan (RMP)**: A BLM planning document that presents systematic guidelines for making resource management decisions for a resource area. An RMP is based on an analysis of an area's resources, their existing management, and their capability for alternative uses. An RMP is issue-oriented and developed by an interdisciplinary team with public participation.

**Separator (separation unit)**: Equipment that separates well stream fluids into manageable products (gas, condensate, and water).

**Simultaneous Operations (SIMOPS)**: The process of performing several different tasks on multiple wells from one pad at the same time. For example, efficiency rigs are designed for SIMOPS where the rig can be drilling a well while other wells are undergoing completion operations, and other wells are actually producing – all from one pad at the same time.

**Staging area**: A location set up in the project area where resources can be placed to aid in construction of pipelines and facilities.

**Well**: A bored, drilled, or driven shaft, or a dug hole below the earth's surface whose purpose is to reach underground water or hydrocarbon (oil or gas) supplies, or to store or bury fluids below ground.

**Wellhead:** The wellhead consists of the pieces of equipment mounted at the opening of the well to regulate and monitor the extraction of hydrocarbons from the underground formation.

**Well Pad**: A surface location from which wells are drilled, which consists of wellheads and separators.

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# APPENDIX B
# PUBLIC COMMENTS AND RESPONSES

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# PUBLIC COMMENTS AND RESPONSES

A Public Notice requesting comments on the proposal was published in the Glenwood Post Independent on June 27, 2007, and in the Rifle Citizen Telegram on June 28, 2007. In addition, the public notice was mailed directly to multiple state and Federal agencies, interest groups, adjacent landowners, Garfield County, and the Colorado Division of Wildlife (CDOW). The 30-day public comment period expired on July 22, 2007.

In response to the solicitation for comment, BLM received responses from 14 interested parties, including the Colorado Division of Wildlife (CDOW), the Colorado Mule Deer Association, the Grand Valley Citizen's Alliance, and several adjacent landowners or their representatives.

Several respondents expressed common concerns regarding the proximity of the developments to the Project Rulison site; responses to these comments are presented in a separate heading below. Comments and responses not related to Project Rulison are organized by respondent.

**Response to Comments from Multiple Parties Regarding Project Rulison Site**

The BLM is aware of public concerns about oil and gas development in the vicinity of the Project Rulison nuclear test conducted in 1969. As several parties are aware, subsequent to Project Rulison, the following "buffer" zones were established:

a. The U.S. Department of Energy (DOE) established a restriction on drilling beyond a depth of 6,000 feet below ground surface in an area of 40 acres surrounding the blast site.

b. The Colorado Oil and Gas Conservation Commission (COGCC) established 0.5-mile of the blast site, directing that downhole drilling is not permitted without a hearing before, and approval by, COGCC. The 0.5-mile width is an arbitrary distance not tied to any monitoring data but instead is intended be considerably more than adequate to protect human health, based on the slow migration rate of radionuclides.

c. COGCC also established a 3-mile notification area within which all well permits issued by COGCC are reported to, and reviewed by, DOE. The permits for those wells include a stipulation that gives DOE the authority to sample any wells within the 3-mile notification area.

d. DOE conducts annual sampling, including groundwater and some domestic wells, and has never found any contaminants outside the test site. The most recent sampling was in December 2006. A newly established sampling program would include sampling selected wells within 3 miles, unless that radius is later reduced due to consistently negative findings.

e. The radionuclide being sampled for is tritium, which is the most mobile radionuclide associated with the blast.

None of the proposed pads or downhole locations in the Doghead Mountain GAP area would be within 0.5 mile of the test site. Some pads and downhole locations would be within the 3-mile notification area. COGCC will report these to DOE, as per their standard protocol, and DOE may select some or all of these wells for inclusion in the sampling program. DOE's *Rulison Site Environmental Management End-State Vision*, dated January 2005, specifies long-term monitoring program of selected wells at varying distances from the test site. This program would have an anticipated duration of 100 years, beginning in 2011 with closure of the Project Rulison site.

Although the BLM believes that issues involving oil and gas development in the vicinity of the Project Rulison test site are being adequately addressed by the existing COGCC and DOE processes, the Doghead Mountain GAP addresses the public concerns further as follows:

- BLM will formally request that DOE include at least one of the Williams wells to be drilled into the southern half of Section 13, Township 7 South, Range 95 West, in DOE's long-term monitoring program. These wells have the downhole locations closest to the Project Rulison test site (approximately 1.5 miles).

- If the DOE determines not to sample the wells in the southern half of Section 13 as part of its monitoring program, the BLM will collaborate with the COGCC regarding whether to require sampling by Williams. Accordingly, the APDs for the wells in the southern half of Section 13 will include a condition of approval specifying that Williams may be required to sample one or more of these wells for tritium or other radionuclides prior to gathering and marketing of the gas.

- If any sampling or monitoring of these or other wells in the vicinity of the Project Rulison site indicates the presence of radionuclides linked to the subsurface nuclear test, the BLM retains the authority to require sampling of any Federal well in the Doghead Mountain GAP area and, depending on the outcome of that sampling, to order that production be suspended pending further investigation and collaboration with COGCC, DOE, the Environmental Protection Agency, the Colorado Department of Public Health and the Environment, and/or other agencies.

**<u>Other Comments by Agencies and Associations, Excluding Comments on Project Rulison</u>**

**Colorado Division of Wildlife (CDOW)**

*1) Winter range along the Colorado River continues to experience tremendous pressure from residential and commercial development. The Doghead Mountain area is both winter and transitional ranges for deer and elk. Transitional range occurs between the summer (higher elevation) range and the winter range (Colorado River). This transitional range is important to deer and elk because it provides necessary forage during spring green up.*

*CDOW has several basic recommendations on the GAP proposal:*

1) *Phased development with development clustered in discrete areas prior to moving on and developing other areas.*

2) *Multi-phased gathering/consolidation of facilities.*

3) *Remote well monitoring.*

4) *Management of traffic on road ways and public access closures.*

5) *Pursuit of conservation easements for Williams' private property.*

***Response:*** The BLM does not have the authority on existing leases to require phased or clustered development. Remote well monitoring also cannot be required by BLM, but is always encouraged, and Williams commonly uses this method to reduce traffic. The BLM would include a COA requiring placement of a gate restricting public access where possible. Regarding conservation easements, BLM has had multiple discussions with Williams and other operators to search for opportunities for using conservation easements on the operator's property for wildlife mitigation. For the Doghead Mountain

GAP, however, the voluntary habitat enhancement measures (see EA Section 2.10.9 Big Game Habitat Mitigation and Enhancements), which were developed in concert with CDOW, are believed to be suitable mitigation of the direct and indirect habitat loss for big game and other species.

*2) Additionally, we encourage the BLM and operator to analyze the maximum development potential as early in the process as possible.*

***Response:*** The BLM does not currently have any information regarding the operator's plans for the development of these leases beyond 2010. The BLM can only evaluate what is being proposed and typically does not analyze a hypothetical full-field development. Although the downhole spacing set by the COGCC for this area is 10 acres, that does not necessarily mean that the operator plans to, or could, develop to that spacing. The laterally discontinuous nature of the oil and gas and constraints by BLM on where surface pads can be located combine to reduce the number of wells compared to the hypothetical maximum. If technological or economic factors lead the operator to seek additional wells in the future, it would be within their right as the leaseholder to do so. If and when additional wells are proposed, the BLM will evaluate that proposal at that time.

*3) CDOW has attached some suggested best management practices (BMPs) designed to reduce wildlife impacts.*

***Response:*** The BLM appreciates CDOW's continued participation in our public scoping process. Many of the recommendations presented in CDOW's draft document, *Methods to Reduce Oil and Gas Impacts to Wildlife* have been either incorporated into the proposed action or are presented in **Appendix C, Surface Use Conditions of Approval.**

*4) Wildlife of all sizes could accidentally enter the evaporation/holding pits of gas wells at any time during the year.*

***Response:*** The BLM requires placement of netting or other features across pits with liquids that could be a risk to migratory waterfowl as well as most other wildlife. Regarding pits that are lined with plastic or other "slippery" material, these typically contain liquids, and thus are required by the BLM to be fenced or netted. To date, BLM has not found that this poses a substantial hazard to wildlife.

*5) Onsite meetings with CDOW, Bureau of Land Management (BLM), and Williams representatives discussed options for road alignment and found a preferred alignment was not apparently incorporated into the GAP. The current proposal does not site roads in optimum locations to minimize impacts to wildlife. Roads should be constructed to minimize impacts to wildlife, and traffic should be controlled to reduce habitat fragmentation effects.*

***Response:*** Upon further investigation, the potential road realignment proved infeasible due to grade. Roads have been sited in the best practicable location consistent with the operator's needs to access specific surface locations, which are dictated by downhole targets. The road design would include measures to reduce ecological and visual impacts, including restrictions on road width in sensitive areas.

*6) Additional roads that are developed in support of this project should be restricted to gas development and production activities. The proposed well locations are sited in areas where increased public access is occurring as a result of new roads being built in the project area. Increased activity exacerbates human disturbances and habitat fragmentation. Negative impacts to wildlife caused by new road construction could be minimized by closing new lease roads to public motor vehicles. Travel management is an issue that should continually be assessed by BLM.*

***Response:*** The BLM would require roads constructed for access to well pads and associated facilities to be gated in order to restrict public access and limit disturbance to wildlife.

*7) CDOW encourages assessment of areas including and outside of the project boundary to identify how to better reduce cumulative impacts from development in the area in general. CDOW advises Williams to pursue acquiring a conservation easement on their property. It is our recommendation that conservation easements could be pursued to help retain wildlife values upon activity cessation.*

***Response:*** The BLM has had multiple discussions with Williams and other operators to search for opportunities for using conservation easements on the operator's property for wildlife mitigation. We are continuing to investigate this issue.

*8) CDOW confirms the mitigation plan proposes sound principles for habitat improvement, and we are encouraged by this proactive effort by BLM and Williams. CDOW is optimistic that this development project will incorporate beneficial measures to reduce impacts to wildlife and improve habitat. CDOW strongly encourages that the mitigation portion of the GAP be pursued and completed within reasonable timelines.*

***Response:*** The BLM appreciates CDOW's participation in the mitigation planning process and shares its desire that the beneficial measures be implemented as early in the process as practicable.

**Colorado Mule Deer Association**

*1) Allowing a company to stretch out their drilling over a period of many years using conventional vertical drilling when existing directional drilling technology has the potential to dramatically reduce surface disturbance and degradation constitutes "undue and unnecessary environmental degradation" in an area of critical big game winter range.*

***Response***: The BLM does not have the authority to dictate to leaseholders how developments will be sequenced or what drilling technologies will be used.

*2) On the north lease, they are planning a 15-acre downhole spacing based on the number of wells planned. On the south unit they are planning a 30-acre downhole spacing. Since the industry can only frac an area of 5-10 acres, that means that they are planning to drill double the number of wells planned over some extended period of many years or else they do not plan to recover all gas possible.*

***Response:*** The BLM does not currently have any information regarding the operator's plans for the development of these leases beyond 2010. The BLM can only evaluate what is being proposed and typically does not analyze a hypothetical full-field development. Although the downhole spacing set by the COGCC for this area is 10 acres, that does not necessarily mean that the operator plans to, or could, develop to that spacing. The laterally discontinuous nature of the oil and gas and constraints by BLM on where surface pads can be located combine to reduce the number of wells compared to the hypothetical maximum. If technological or economic factors lead the operator to seek additional wells in the future, it would be within their right as the leaseholder to do so. If and when additional wells are proposed, the BLM will evaluate that proposal at that time.

*3) Williams gives four reasons for the use of conventional drilling as opposed to better but nowhere near state of the art directional drilling. All four of these reasons should have already been answered by wells on surrounding leases and by conventional wells currently in place on the leases. Instead of blind acceptance of what ever industry submits, the BLM should require hard data for independent evaluation to back up the request.*

***Response:*** It is beyond the authority of the BLM to require an operator to submit evidence that exploration is needed on these leases. Furthermore, the area is known to have less predictable oil and gas resources than other portions of the basin, and proposals including an exploration phase in areas south of the Colorado River are common.

*4) At a minimum, BLM should require that all wells be drilled with state-of-the-art directional drilling. They should require that once drilling on a pad has commenced, all wells needed to meet the planned downhole spacing will be drilled and completed.*

***Response:*** It is beyond the authority of the BLM to require that state of the art technology be used or that a given area be drilled out at the maximum allowable downhole spacing.

5) *[Reclamation] objectives are not quantified, so how will the BLM determine that reclamation goals have been met other than expression of a general opinion.*

***Response:*** Reclamation goals, objectives, timelines, measures, and monitoring methods for interim and final reclamation for oil and gas-related disturbances are presented in the 1998 *Oil and Gas Leasing and Development Draft Supplemental EIS* in Appendix I, *Surface Reclamation*.

*6) In both Final Reclamation and Big Game Enhancement sections, objectives are given for what would constitute final bond release. Yet there is no mention of anyone—BLM or Williams—planning to do any actual monitoring to determine if objectives have been met. Without quantifying the objectives, the BLM cannot determine compliance. Williams should be required to quantify the objectives and to develop a monitoring plan with standard experimental design and accuracy levels that will determine compliance.*

***Response:*** The operator would be responsible for providing monitoring reports for the big game habitat enhancement portion of the proposed action, as well as for temporary and interim reclamation of pads following completion of wells and reclamation of buried pipeline corridors. Monitoring reports must be submitted to the BLM annually, and these activities are subject to BLM oversight and verification.

Only final reclamation, not big game habitat enhancement, is tied to final bond release. Reclamation objectives, monitoring methods, and responsibilities are presented in the 1998 *Oil and Gas Leasing and Development Draft Supplemental EIS* in Appendix I, *Surface Reclamation.* These objectives, methods, and responsibilities, along with some updates established subsequently by the BLM, apply to all Federal leaseholders in the Glenwood Springs Resource Area and will be attached as Conditions of Approval (COAs) to permits for oil and gas development associated with the Doghead Mountain GAP.

*7) On page 7 of the GAP it states that all roads will be gravel surfaced. On page 19 it states a lower standard will be used for road surfacing. Which will prevail?*

***Response:*** All roads for which BLM has jurisdiction will be graveled. The passage should read "New roads would be constructed and existing roads maintained in accordance with standards described for a BLM **Local** Road as outlined in BLM Manual 9113, and construction details outlined in the COAs. Thank you for calling this to our attention.

*8) There is no discussion of what impacts of all this heavy truck traffic will be on county roads. There is no discussion of how Williams will respond to this road damage. BLM should require that Williams address this fact rather than putting the maintenance burden on the general public.*

***Response:*** Impacts of heavy truck traffic on roads is addressed in the EA Section 7.2.1 Access and Transportation. BLM has no authority to require Williams to address damage to county roads.

*9) The company must be required to report all additives to drilling fluids and quantities used, to the BLM. While industry is exempt from CERCLA and RECRA, the BLM is not. The BLM can be held accountable for permitting the use of hazardous chemical which can negatively impact surface and ground water.*

***Response:*** Please see the EA Section 7.1.10 Wastes, Hazardous and Solid.

*10) In planning their pipeline system, Williams should be required to plan the pipelining of drilling fluids to each pad as well as production and produced water away to reduce the heavy truck traffic.*

**Response:** The BLM has no authority to require Williams to pipe drilling fluids and produced water.

*11) On page 20, 2.9.5 is a statement that gates and fences will be installed to prevent public access. It does not state who will be responsible for this compliance effort.*

***Response:*** Williams will be responsible for installing gates and fences.

**Grand Valley Citizens Alliance**

*1) An existing road in Section 11 could be further developed to access proposed wells in Sections 13 and 14.*

*2) The proposed pipeline accessing Williams' production facility should follow this Section 11 roadway extension from pad PA 23-12 onto County Road 301 right-of-way.*

***Response:*** As the leaseholder, Williams has the right to develop access routes in the areas proposed. The BLM does not have the authority to require Williams to access the GAP area, whether for a road or pipeline, through any specific private parcel. While this access would have some benefits, the BLM cannot require it.

*3) Williams' proposed pipeline location for the area directly north of pad SP 33-14 fails to follow the clearance made for the road access [to] this well pad. Williams should endeavor to collocate this pipeline with the road to eliminate further surface disturbance in this area.*

***Response:*** There is no pad identified as SP 33-14, however, the BLM has worked with Williams to align pipelines in existing roadways where feasible.

*4) Williams should move pad PA 34-12 to [the] west, away from the wetland, and access the same downhole locations from the new site with its directional drilling capabilities.*

***Response:*** The currently proposed location of this pad represents a shift from the original location and would avoid direct and indirect impacts to the wetland. The BLM considered possible alternative locations, but were restrained by an identified cultural site, visual impacts, and potential impacts to raptor nests.

*5) Well pads SP 43-14, SP 23-13, and SP 44-13 and the operations from these pads will greatly impact elk herds that come to these areas to calve. Williams has proposed big game habitat enhancement in Section 12…but none has been proposed for Section 13. If Williams cannot move these well pads, it should apply big game habitat enhancements in this area similar to those proposed for Section 12.*

***Response:*** The BLM does not agree that these pads "will greatly impact elk herds." The Colorado Division of Wildlife (CDOW), to which the BLM generally defers in issues regarding use by big game,

has mapped the area as primarily winter range and transitional range. Calving occurs but is dispersed instead of concentrated into a specific "production area." Based on the mapping by CDOW, and because of the particular importance of winter range, the BLM would impose a timing limitation to prohibit construction and drilling activity during the mid-winter period of January 1 through February 28 (see the EA Section 7.2.13 Wildlife, Terrestrial). A 60-day timing limitation is the longest period that BLM can impose under the standard lease terms that apply to the Doghead Mountain GAP area. Section 12 was selected for habitat enhancements, not on the basis of impacts in Section 12, but because it is the area identified during site evaluations as the areas most appropriate for application of these treatments.

*6) Emissions from all stages of natural gas development are significant sources of air pollutants, including Volatile Organic Compounds and associated air toxics like benzene and toluene. Given that combusting these emissions contributes to greenhouse gases to the atmosphere, possibly influencing climate change, Williams should be required to control these emissions through the use of vapor recovery units.*

**Response**: A screening-level human health risk assessment for gaseous emissions from oil and gas development indicates that the amount of pollutants associated with wells planned for the Doghead Mountain GAP does not represent a substantial risk to human health and the environment (see EA Section 7.1.1 Air Quality and the *Final Roan Plateau Planning Area Resource Management Plan Amendment and Environmental Impact Statement*). Because these conservative models do not predict significant impacts, the BLM is not requiring air monitoring. While the BLM regional air quality model did not address contribution of gaseous emissions to possible climate change, any such contribution would be infinitesimal and not significant.

**Comments by Individuals, Excluding Comments on Project Rulison (see above)**

**Douglas DeNio**

*1) The recent article in the Rocky Mountain News (7/19/07) documenting existing drilling violations in adjacent area to this GAP should give BLM pause in promoting the Doghead GAP at this time.*

***Response***: The article to which you refer is not related to the Doghead Mountain GAP because the operator responsible for the violations is not involved.

**Randy and Pat Warren**

*1) In the notice, it is stated there will be construction of approximately 4.9 miles of new roads, the upgrading of up to 1.8 miles of existing roads, and the installation and/or upgrading of 4.3 miles of pipelines. Could someone please tell where all this is?*

***Response:*** The locations of the various developments are indicated on page 30 of *The Proposed Doghead Mountain Geographic Area Plan for Natural Gas Exploration and Development.* The plan can be found at http://www.co.blm.gov/gsra/Doghead.htm.

*2) Why is County Road 302 going to be used for primary access if the proposal is off County Road 301?*

***Response:*** For the majority of the development activities, County Road 301 would provide the primary access. County Road 302 would be used as primary access to the existing Federal Rulison 14-95 pad where four new wells will be developed.

*3) A little clarification on how far the up the road is to be used would be helpful and appreciated.*

***Response:*** County Road 302 would be used from the intersection of County Road 300 on the west to the intersection of Battlement Creek Road on the east.

**J and B Bell**

*1) It seems logical that there should be some concern over the geophysical and seismological side effects of removing so much gas in this (relatively small?) area here. How much do we know about this?*

***Response:*** A great deal is known about this, because oil and gas (and water) resources have been removed from geologic formations for many, many decades without triggering seismologic events. The reason is that the oil and gas (and water) occur in pore spaces of the rock, not in large, open reservoirs. Removal has no effect on the structure of the rock because as fluids these substances have no geophysical structural quality. Finally, although the volume of gas seems large, it represents a tiny fraction of the total volume of rock and pore space in the geologic materials beneath the ground surface.

*2) Was the air in a variety of downwind locations tested under various weather conditions prior to well-digging and is it being compared with present test results?*

***Response:*** No, the BLM has not conducted air quality tests for individual projects. However, air quality impacts from oil and gas development have been modeled relative to a variety of development scenarios, as described in the EA Section 7.1.1 Air Quality. The modeling is based on typical emission rates from wells, storage facilities, processing facilities, compressors, vehicular emissions, and fugitive dust from roads and pads.

**Arthur and Ethna Wiessners**

*1) Our main concern is the impact to County Roads 301, 302, and 309.*

***Response:*** The BLM has no authority to mitigate impacts to county roads or to improve the county roads. These are in the purview of the Garfield County government through the allocation to road projects of monies derived from royalty payments, taxes, user fees, and other mechanisms.

**Elaine Cloninger**

*1) Regarding used, new, and existing roads: All roads need to be graveled (unless already paved with asphalt).*

***Response:*** All proposed new roads and those proposed for upgrading within the project area boundary will be graveled. However, the BLM has no authority to gravel roads that are not in its jurisdiction.

*2) Regarding permanent records of pipe locations: All nonmetallic subsurface (such as PVC) pipeline location shall be documented with as-constructed drawings with coordinates at 100 foot station for Garfield County's permanent record.*

***Response:*** The BLM has not received a request from Garfield County to provide this type of information.

**Douglas Boyles**

*1) Road traffic: Currently, CR 301 is poorly maintained by Williams and Garfield County and they plan to add 22,542 trucks minimum by their count.*

***Response:*** The BLM has no authority to mitigate impacts to county roads or to improve the county roads. These are in the purview of the Garfield County government through the allocation to road projects of monies derived from royalty payments, taxes, user fees, and other mechanisms.

*2) Access: Should be through the Bentley property on the EnCana Road which will save miles of road and acres of land. It certainly would cost less than building a 50 foot road easement. Williams owns the property north of the BLM. Access could be from their property and not on my fence line.*

***Response:*** As the leaseholder, Williams has the right to develop access routes in the areas proposed. The BLM does not have the authority to require Williams to access the GAP area through any specific private parcel.

*3) Staging: Should be done from Williams' property to the north and not on BLM land.*

***Response:*** Williams is within their right to develop staging areas on their leasehold. The staging facilities coincide with the pipeline alignment.

*4) Nuisance: I would like a 24 hour/day phone number of a person whom I could contact in regards to noise, dust, odor, light, and trespassing.*

***Response:*** Please contact Williams RMT Production Company at (970) 285-9377. You may wish to address your concerns to the Garfield County planning department, which currently is considering additional restrictions on oil and gas development in proximity to residences.

*5) Wildlife: This area is used extensively by elk. They use it as a calving area in the spring, and winter range.*

***Response*:** The Colorado Division of Wildlife (CDOW), to which the BLM generally defers in issues regarding use by big game, has mapped the area as primarily winter range and transitional range. Calving occurs but is dispersed instead of concentrated into a specific "production area." Based on the mapping by CDOW, and because of the particular importance of winter range, the BLM would impose a timing limitation to prohibit construction and drilling activity during the mid-winter period of January 1 through February 28 (see the EA Section 7.2.13 Wildlife, Terrestrial). A 60-day timing limitation is the longest period that BLM can impose under the standard lease terms that apply to the Doghead Mountain GAP area.

*6) Why ruin the only two wetlands or contaminate the water, reservoir, stock pond, and maybe dry up the springs.*

***Response:*** As indicated in Section 7.1.12 Wetlands and Riparian Zones and Section 7.1.11 Water Quality, Surface and Ground of the EA, significant adverse impacts to wetlands, surface water, groundwater, or springs are not expected to result from the proposed action. Any stockponds that are damaged or destroyed by the development would have to be replaced by Williams.

*7) Ridgeline: 43-14, 23-13, and 44-13 are all along the ridge and the access road to these pads run exactly along my boundary line.*

***Response:*** Onsite examination of these locations indicates that the development of these pads would meet the BLM's visual resource objectives for this area (see Section 7.2.11 Visual Resources of the EA). As long as associated road does not encroach onto your property, Williams has the right as the leaseholder to construct it along this alignment.

*8) Pipelines: Should all be contained within the 50-foot road easements.*

***Response:*** Along nearly their entire lengths, pipelines would be installed within the 50-foot road easements.

*9) Venting: Their proposal allows for 2,460 days of potential venting of gas upwind of my home. Venting should be prohibited and sanctioned.*

*10) Flaring: Should not be allowed.*

***Response:*** The BLM has no authority to prohibit either venting or flaring. These are generally associated primarily with drilling or workover operations. Once in production, the three-phase separation process currently in use by Williams and other operators results in all but a small fraction of the produced gas being placed into the pipeline system.

*11) Water wells: During the drilling on William's property, our water well smelled and felt oily. I am very concerned about my water quality and quantity.*

***Response:*** A cemented casing would isolate the wells from water-bearing strata as a means of protecting water quality and quantity (see EA Section 7.1.11 Water Quality, Surface and Ground and Section 7.2.2 Geology and Minerals). Water quantity would be further protected by trucking in water for drilling and completion operations from offsite surface sources. If you have specific complaints about impacts to your well, you should contact the BLM, Colorado Department of Health and Environment (CDPHE), Colorado Oil and Gas Conservation Commission (COGCC), and/or Garfield County health department at the time of the problem so that testing can be done to confirm your observations.

*12) BLM: This property is used by cattlemen, horseman, hunters, hikers, wildlife, and is a neighbor to other landowners. This land and water will be changed forever and will be of no use in the future if this kind of development is allowed.*

***Response:*** Under the Federal Land Policy and Management Act (FLPMA), the BLM is mandated to manage Federal lands for multiple uses, including oil and gas development. The BLM's emphasis is to manage Federal lease development in an environmentally responsible manner within the context of existing lease rights. This includes the requirement that lands subject to oil and gas development are reclaimed to approximate their natural condition. In this way, the various uses of Federal lands can be both accommodated and sustained into the future.

**Katherine Bevans-Backes**

*1) How is the elk calving area going to be protected?*

***Response:*** The Colorado Division of Wildlife (CDOW), to which the BLM generally defers in issues regarding use by big game, has mapped the area as primarily winter range and transitional range. Calving occurs but is dispersed instead of concentrated into a specific "production area." Based on the mapping by CDOW, and because of the particular importance of winter range, the BLM would impose a timing limitation to prohibit construction and drilling activity during the mid-winter period of January 1 through February 28 (see the EA Section 7.2.13 Wildlife, Terrestrial). A 60-day timing limitation is the longest period that BLM can impose under the standard lease terms that apply to the Doghead Mountain GAP area.

*2) How are the sage grouse going to be protected?*

***Response:*** The BLM, and CDOW with which the BLM consults, are not aware of any sage-grouse populations within or near the project area.

*3) How are the boundaries of our property going to be protected?*

***Response:*** The development of the Federal leases within the Doghead Mountain GAP area would have no effect on your property boundaries.

*4) How are the springs at the top of the Ranch going to be protected?*

***Response:*** A cemented casing would isolate the wells from water-bearing strata, thus protecting water quality and quantity (see EA Section 7.1.11 Water Quality, Surface and Ground and Section 7.2.2 Geology and Minerals). Water quantity would be further protected by trucking in water for drilling and completion operations from off-site surface sources, thus protecting the springs from depletion.

**Arbo J. Doughty**

*1) There is no place in a NEPA document to try and persuade the reader about one method [efficiency drilling] over another [conventional drilling]. If Williams wants to prove that efficiency really is a better drilling methodology, then BLM should have four alternatives: conventional drilling, efficiency drilling, combined drilling, and no action.*

*The bottom line is that disturbance is disturbance [regardless of drilling method] and is conditional on timing of activities, the size of the activities, and the period of which this will occur.*

*[W]hat about the wells pads that will be explored in 2008, 2009, and 2010? Presumably, if these are successful wells, then efficiency rigs will be brought in to develop and produce from those well pad locations. The proposed action makes no statement when this will occur, or if another EA would be prepared.*

***Response:*** In response to the excerpts above, taken from a lengthier comment, the intent of the language in the EA was to explain the difference between exploratory-phase and development-phase drilling methods and the associated levels of impacts. Without being an advocate for Williams, it is the case that (1) use of a conventional drilling rig during exploration requires a smaller pad, thereby reducing the area to be reclaimed if the exploration is unsuccessful or does not warrant additional wells; and (2) use of a an "efficiency" drilling rig during development allows more wells to be drilled from a single pad and also allows completion work on some wells to occur simultaneously with drilling of other wells. The BLM continues to believe that explaining these considerations is appropriate for inclusion in the EA.

BLM regulations under Section 390 of the Energy Policy Act of 2005, through one or more Statutory Categorical Exclusions, allow additional wells to be drilled on existing pads through a process that does not require additional NEPA analysis if it occurs within a few years (typically 5 years or less) of the initial EA. This process requires that any areas of additional surface disturbance have been surveyed for cultural, paleontological, vegetation, wildlife, hydrologic, and visual resources and that these resources are adequately addressed.

Section 2.2 Project Overview of the EA discloses the potential for additional wells on existing pads. Any additional wells that may be requested on new pads would require a new EA.

*2) BLM should include the entire lease area in the EA to determine whether significant impacts would occur, thus triggering an EIS, as required by NEPA. BLM should not be "piece-mealing" these EAs together…."*

***Response:*** The BLM can only evaluate what is being proposed. Other oil and gas development in the project vicinity and region is acknowledged in the EA Section 8.0 Cumulative Impacts. A more programmatic look at oil and gas development in the Glenwood Springs Resource Area was addressed in the 1999 FSEIS (BLM 1999). The *Roan Plateau RMPA/EIS* (BLM 2006) included an updated cumulative impact analysis based on proposed leasing of remaining portions of Naval Oil Shale Reserves No. 1 and 3 and reflected the quickening pace of oil and gas development throughout western Garfield County.

*3) [M]any "third-party" NEPA documents carry an inherent bias favoring the proponents of projects. The Doghead Mountain GAP EA is clearly no different and [the] contractor used to prepare this document has clearly had problems on other NEPA projects discerning how to produce NEPA documents that are unbiased.*

***Response:*** The use of third-party contractors is common in the BLM. While the contractor is selected and paid by the proponent, the bottom line is that their draft documents are thoroughly reviewed and, in most cases, extensively edited by the BLM resource specialists and NEPA coordinator prior to publication. This process is intended to eliminate any bias, to ensure that the document meets BLM standards and NEPA guidance, and to take advantage of the intimate knowledge of the project area by the local BLM staff.

*4) [T]he contractor preparing the Doghead Mountain GAP EA, TetraTech, Inc. of Boulder, CO, is the very same contractor that also holds the federal contract for producing the revision of the Glenwood Springs-Kremmling combined RMP/EIS. This [is] a conflict of interest and should not be allowed….BLM cannot reasonably accept that a contractor can do two jobs, one that is paid for by the taxpayers and the other by industry. You are requested to reconsider the preparer of this EA, or the RMP/EIS.*

***Response:*** The BLM does not believe that one contract has a bearing on the other. Working for both industry and government is common among large consulting companies. See response to the previous comment regarding BLM review and, as appropriate, revision of draft documents submitted to the BLM by either direct or third-party contractors.

*5) [T]here are no maps or tables showing downhole locations, and whether they extend to private mineral rights or federal mineral rights. Depending on the location and depth of these downholes, there could be impacts on groundwater aquifers on private lands or federal mineral rights [underlying] private surface ownership. BLM and Williams should show these downhole locations.*

**Response:** A map showing downhole locations has been included in the EA (Figure 1).

*6) Williams should demonstrate that a wildlife mitigation plan has been prepared and submitted to BLM prior to any construction activities. Williams should be doing appropriate mitigation at onsite areas, and not allowed to merely do offsite mitigation.*

***Response:*** A mitigation plan has been submitted by Williams that was based on measures identified by the BLM and CDOW. The terms "onsite" and "offsite" can be somewhat misleading, because BLM uses "onsite" in terms of mitigation as applying to the specific area affected. Any other area, even within the same GAP boundary, for example, is considered "offsite."

*7) The proposed action does not identify key environmental resources that could be impacted by the project. For example: Wetlands and seeps and springs. The project occurs in between two significant watersheds that support the Colorado River system. How will these issues be addressed in the impact analysis and what mitigations will Williams perform and how will BLM ensure and enforce requirements that are the responsibility of [Williams].*

***Response:*** These issues are addressed in Section 7.1.12 Wetlands and Riparian Zones and Section 7.1.11 Water Quality, Surface and Ground of the EA.

*8) [T]he draft EA, which includes a revised proposed action with appropriate number of additional alternatives for analysis (see above) and the assessment of impacts, should be put before the public again to evaluate and comment upon. It seems highly unlikely that an EA could conclude that there would be no significant impacts from the project.*

***Response:*** The Glenwood Springs Energy Office (GSEO) conducts an external scoping process to define issues and concerns that are important to the public. These issues are one of the factors that are considered in the design of a proposed action such as that presented in the Doghead Mountain GAP. The GSEO does not ordinarily ask for public comments after the external scoping period has expired, and there is no specific requirement to do so.

Like many projects of this scope, the Doghead GAP is the result of an extensive process of evaluation involving on-site examinations and surveys by local BLM resource professionals and third party contractors. Based on this process, the proposal was modified several times (see EA Section 4.0 Alternatives Considered During the Development of the DMGAP) and measures to minimize or eliminate potentially significant environmental impacts were developed (see EA Section 2.10 Best Management Practices, Design Features, and Mitigation Measures; Appendix C, Surface Use Conditions of Approval; and Appendix D, Site-Specific and Downhole Conditions of Approval).

**Cary and Ruth Weldon**

*1) Don't drill on public lands until all privately owned land is completely diminished regardless of where it is.*

***Response:*** The BLM is obligated to allow drilling to access oil and gas resources in Federal leases purchased by an operator. In many cases, those resources can be accessed only from Federal lands. The BLM has no mechanism by which it can defer drilling on Federal surface until all resources accessible from private surface have been accessed, nor can it dictate whether an operator can access a specific lease from private or Federal surface. Furthermore, it must be noted that many members of the public believe just the opposite: that drilling should be precluded from private surface as long as Federal surface remains available from which oil and gas leases can be accessed.

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# APPENDIX C
# SURFACE USE CONDITIONS OF APPROVAL

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## SURFACE USE CONDITIONS OF APPROVAL

1. Administrative Notification: At least 48 hours prior to construction, the operator shall notify the BLM representative of construction startup plans.

2. Dust Abatement. The operator shall implement dust abatement measures as needed or directed by the BLM authorized officer. The level and type of treatment (watering or application of various dust agents, surfactants, and road surfacing material) may be changed in intensity and must be approved by the BLM authorized officer. Dust control is needed to prevent heavy plumes of dust from road use that create safety problems and disperses heavy amounts of particulate matter on adjacent vegetation.

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

   Pursuant to 43 CFR 10.4(g), the BLM authorized officer must 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 authorized officer 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 authorized officer 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 authorized officer. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the BLM authorized officer 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 authorized officer will inform the operator as to:

   - whether the materials appear eligible for the National Register of Historic Places
   - what mitigation measures the holder will likely have to undertake before the site can be used (assuming that *in-situ* preservation is not necessary)
   - the timeframe for the BLM authorized officer 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 authorized officer 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 authorized officer will provide technical and procedural guidelines for relocation and/or to conduct mitigation. Upon verification from the BLM authorized officer that the required mitigation has been completed, the operator will be allowed to resume construction.

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

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

4. Soils. Cuts and fills shall be kept to minimum 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 silt fences, straw wattles, or other acceptable to 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.

5. Culverts. Culverts at drainage crossings shall be installed as to avoid high flow conditions and 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 18 inches. Contact Jeff O'Connell, Glenwood Springs Energy Office Hydrologist at 970-947-5215 or jeffrey_o'connell@blm.gov. 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 recommends designing drainage crossings for the 100-year event. Contact Sue Nall at 970-243-1199 x16 or susan.nall@usace.army.mil.

6. Perennial and Intermittent Stream Crossings. Construction activities at perennial and intermittent stream crossings (e.g. burying pipelines, installing culverts) shall occur as to avoid high flow conditions and shall consist of either a piped stream diversion or the use of a coffer dam and pump to divert flow around the disturbed area.

7. Reclamation. Reclamation 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). The specific measures described below shall be followed during interim reclamation of disturbed surfaces associated with well pads, access roads, and pipelines. These measures, except seedbed preparation, shall also apply to temporary reclamation of topsoil storage piles and surfaces that are subject to interim reclamation but not scheduled to undergo interim reclamation for more than 1 year.

   a. Seedbed Preparation. For interim reclamation, all slopes shall be reshaped prior to seedbed preparation. Initial seedbed preparation shall consist of backfilling, leveling, and ripping all areas to be seeded to a minimum depth of 18 inches with a furrow spacing of 2 feet, followed by recontouring the surface and then spreading the stockpiled topsoil evenly. Prior to seeding, the seedbed shall be scarified and left with a rough surface. No depressions shall be left that would trap water and form ponds. Final seedbed preparation shall consist of contour cultivating to a depth of 4 to 6 inches within 24 hours prior to seeding. NOTE: Seedbed preparation is not required for topsoil storage piles or other areas of temporary reclamation.

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

b. Seed Mixes. Selection of seed to be used in temporary or interim reclamation shall comply with the menu-based seed mixes in the letter provided to oil and gas operators dated April 16, 2007. For private surfaces, the menu-based seed mixes are recommended, but the landowner would have ultimate authority over the seed mix to be used in reclamation. The seed shall be certified free of noxious weeds. Seed may contain up to 2.0 percent of "other crop" seed by weight, including the seed of other agronomic crops and native plants; however, a lower percent of other crop seed is recommended. Seed tags or other official documentation shall be supplied to the BLM Glenwood Springs Energy Office Ecologist (Beth Brenneman, 970-947-5232 or beth_brenneman@blm.gov) 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.

c. Seeding Procedures. Seeding shall be conducted no more than 24 hours following completion of final seedbed preparation. 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 April 16, 2007).

   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. Hydroseeding and hydromulching may be used in temporary reclamation or in areas where drill-seeding or broadcast-seeding/raking are impracticable. Hydroseeding and hydromulching must be conducted in two separate applications to ensure adequate contact of seeds with the soil.

   If interim revegetation is unsuccessful, the operator shall implement subsequent reseedings until interim reclamation standards are met. Requirements for reseeding of unsuccessful temporary reclamation will be considered on a case-by-case basis.

d. Mulch. Mulch shall be applied within 24 hours following completion of seeding. In areas of interim reclamation that used drill-seeding or broadcast-seeding/raking, mulch shall consist of crimping certified weed-free straw or certified weed-free native grass hay into the soil. Hydromulching may be used in areas of interim reclamation where crimping is impracticable, in areas of interim reclamation that were hydroseeded, and in areas of temporary reclamation regardless of seeding method.

   NOTE: As an exception to this provision, mulch is not required in areas where erosion potential mandates use of a biodegradable erosion-control blanket (straw matting).

e. 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 authorized officer. Biodegradable straw matting, bales or wattles of weed-free straw or weed-free native grass hay, or well-anchored fabric silt fence shall be used on cut-and-fill slopes and along drainages to protect against soil erosion. Additional BMPs shall be employed as necessary to reduce erosion and offsite transport of sediment.

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

g. Monitoring. The operator shall conduct annual monitoring surveys of reclaimed areas and shall submit an annual monitoring report to the authorized officer by December 31 of each year. The monitoring program shall use the four Reclamation Categories defined in Appendix I of the 1998 DSEIS to assess progress toward reclamation objectives. The annual report shall document whether attainment of reclamation objectives appears likely. If one or more objectives appear unlikely to be achieved, the report shall identify appropriate corrective actions. Upon review and approval of the report by the BLM, the operator shall be responsible for implementing the corrective actions or other measures specified by the authorized officer. Contact Beth Brenneman, Glenwood Springs Energy Office Ecologist, at 970-947-5232 or beth_brenneman@blm.gov.

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 Energy 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. Contact Beth Brenneman, Glenwood Springs Energy Office Ecologist, at 970-947-5232 or beth_brenneman@blm.gov.

9. 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. Contact Creed Clayton, USFWS Biologist assigned to the Glenwood Springs Energy Office, at 970-947-5219 or creed_clayton@fws.gov. Under the MBTA, "take" means to harass, harm, 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 reserve pits, produced water pits, and evaporation pits, that store or are expected to store fluids which may pose a risk to such birds (e.g., migratory waterfowl, shorebirds, wading birds, and raptors) during completion and after completion activities have ceased. Several established methods to prevent bird access are known to work. Methods may include but are not limited to netting, the use of bird-balls, or other alternative methods that effectively prevent bird access/use. Regardless of the method used, it should be applied within 24 hours after completion activities have begun. All mortality or injury to species protected by the Migratory Bird Treaty Act shall be reported immediately to the BLM project lead.

10. Jurisdictional Waters of the U.S. The operator shall obtain appropriate permits from the U.S. Army Corps of Engineers 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 Sue Nall, Regulatory Specialist, Colorado/Gunnison Basin Regulatory Office, U.S. Army Corps of Engineers, at 970-243-1199 x16 or susan.nall@usace.army.mil.

11. Wetlands and Riparian Zones. The operator shall restore temporarily disturbed wetlands or riparian areas. The operator shall consult with the BLM Glenwood Springs Energy Office to determine appropriate mitigation, including verification of native plant species to be used in restoration. Contact Jeff O'Connell, Glenwood Springs Energy Office Hydrologist, at 970-947-5215 or jeffrey_o'connell@blm.gov.

12. Project Rulison Testing. The BLM will request that DOE include at least one of the Williams wells to be drilled into the southern half of Section 13 in DOE's long-term monitoring program. These are the DMGAP wells with downhole locations closest to the Project Rulison site (approximately 1.5 miles). If the DOE determines not to sample the wells in the S½ of Section 13 as part of its monitoring program, the BLM will collaborate with the COGCC regarding whether to require sampling by Williams. Accordingly, the APDs for the wells in the S½ of Section 13 will include a

condition of approval specifying that Williams may be required to sample one or more of these wells for tritium or other radionuclides prior to gathering and marketing of the gas. If monitoring of these or other wells in the vicinity of the Project Rulison site indicates the presence of radionuclides linked to the subsurface nuclear test, the BLM retains the authority to require sampling of any Federal well in the DMGAP and, depending on the outcome of that sampling, to order that production be suspended pending further investigation and collaboration with COGCC, DOE, EPA, the Colorado Department of Public Health and the Environment, and/or other agencies.

13. 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 authorized officer of the findings. The discovery must be protected until notified to proceed by the BLM authorized officer.

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

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

15. Visual Resources. All applications for permit to drill (APDs) shall include detailed, site-specific description outlining how the proposed action will meet the VRM Class the action is located in. The specific location of the proposed action, including pads, roads, and pipeline locations, shall be shown on a map and include associated cut and fill data, including the location and extent of the cut and fill.

    To reduce the view of production facilities from visibility corridors and private residences, facilities will not be placed in visually exposed locations (i.e., they will be located against backdrops or cut side of pad) and will be placed to allow the maximum reshaping of cut and fill slopes.

    To help mitigate the contrast of bare, recontoured slopes, reclamation may include, but is not limited to, the following mitigation techniques:

    - Grading and contouring. Enhanced grading and contouring of pad and access road cut and fill slopes to emulate the surrounding grades and to integrate inter-contour relief into the new slopes to achieve similar reflectivity and shadow effects inherent to the natural surrounding landform.

    - Vegetation thinning and feathering. Existing vegetation adjacent to access roads and pads may need thinning and feathering to create a more natural-appearing edge. Thinning and clearing of vegetation may need to be repeated in other areas within the vicinity to make the proposed improvements blend better with the overall landscape.

- Revegetation. Establishing appropriate vegetation within the proposed cuts and fills of the road will help harmonize the visual presence of the road improvements. The revegetation strategy will also consider topsoil stripping, topsoil amendment, clearing practices, planting, seeding, vegetation establishment, and weed management.

- Preservation of existing vegetation. Existing vegetation shalll be preserved when clearing and grading, when possible, along the edges of the pads or roads whenever possible to retain a more natural-appearing edge.

- Salvage. Cleared trees, debris, and rock may be saved and redistributed over reshaped cut and fill slopes.

- Color Treatment. Above ground facilities shall be painted a natural color (to be approved by the BLM) for color harmonization with the immediate surroundings.

16. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

17. *Ips* Beetle. To avoid pinyon tree mortality caused by infestations of the *Ips* beetle, any pinyon trees disturbed during road, pad, or pipeline construction work 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 Forest Service.

18. Pipeline Installation. For pipelines installed beneath stream crossings, the operator shall bury the pipeline at a minimum depth of 4 feet below 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.

# APPENDIX D
# SITE-SPECIFIC AND DOWNHOLE CONDITIONS OF APPROVAL

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## SITE-SPECIFIC AND DOWNHOLE CONDITIONS OF APPROVAL

### EXISTING PA 21-2 PAD (TO BE USED AS REMOTE FRAC SITE)

Surface Use COAs outlined in Appendix C of the DMGAP shall apply and remain in full force and effect.

### EXISTING W 37-1 PAD

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP EA shall apply and remain in full force and effect.

2. VRM. Applications for permit to drill shall include detailed, site-specific information outlining how any new surface disturbance on existing W 37-1, pipeline installation, or upgrades to the access road will meet VRM Class II, including pad design and any applicable visual mitigation measures. To reduce the view of production facilities from visibility corridors and private residences, facilities shall not be placed in visually exposed locations (i.e., they shall be located against backdrops or cut side of pad) and shall be placed to allow reshaping of cut-and-fill slopes.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

### EXISTING W 34-2 PAD

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP shall apply and remain in full force and effect.

2. VRM. Applications for permit to drill shall include detailed, site-specific information outlining how any new surface disturbance on existing W 34-2, pipeline installation, or upgrades to the access road, will meet VRM Class II, including pad design and any applicable visual mitigation measures. To reduce the view of production facilities from visibility corridors and private residences, facilities shall not be placed in visually exposed locations (i.e., they shall be located against backdrops or cut side of pad) and shall be placed to allow maximum reshaping of cut-and-fill slopes.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

4. Wetlands and Riparian Zones. The operator shall avoid wetlands and riparian areas. The operator shall restore any temporary disturbance to wetlands or riparian areas which result from upgrades to the access road. The operator shall consult with the BLM Glenwood Springs Energy Office to determine appropriate mitigation, including verification of native plant species to be used in restoration. Contact Jeff O'Connell, Glenwood Springs Energy Office Hydrologist, at 970-947-5215 or jeffrey_o'connell@blm.gov.

4. Soils. Cuts and fills shall be kept to a minimum when working on erosive soils and slopes in excess of 30 percent. Cuts and fill slopes shall be stabilized through revegetation practices with an approved species mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with 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.

**CENTRAL PRODUCTION FACILITY**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP EA shall apply and remain in full force and effect.

**NEW PA 23-12 PAD**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP EA shall apply and remain in full force and effect.

2. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

3. Road Reclamation. The existing two-track access road in Section 12 shall be reclaimed to BLM standards and motorized access by the public shall be allowed on the new access road to the point previously reached by the two-track road. At this location a gate shall be installed to prevent public motorized access on the remainder of the new road in Sections 12, 13, and 14. In addition to the gate, any supplementary measures necessary to prevent public motorized access, such as boulders or fencing, shall be installed by Williams at BLM's request.

**NEW PA 34-12 PAD**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP EA shall apply and remain in full force and effect.

2. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

3. Raptor Nesting. Raptor nest surveys in the project vicinity resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to prohibit construction and drilling activities within the buffer widths specified above. This TL shall apply during the period **March 15 to May 15**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied as of May 15, (c)

the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied but the nestlings have fledged and dispersed from the nest. In the case of a dilapidated nest or one that was destroyed due to natural causes, the TL shall apply to any alternate or replacement nest within the buffer widths specified above, unless an exception is granted for the alternate or replacement nest for one of the reasons listed. Contact Jeff Cook, Glenwood Springs Energy Office Wildlife Biologist, at 970-947-5231 or jeffrey_cook@blm.gov).

4. Road Reclamation. The existing two-track access road in Section 12 shall be reclaimed to BLM standards and motorized access by the public shall be allowed on the new access road to the point previously reached by the two-track road. At this location a gate shall be installed to prevent public motorized access on the remainder of the new road in Sections 12, 13, and 14. In addition to the gate, any supplementary measures necessary to prevent public motorized access, such as boulders or fencing, shall be installed by Williams at BLM's request.

**NEW PA 24-12 PAD**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP EA shall apply and remain in full force and effect.

2. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

3. Raptor Nesting. Raptor nest surveys in the project vicinity resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to prohibit construction and drilling activities within the buffer widths specified above. This TL shall apply during the period **March 15 to May 15**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied as of May 15, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied but the nestlings have fledged and dispersed from the nest. In the case of a dilapidated nest or one that was destroyed due to natural causes, the TL shall apply to any alternate or replacement nest within the buffer widths specified above, unless an exception is granted for the alternate or replacement nest for one of the reasons listed. Contact Jeff Cook, Glenwood Springs Energy Office Wildlife Biologist, at 970-947-5231 or jeffrey_cook@blm.gov).

4. Road Reclamation. The existing two-track access road in Section 12 shall be reclaimed to BLM standards and motorized access by the public shall be allowed on the new access road to the point previously reached by the two-track road. At this location a gate shall be installed to prevent public motorized access on the remainder of the new road in Sections 12, 13, and 14. In addition to the gate, any supplementary measures necessary to prevent public motorized access, such as boulders or fencing, shall be installed by Williams at BLM's request.

**EXISTING FEDERAL RULISON 14-95 PAD**

1. Standard Conditions of Approval outlined in Appendix C shall apply and remain in full force and effect.

2. VRM. Applications for permit to drill shall include detailed, site-specific information outlining how any new surface disturbance on existing new surface disturbance on existing Federal Rulison 14-95 pad, pipeline installation, or upgrades to the access road, will meet VRM Class III, including pad design and any applicable visual mitigation measures. To reduce the view of production facilities from visibility corridors and private residences, facilities shall not be placed in visually exposed locations (i.e., they shall be located against backdrops or cut side of pad) and shall be placed to allow maximum reshaping of cut-and-fill slopes.

   Material resulting from recontouring this existing location to prepare it for drilling shall not be cast down the western slope of the pad.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

4. Soils. Cuts and fills shall be kept to a minimum when working on erosive soils and slopes in excess of 30 percent. Cuts and fill slopes shall be stabilized through revegetation practices with an approved species mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with 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.

**SP 32-14 PAD and ACCESS ROAD FROM PA 24-12 PAD to PA 32-14 PAD**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP shall apply and remain in full force and effect.

2. VRM. The application for permits to drill associated with the SP 32-14 pad shall include a detailed plan showing the final road layout and associated cut-and-fill locations and calculations, along with site-specific descriptions outlining the how the proposed access road will meet VRM Class III.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

4. Soils. Cuts and fills shall be kept to a minimum when working on erosive soils and slopes in excess of 30 percent. Cuts and fill slopes shall be stabilized through revegetation practices with an approved species mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with 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.

5. Road Design and Operation.. The access road from PA 24-12 to PA 32-14 shall be constructed with a maximum 14-foot running surface, except where greater widths (to a maximum of 25 feet) are required for safe conveyance of equipment at switchbacks. During rig moves along this road segment, the operator shall provide one-way traffic control as necessary for safety. Cut-and-fill locations on this road segment shall be at a 1.5 to 1 or 1 to 1 steepness, as directed by the authorized officer, to minimize visual impacts. An engineered road design shall be submitted by the operator showing the cut-and-fill slope lengths and heights, the limits of disturbance, and specialized design features needed to ensure road stability. At selected locations, the authorized officer may require end-hauling and disposal of fill material in excess of the amount need for road stability.

6. Pipelines. Pipelines shall be located within the road where possible. For sections outside the road disturbance area, a detailed plan shall be submitted by the operator outlining how the pipeline will be constructed to meet VRM class III. For pipelines installed beneath stream crossings, the operator shall bury the pipeline at a minimum depth of 4 feet below 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.

**SP 43-14 PAD and ACCESS ROAD between SP32-14 PAD and SP43-14 PAD**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP shall apply and remain in full force and effect.

2. VRM. Applications for permit to drill for the SP 43-14 pad shall include a detailed plan showing the final road layout and associated cut-and-fill locations and calculations, along with site-specific descriptions outlining the how the proposed access road will meet VRM Class III.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

4. Raptor Nesting. Raptor nest surveys in the project vicinity resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to prohibit construction and drilling activities within the buffer widths specified above. This TL shall apply during the period **March 15 to May 15**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied as of May 15, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied but the nestlings have fledged and dispersed from the nest. In the case of a dilapidated nest or one that was destroyed due to natural causes, the TL shall apply to any alternate or replacement nest within the buffer widths specified above, unless an exception is granted for the alternate or replacement nest for one of the reasons listed. Contact Jeff Cook, Glenwood Springs Energy Office Wildlife Biologist, at 970-947-5231 or jeffrey_cook@blm.gov).

5. Soils. Cuts and fills shall be kept to a minimum when working on erosive soils and slopes in excess of 30 percent. Cuts and fill slopes shall be stabilized through revegetation practices with an approved species mix shortly following construction activities to minimize the potential for slope failures and excessive erosion. Fill slopes adjacent to drainages shall be protected with 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.

**SP 23-13 PAD and ACCESS ROAD between SP 43-14 PAD and SP 23-13 PAD**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP shall apply and remain in full force and effect.

2. VRM. Applications for permit to drill for the SP 23-13 pad shall include a detailed plan showing the final road layout and associated cut-and-fill locations and calculations, along with site-specific descriptions outlining the how the proposed access road will meet VRM Class III.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

4. Raptor Nesting. Raptor nest surveys in the project vicinity resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to prohibit construction and drilling activities within the buffer widths specified above. This TL shall apply during the period **March 15 to May 15**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied as of May 15, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied but the nestlings have fledged and dispersed from the nest. In the case of a dilapidated nest or one that was destroyed due to natural causes, the TL shall apply to any alternate or replacement nest within the buffer widths specified above, unless an exception is granted for the alternate or replacement nest for one of the reasons listed. Contact Jeff Cook, Glenwood Springs Energy Office Wildlife Biologist, at 970-947-5231 or jeffrey_cook@blm.gov).

**SP 44-13 PAD and ACCESS ROAD between SP 23-13 and SP 44-13**

1. Standard Conditions of Approval outlined in Appendix C of the DMGAP shall apply and remain in full force and effect.

2. VRM. The application for permit to drill for the SP 44-13 pad shall include a detailed plan showing the final road layout and associated cut-and-fill locations and calculations, along with site-specific descriptions outlining the how the proposed access road will meet VRM Class III.

3. Big Game Winter Timing Limitation. To minimize impacts to wintering big game, no construction or completion activities shall occur during a Timing Limitation (TL) from **January 1 to February 28**. In addition, scheduled winter visits (those other than for emergency purposes) should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife. BLM recommends that remote monitoring be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

4. Raptor Nesting. Raptor nest surveys in the project vicinity resulted in the location of one or more raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. To protect nesting raptors, a 60-day Timing Limitation (TL) shall be applied to prohibit construction and drilling activities within the buffer widths specified above. This TL shall apply during the period **March 15 to May 15**. An exception to this TL may be granted for any year in which a subsequent survey determines one of the following: (a) the nest is in a severely dilapidated condition or has been destroyed due to natural causes, (b) the nest is not occupied as of May 15, (c) the nest was occupied but subsequently failed due to natural causes, or (d) the nest was occupied but the nestlings have fledged and dispersed from the nest. In the case of a dilapidated nest or one that was destroyed due to natural causes, the TL shall apply to any alternate or replacement nest within the buffer widths specified above, unless an exception is granted for the alternate or replacement nest for one of the reasons listed. Contact Jeff Cook, Glenwood Springs Energy Office Wildlife Biologist, at 970-947-5231 or jeffrey_cook@blm.gov).

5. Wetlands and Riparian Zones. The operator shall restore temporarily disturbed wetlands or riparian areas. The operator shall consult with the BLM Glenwood Springs Energy Office to determine appropriate mitigation, including verification of native plant species to be used in restoration. Contact Jeff O'Connell, Glenwood Springs Energy Office Hydrologist, at 970-947-5215 or jeffrey_o'connell@blm.gov.

6. Perennial and Intermittent Stream Crossings. Construction activities at perennial and intermittent stream crossings (e.g., burying pipelines, installing culverts) shall occur during low-flow conditions (i.e., late summer/early fall) and shall consist of either a piped stream diversion or the use of a coffer dam and pump to divert flow around the disturbed area.

7. Pipeline Installation. For pipelines installed beneath stream crossings, the operator shall bury the pipeline at a minimum depth of 4 feet below 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.

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# WILLIAMS PRODUCTION RMT COMPANY

## MASTER APD
Standard Operating Practices

**Including:**
**10 Point Drilling Plan**
**13 Point Surface Use Plan**
**Conditions of Approval**

**for**

**Williams Fork wells located within the townships of:**

| | |
|---|---|
| Grand Valley Field | 6 South – 96 West, 7 South – 96 West |
| Parachute Field | 6 South – 95 West, 7 South – 95 West |
| Rulison Field | 6 South – 94 West, 7 South – 94 West |

**in**

**Garfield County, Colorado**

**Surface Ownership: UNITED STATES GOVERNMENT**

# 10 Point Drilling Plan

WILLIAMS PRODUCTION RMT COMPANY
Garfield County, Colorado

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

Formation depths will be submitted with the well-specific *Drilling Prognosis*. Wells in the South Grand Valley area (7S-96W, Sec. 32 and 33 6S-96W) will be listed within a formation top table included in the South Grand Valley EA Proposal.

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

Water wells used for domestic, livestock, and irrigation supply within the Grand Valley, Parachute, and Rulison development areas produce water primarily from the stream and floodplain alluvial deposits that overlie the Wasatch Formation; the depth range for these wells is 110 feet to 290 feet. Two irrigation wells have been reported to produce water from the Wasatch Formation. Further details on groundwater aquifers and usage are available in the *Wheeler to Webster GAP Environmental Assessment, Section 3.9.3, July 2002, U.S. Department of the Interior, Bureau of Land Management*. Any and all historically proven domestic, livestock, and irrigation groundwater sources will be isolated with surface casing/cement during drilling (see section 5 for details).

**3. BOP and Pressure Containment Data**

After setting surface casing to the specified depth (section 5), 3,000-psi equipment will be used. Equipment will be installed per **Attachments A & B**. Test pressures will be as follows:

| | |
|---|---|
| 11" – 3,000-psi ram type BOP's | 3,000 psi |
| 11" – 3,000-psi annual BOP's | 1,500 psi |
| Ancillary equipment and choke manifold | 3,000 psi |
| Surface casing | 1,500 psi |

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

BOP and choke manifold equipment and installation will be consistent with 43 CFR Part 3160 III Well Control Requirements as it pertains to 3,000-psi systems.

The accumulator will have sufficient capacity to close all rams and annular preventer, and to open the hydraulically controlled valve. Two sets of hydraulic controls will be utilized with one set on the rig floor and one set in the accumulator house; its location is not available because a contractor has not been picked yet.

4. **Auxiliary equipment**

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

5. **Casing Program** – dependant on well location from the following areas - proposed casing depths will be submitted on *Form 3160-3 item 23* (BLM Application for Permit to Drill)

*Area A – Grand Valley (6S-96W, 7S-96W)*

| HOLE SIZE | SETTING DEPTH from | to | SIZE | WEIGHT | GRADE | THREAD | CONDITION |
|---|---|---|---|---|---|---|---|
| 24" | surface | 45' | 18" | corrugated conductor | | | |
| 13-1/2" | surface | 10% of TD | 9-5/8" | 32.3# | H-40 | ST&C | New |
| 7-7/8" | surface | TD | 4-1/2" | 11.6# | I-80 | LT&C | New |

(Surface casing depth requirements by the COGCC - See **Attachment C**, "Notice to All Operators Drilling…", dated May 3, 2001)

*Area B – Parachute (Sections 1-25, 30, 31, 36 for 6S-95W, Sections 1, 6-36 for 7S-95W)*

| HOLE SIZE | SETTING DEPTH from | to | SIZE | WEIGHT | GRADE | THREAD | CONDITION |
|---|---|---|---|---|---|---|---|
| 24" | surface | 45' | 18" | corrugated conductor | | | |
| 13-1/2" | surface | 10% of TD | 9-5/8" | 32.3# | H-40 | ST&C | New |
| 7-7/8" | surface | TD | 4-1/2" | 11.6# | I-80 | LT&C | New |

(Surface casing depth requirements by the COGCC - See **Attachment C**, "Notice to All Operators Drilling…", dated May 3, 2001)

*Area C – Parachute (Section 26-29 for 6S-95W, Sections 2-5 for 7S-95W)*

| HOLE SIZE | SETTING DEPTH from | to | SIZE | WEIGHT | GRADE | THREAD | CONDITION |
|---|---|---|---|---|---|---|---|
| 24" | surface | 45' | 18" | corrugated conductor | | | |
| 13-1/2" | surface | Bottom of "G" sand | 9-5/8" | 32.3# | H-40 | ST&C | New |
| 7-7/8" | surface | TD | 4-1/2" | 11.6# | I-80 | LT&C | New |

** The Wasatch "G" Sand in Area C has been designated as a potential future water-injection interval.
(Surface casing depth requirements by the COGCC will be met or exceeded - See **Attachment C**, "Notice to All Operators Drilling…", dated May 3, 2001)

*Area D – Rulison (6S-94W, 7S-94W)*

| HOLE SIZE | SETTING DEPTH from | to | SIZE | WEIGHT | GRADE | THREAD | CONDITION |
|---|---|---|---|---|---|---|---|
| 24" | surface | 45' | 18" | corrugated conductor | | | |
| 13-1/2" | surface | 1100' | 9-5/8" | 32.3# | H-40 | ST&C | New |
| 7-7/8" | surface | TD' | 4-1/2" | 11.6# | I-80 | LT&C | New |

(Surface casing depth requirements by the COGCC for the over-pressured area of the Rulison Field- See **Attachment C**, "Notice to All Operators Drilling…", dated May 3, 2001)

**Casing Strength:**

| | | | | COLLAPSE | BURST (minimum) | TENSILE |
|---|---|---|---|---|---|---|
| 9-5/8" | 32.3# | H-40 | ST&C | 1370 psi | 2270 psi | 254,000 lb |
| 4-1/2" | 11.6# | I-80 | LT&C | 6360 psi | 7780 psi | 267,000 lb |

MINIMUM DESIGN FACTORS:

| | |
|---|---|
| COLLAPSE | 1.125 |
| BURST | 1.0 |
| TENSION | 1.8 |

Area Fracture Gradient: 0.79 psi 1 foot

6. **Cementing Program**

| | |
|---|---|
| 18" Conductor | cemented to surface with construction cement |
| 9-5/8" Surface Casing | Full cement returns back to surface will be attempted.<br>*Lead Cement* - 65/35 Type III/Poz, 6% Gel, 3% Salt, 0.2% Versaset, and 0.125#/sk Poly-e-Flake. 12.7#/gal, 1.86 ft3/sk, 10.0 gal/sk<br>*Tail Cement* – Type III, 2% CaCl. 14.5#/gal, 1.43 ft3/sk, 6.9 gal/sk<br>*If full returns are not seen or fallback occurs, 1" injection of remedial cement down the backside will be performed.* |
| 4-1/2" Production | *Lead cement* to cover to 200' over Mesaverde top (volume to be calculated from caliper log). 25/75 Prem G/Poz, 8% Gel, 10% Lime. 12.5#/gal, 1.75 ft3/sk, 8.82 gal/sk<br>*Tail Cement* - 50/50 Prem G/Poz, 2% Gel, 0.6% Lap-1, 0.3% CFR-3, 0.2% HR-5. 0.3% Versaset, 0.2% Super CBL. 14.2#/gal, 1.23 ft3/sk, 5.4 gal/sk |

Placement of cement across the "G" Sand will be attempted on all wells within an undeveloped Wasatch 160-acre area adjacent to currently proven and producing Wasatch areas. Petrophysical analysis has determined that the Wasatch sands in the area of Grand Valley field (6S-96W, 7S-96W) are at lower pressures and contain significantly less net pay than comparable geologic intervals at Parachute and Rulison fields. Current analysis suggests these sands are not productive at commercial rates.

7. **Mud Program**

| INTERVAL | WEIGHT | VISCOSITY | FLUID LOSS | REMARKS |
|---|---|---|---|---|
| Surface –Bottom of Surface Hole' | 9.0 – 9.5 | 45-50 | NC | Spud Mud |
| Bottom of Surface Casing to TD | 9.5 – 13.0 | 40-50 | 6 - 10 | LSND |

Spud mud will be used to drill surface (gel and lime). System will 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 will be maintained until more weight is needed (possibly preparing logs) then will be 9.5 – 13.0 ppg as needed. Sufficient mud materials to maintain mud properties, control lost circulation and to contain blowout will be available at the wellsite. All mud additives are biodegradable and Material Safety Data Sheets will be kept on location at all times.
No chrome constituent additives will be used in the mud system on Federal and Indian lands without prior BLM approval to ensure adequate protection of fresh water aquifers.

8. **Testing, Logging and Core Programs:**

| | |
|---|---|
| Cores: | None |
| DST's: | 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 the top of the Mesaverde to TD. |
| Logging Program: | Open-hole logs: An attempt will be made to obtain one open-hole log across the Mesaverde Formation per 40-acre tract and an attempt will be made to obtain one open-hole log across the "G" Sand per undeveloped Wasatch 160-acre tract. Logs and intervals include DIL-GR-SP from TD to surface casing, Neutron Density from TD to 100' above top of Mesaverde and Neutron Density across the "G" Sand (where applicable). Cased-hole logs: All wells that are not logged open-hole will be logged with cased-hole logging tools. Logs and intervals include a cased-hole pulsed neutron log from TD to 100' above top of Mesaverde and GR from TD to surface casing. |
| Directional Drilling: | Directional Drilling Plan will be submitted for all deviated wellbores. See well-specific ***Directional Plan*** for details. |

9. **Anticipated Pressures and Temperatures:**

| | |
|---|---|
| Grand Valley Field | 0.34 to 0.50 psi/ft pore pressure grad, BHT of 155 to 180 degrees F |
| Parachute Field | 0.40 to 0.65 psi/ft pore pressure grad, BHT of 165 to 190 degrees F |
| Rulison Field | 0.48 to 0.70 psi/ft pore pressure grad, BHT of 170 to 210 degrees F |

Proper mud weight will be maintained to drill at a balanced or slightly over-balanced condition. Notification will be made if planned drilling practices deviate from this.

10. **Drilling Schedule**

| | |
|---|---|
| Anticipated starting date: | See "Item 22" of ***Federal Form 3160-3*** |
| Duration of operation: | 150 days |

No location will be moved, no well will be plugged and no drilling or workover equipment will 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 will be obtained and notification given before resumption of operations.

The spud date will 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) will 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 will be submitted on the following regular workday.

In accordance with Onshore Oil and Gas Order No. 1, this well will 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 will 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 NTL-3A.

If a replacement rig is contemplated for completion operations, a Sundry Notice (Form 3160-5) to that effect will 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 will be obtained from the Authorized Officer.

Should the well be successfully completed for production, the Authorized Officer will be notified when the well is placed in a producing status. Such notification will 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 will be scheduled within fifteen (15) days after receipt of the first production report. The BLM Field Office will coordinate the field conference.

No well abandonment operations will 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 will be obtained from the Authorized Officer. A "Subsequent Report of Abandonment" (Form 3160-5) will be filed with the Field Office within thirty (30) days following completion of the well for abandonment. This report will indicate where plugs were placed and the current status of surface restoration. Final abandonment notice will 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 will be obtained from the Field Office. The preliminary approval will not exceed 30 days or 50 MMCF gas. Approval to vent/flare beyond this initial test period will require Field Office approval pursuant to guidelines in NTL-4A.

Upon completion of approved plugging, a regulation marker will be erected in accordance with 43 CFR 3162.6. The marker will be constructed after contouring. The top of the marker will be closed or capped and the following minimum information will be permanently placed on the marker with a plate, cap or beaded-on with a welding torch: "Fed" or "Ind", as applicable; "well number, location by quarter, quarter section, township and range"; and "lease number".

Williams will be operating under its Nationwide Bond # 61017573 42.

Please contact Steve Ficklin (970) 947-5213 or Jennifer Gallegos (970) 947-5220, of the Glenwood Springs Energy office at least 24 hours prior to:

1) pre- and post- spud
2) running the surface and production casing
3) conducting the BOP test

In the event after-hours approval or notification is necessary, please contact one of the following individuals:

| | |
|---|---|
| Marty O'Mara<br>Petroleum Engineer | C: 970.319.5837<br>W: 970.947.5221 |
| Steve Ficklin<br>Petroleum Engineering Tech. | W: 970.947.5213<br>C: 970.319.2509 |
| Jennifer Gallegos<br>Petroleum Engineering Tech. | W: 970.947.5220<br>C: 970.319.2211 |
| Bridget Kobe Clayton<br>Natural Resource Specialist | W: 970.947.5224 |

BLM Fax: 970.947.5267

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# APPENDIX E
# HABITAT MITIGATION PLAN

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# HABITAT MITIGATION PLAN

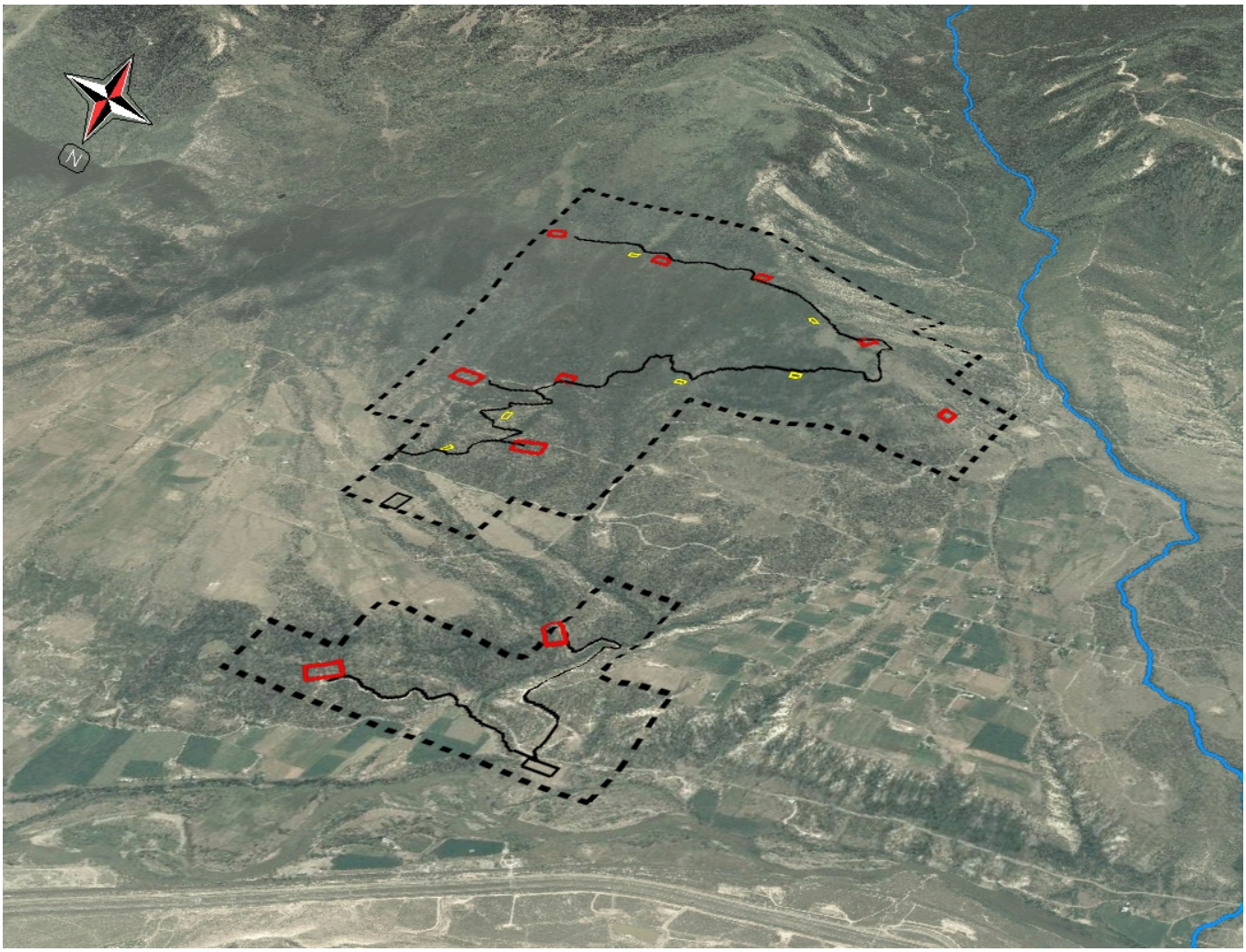
**for the**

# DOGHEAD MOUNTAIN
# GEOGRAPHIC AREA PLAN (GAP) OF DEVELOPMENT

**Williams Production RMT Company**

**Prepared by:**

**WestWater Engineering, BLM Glenwood Springs Energy Office,**
**and the Colorado Division of Wildlife**




**August 2007**

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## INTRODUCTION

Williams Production RMT has developed a Geographic Area Plan (GAP) for oil and gas production on the north side of Doghead Mountain near the town of Parachute, Colorado. Most of the GAP area provides winter habitat for mule deer and elk. Proposed developments within the GAP are expected to impact wintering big game through direct loss of habitat, physiological stress, disturbance and displacement, and habitat fragmentation. The following habitat mitigation plan was developed to partially mitigate these impacts by improving and expanding winter habitat within a portion of the GAP.

**Project Description**: The project is a habitat enhancement project designed to maintain and restore native plant communities within elk and mule deer winter habitat. Within Section 12, up to 75 acres of sagebrush, juniper, and mixed mountain brush communities would be mechanically treated to accomplish objectives.

The area is considered elk and deer winter range by the Colorado Division of Wildlife (CDOW). Field surveys indicate the entire project area is occupied winter range for both ungulate species. Mule deer occupy the habitat on a year-round basis, with increasing numbers during winter months.

**Project Location**: The project is located on U.S. Bureau of Land Management (BLM) lands in T7S, R95W, Section 12 (Figure 1). Section 12 is in Garfield County, Colorado and is located approximately 5 miles east of Parachute, Colorado. The project area is accessible by a two-track road originating in the northeast portion of Section 12.

**Site History**: The project area is generally undeveloped deciduous and evergreen mountain shrub and juniper woodlands. The area has most likely been used for domestic livestock grazing; however, recent use by livestock is not evident. A dilapidated cabin is located south of proposed pad 24-12, outside proposed treatment units. A high voltage electrical power transmission system and one natural gas pipeline also occur in Section 12. Section 12 is fenced on the north, east and west boundaries but contains no interior fences.

**Site Description**: Habitat in the area consists of mountain shrubs and juniper woodlands. Shrublands are generally open with the exception of dense oakbrush and serviceberry stands. Juniper encroachment is primarily affecting areas dominated by sagebrush or serviceberry. There are several unnamed, intermittent drainages that flow north into Cottonwood Creek. One small (< 28” wide) perennial, spring fed drainage run through the area from south to north.

**Site Condition (stable, degrading, improving)**: Evidence of accelerated erosion includes gullying, headcutting, pedestaling around shrubs and sediment deposition areas were noted. Vegetation for some species and habitat types occurs as even-aged mature or decadent stands or is decreasing in area through juniper encroachment.

**Seral Stage by Vegetative Type**:

1. Sagebrush is in a late seral stage, with most individual plants occurring in even-aged, mature or over-mature (dying) stands. Sagebrush do not appear diseased but many are hedged, an indication of repeated browsing.

2. Juniper woodlands occur primarily as a middle age but many younger trees are present where they occur in shrublands.
3. Oakbrush appears relatively young and most stands are less than 12 feet tall. Larger and older stands occur along drainages.
4. Serviceberry, bitterbrush, and mountain mahogany are in a mature status and often appear in a "clubbed" growth form with current annual growth typically less than 2 inches.

**Representative List of Common Vegetative Species**: See Biological Report for Doghead Mountain Environmental Assessment (WWE 2007)

**Previously Treatments**: No known previous treatments.

**Soil Types**: The Garfield County generalized soils map lists the following two soil complex in the project area.

- Morval-Tridell Complex: Moderately sloping to hilly soils on alluvial fans and sides of mesas. The soils are deep and well drained. Surface runoff is medium and the erosion hazard is moderate.

- Potts-Ildefoso complex: The soils are typically strongly sloping to hilly and are on mesa, alluvial fans, and sides of valleys. Both soils are deep and well drained. Surface runoff is medium and the erosion hazard is moderate.

**Elevation**: Elevations range from about 5,300 to 5,600 ft. Generally, elevations increase from north to south.

**Aspect**: The prevailing aspect of the project area is to the north.

**Gradient**: Average slope is between 5 and 15 percent. The southern half of the Section 12 tends to have steeper slopes than the northern half.

**Precipitation**: Average annual precipitation ranges from 14 to 18 inches (http://water knowledge. colostate.edu/prcp_map.htm).

**Sensitive Timing Issues**: To minimize negative impacts to wildlife populations, treatments would not occur during the big game wintering season (December 1 –April 30) or during the migratory bird breeding season (March 1 – August 15). Sagebrush treatments would occur in the fall following seed development.

**Potential for Post-treatment Recovery**: The potential for post-treatment recovery is good in oakbrush and serviceberry communities. The potential for recovery of sagebrush is somewhat less assured based on a variety of factors mentioned by Monsen (2005). Multiple treatment methods may be necessary at different locations depending on site-specific stand conditions. While understory grasses and forbs have declined in some areas, there is likely sufficient natural seed production such that that supplemental seeding may not be necessary. However, seeding may be necessary in areas where natural seed production is low or if indicated by pre- or post-treatment monitoring.

**Potential Treatment Problems**: In western Colorado, soil disturbance caused by mechanical treatments methods may increase the incidence and proliferation of noxious and invasive weed species. In general, rubber-tired or wheeled vehicles cause less ground disturbance than tracked equipment and can help to reduce noxious week invasion, particularly in lower, dryer sites where cheatgrass is a concern. Vegetation data collected before and after treatments would be used to address potential problems.

**Vegetation Surveys:** A visual assessment of plant species composition and distribution was conducted in December, 2006 and again in May and July, 2007. Assessments conducted in 2006 were part of the broader biological assessment for the Doghead Mountain GAP. Surveys in 2007 were conducted to determine suitable areas where habitat enhancement treatments could be implemented to improve forage conditions for ungulates. Surveys involving systematic measurements of vegetation to further characterize plant communities and establish baseline conditions would be conducted prior to treatment.

## PROJECT DESIGN AND IMPLEMENTATION GUIDELINES

The following guidelines were used to develop this plan. However, the final design of habitat treatments is dictated by conditions identified through more detailed vegetation surveys.

- Implement treatments on a phased basis (multiple years), such that recovery is occurring as new areas are treated.
- Define the desired vegetative response for each vegetation type affected by the project.
- Use rubber-tired equipment rather than tracked equipment when possible to limit soil disturbance.
- Incorporate mosaics of treated and untreated areas.
- Consider use of diverse vertical structure within and between treatment areas, particularly in sagebrush, oakbrush, and serviceberry habitats.
- Avoid geometric patterns such as cutting strips and other unnatural configurations and emphasize diverse edge patterns that “feather” from treated to untreated areas.
- Avoid large, uniform block treatments and incorporate untreated islands into treatment units over 10 acres in size.
- For supplemental seeding, use BLM recommended mix of native species occurring on the site and, whenever possible, use local eco-types.
- Schedule treatments to avoid known periods of seasonal use by wildlife.
- Consider precipitation, temperature, and land use such as natural gas development when determining a treatment implementation schedule.
- Exclude domestic livestock grazing long enough to allow sufficient recovery of vegetation to occur.
- Consider visual impacts.
- Consider terrain features and site conditions that can influence project success.

## PROJECT SELECTION CRITERIA

The following criteria were considered when developing the habitat mitigation plan for Section 12:

- The project is designed to meet BLM and CDOW goals for ecosystem health and enhance the capability of the habitat to sustain big game species on an annual basis.
- With the exception of oakbrush, treatment areas are in a degraded ecological condition. The majority of oakbrush is young and occurs in large stands too dense for ungulates to penetrate.
- The area is not meeting the needs of the ecological community and likely is in decline because of previous or current management practices.
- The project has potential to meet multiple habitat improvement objectives. The potential exists for cost sharing and partnerships.
- The area is essential wildlife habitat and is in a state of vegetative decline (over-mature).
- An improvement in vegetative species composition and age structure is desired to meet ecosystem restoration objectives.
- Soil erosion can be curtailed to enhance water quality, quantity, and retention.

### Vegetation Condition

#### Sagebrush

Mountain big sagebrush is a dominant shrub species in Section 12. Generally, sagebrush occurs as a single, mature age class with little diversity in the younger age classes (Figures 4 and 5). In areas where there is little herbaceous groundcover, sagebrush appears to be stressed and in poor condition, exhibiting declining density as a result of mortality and very low seedling recruitment (Figure 5).

The amount of grass and forb understory varies across the project area ranging from areas of bare ground to areas with nearly complete coverage. Areas of bare ground dominate and indications are that past grazing management practices have negatively affected understory species due to improper management. Excessive amounts of bare ground are negatively affecting the hydrology in some areas by increasing runoff and decreasing soil moisture conditions.

Winward (2004) emphasizes the need to have both a healthy, multi-aged overstory of sagebrush as well as a healthy, diverse herbaceous understory. Management practices that promote a healthy overstory/understory ratio will increase benefits for wildlife while improving soil and watershed conditions.

#### Juniper Woodlands

Juniper woodlands are encroaching upon and slowly replacing sagebrush habitat in portions of the project area. Juniper encroachment is also occurring in areas where shrub species such as serviceberry and mountain mahogany occur more frequently.

Because juniper out-competes forbs, grasses and shrubs for light and below ground resources (Vaitkus and Eddleman 1987, McPherson and Wright 1990), burning, mechanical treatments, or other measures that eliminate tree competition are necessary for associated species to recover and to restore wildlife habitats (Fairchild 1999; Monsen 2005).

**Oakbrush, Serviceberry, Mountain Mahogany**

Mountain shrub communities occur primarily on the north half of section 12. For the most part, this community is an even-aged stand dominated by oakbrush and serviceberry. Much of the oakbrush is 6 to 12 ft tall and occurs in large stands too dense for ungulates to penetrate. Big game trails are common between but not within stands.

Big game use of the serviceberry is high throughout the project area, particularly along the periphery of this habitat type and in areas where the plants are scattered in other vegetation types.

Mountain mahogany is less common in the project area and generally occurs with oakbrush and serviceberry.

There is no recent evidence of fire having affected the oakbrush/serviceberry community. During spring 2007, an infestation of linden loopers (*Erranis tiliaria)*, a species of moth, defoliated a large portion of the mountain shrub community with the exception of sagebrush.

## Soil Conditions

There are numerous areas of active soil erosion where the soil loss appears to be having a negative impact on the plant communities. Evidence of soil erosion is most apparent in the steeper terrain and in areas of deeper soils. Indications of long-term erosion are reflected by steep gullies along with active head cutting. The lack of identified perennial understory vegetation establishment in gully and rill bottoms, lack of ground litter and the presence pedestaling around perennial plants such as sagebrush is additional indication of active erosion.

# PROJECT DESIGN AND IMPLEMENTATION

### Habitat Improvement Treatments

In May 2007, a preliminary survey was conducted by personnel from the BLM, CDOW and WestWater Engineering to select sites suitable for habitat enhancement treatments. These sites were selected based on the observed condition of the vegetation, potential for treatment, distribution in the project area and relationship to proposed natural gas access roads and well pads.

Habitat treatments would be conducted in phases over several years to allow for recovery while other areas are treated. Additional treatments would only be addressed after evaluating results of initial treatments.

**Sagebrush -** Sagebrush habitat would be improved through treatments designed to develop a multi-aged sagebrush community and increase understory species diversity and abundance.

- Sagebrush treatments would be completed in an irregular pattern, taking advantage of better soils and exposures that would provide for re-growth of the sagebrush. North facing exposures have better hydrologic conditions due to the accumulation of snow and decreased surface evaporation. Rocky areas or south facing exposures would be avoided.

- For most areas, mechanical treatments would be accomplished with either a large rotary mower or a drum-type shredder.

- Where sagebrush shrubs are in poor condition and seed production is marginal treatments may be accomplished by crushing sagebrush with heavy equipment or a land imprinter followed by sagebrush and/or grass and forb seeding. Seed would be sown Best results come from surface broadcast seed that has been pressed into the soil in late fall or early winter. Seed can also be broadcast directly onto snow with good results.

**Juniper –** Juniper encroachment in Section 12 is reducing the amount of available forage by out-competing and replacing shrubland communities (Figures 2 and 3). Reducing juniper in these areas would favorably affect shrub and herbaceous understory species.

- Juniper would be removed where encroachment is occurring. Small groups of trees may be retained to serve as wildlife cover. Edges would be feathered in an irregular pattern.

- Juniper removal would be accomplished with a Hydro-Ax or Fecon Bullhog brush and tree shredder attached to either a rubber-tired or tracked vehicle. Rubber, flotation-type tires are preferred to minimize ground disturbance.

- Seeding would occur if indicated by pre or post-treatment monitoring.

**Oakbrush/Serviceberry –** This habitat type is important to big game animals due to the amount of winter forage it provides. Stands of young oakbrush can form impenetrable stands across large areas, limiting use as forage by deer and elk.

- Treatments would reduce oakbrush height to 20 inches or less across a mosaic of irregular treatment areas within a stand in order to create access points and increase foraging opportunities within the stand. Treatments would remove between 20 and 50 percent of standing oakbrush within treatment units.
- Treatments would be accomplished with equipment described above for juniper woodlands.
- A sufficient grass and forb seed source currently exists in and around stands of oakbrush making the need for supplemental seeding unlikely. However, seeding may occur if post-treatment monitoring indicates a need.

**Noxious and Invasive Weed Management-** Noxious weeds are introduced plant species with the ability to invade intact ecosystems and displace native species. Because of these abilities, the presence of noxious weeds reduces the ability for land managers to manage for biodiversity,

grazing and wildlife habitat requirements. Identification and treatment of such plants is important prior to, during, and following ground disturbing projects.

The following noxious and invasive weed species occur in or near the project area and their potential impacts would be considered prior to treatments.

1. Downy brome (Cheatgrass): Occurs at highest densities in association with juniper but can be found at much lower densities throughout the project area. Typically, this species increases in sites where surface soil disturbance occurs.

2. Houndstongue: This species is found in low densities in the oak bush/serviceberry shrublands in the mid to southern portion of Section 12. Houndstongue can increase in areas where top soil is left bare due to surface disturbance.

3. Diffuse knapweed: This species does not occur within the project area but has recently been observed in the Spruce Creek area about 2 miles to the east.

4. Canada thistle: This may increase in areas where moisture levels are higher, particularly in the area in the vicinity of the power lines.

5. Common mullein: This species was not common in Section 12, but the occurrence could increase at disturbed sites.

The mitigation plan would follow prescribed management techniques for control of noxious weeds as presented in it **Noxious and Invasive Weed Management Plan for Oil and Gas Operators**, prepared by the BLM Glenwood Springs Energy Office (BLM 2007).

**Monitoring**

Monitoring of vegetation treatments would provide information on the success of the initial treatments and allow for adaptive changes in subsequent work. Monitoring would include systematic measurements of various vegetation parameters as well as the establishment of permanent photo points and would be conducted both before and after treatments.

*Intensive monitoring protocol*

- Implementation of line-intercept transects/measurements to determine percent canopy cover and height of vegetation in treatment and control areas.
- Use of point-intercept transects to estimate understory (grass, forb, bare ground, litter) cover and composition.
- Establishment of permanent transects to monitor sagebrush seedling establishment and regrowth in oakbrush and serviceberry vegetation.
- Establishment of permanent photo points to document pre and post project conditions and changes in treatment and control areas.
- Installation of small (4 ft x 4 ft x 3 ft) wire exclosure cages designed to monitor vegetation response in sites where big game herbivory would be controlled.

*Extensive monitoring protocol*

- Establishment of permanent photo points to document pre- and post-project conditions and changes in treatment and control areas.
- Random walking transects to monitor sagebrush seedling establishment and regrowth in oakbrush and serviceberry vegetation.
- Installation of small (4 ft x 4 ft x 3 ft) wire exclosure cages designed to monitor vegetation response in sites where big game herbivory would be controlled.

**Table 1. Implementation Schedule**

| Date | Description of Activity |
|---|---|
| Fall 2007 | Final selection of treatment areas |
| November 2007 | Collection and storage of local sagebrush seed |
| Spring/Summer 2008 | Pre-treatment vegetation assessment |
| September 2008 | Treat a selection of oakbrush and serviceberry units |
| November 2008 | Treat a selection of sagebrush by removing juniper |
| Throughout 2009 | Monitor treatments and plan additional treatments |

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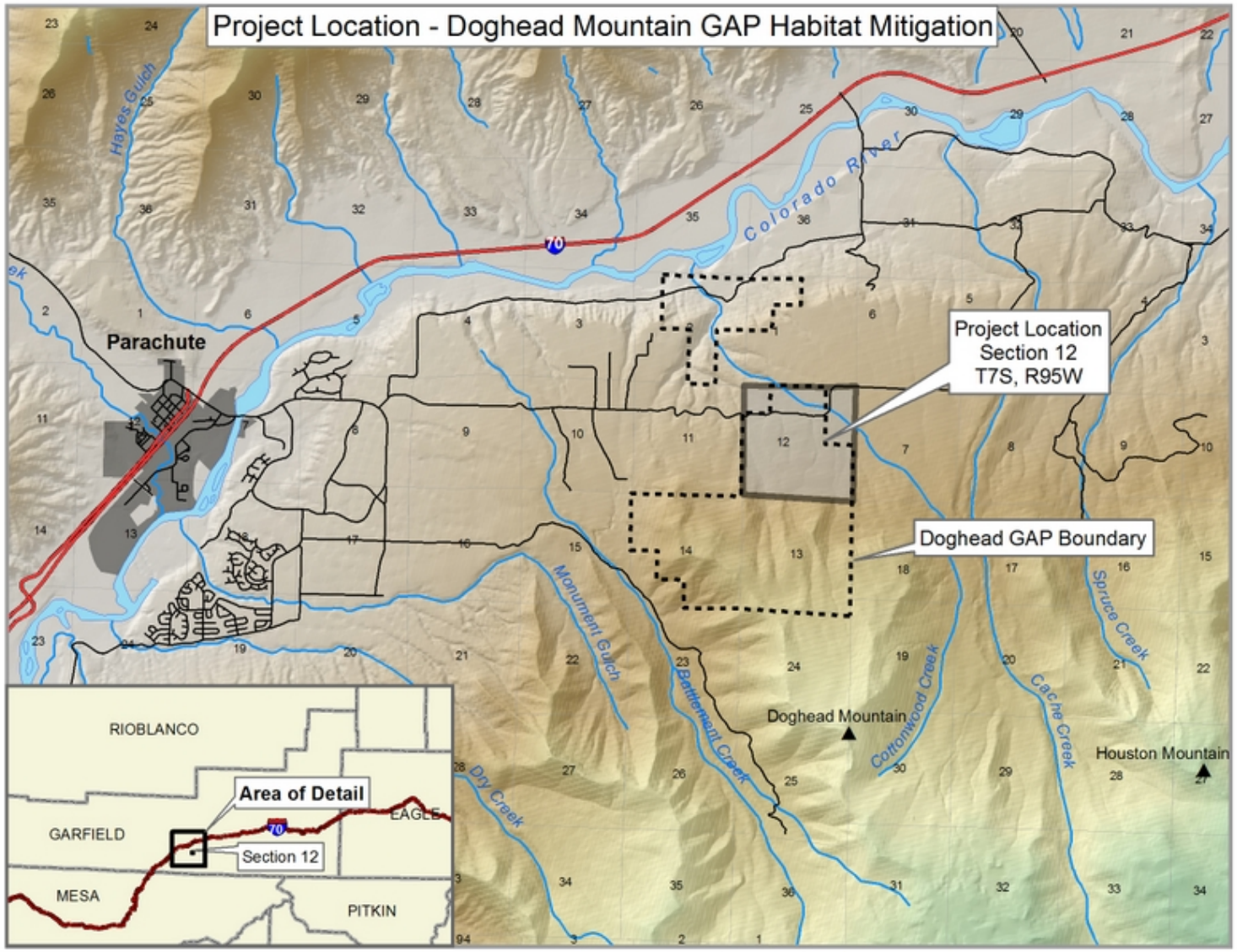


**Figure 1. Doghead Mountain GAP Habitat Mitigation Project Location**

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**Figure 2. Sagebrush and young juniper in Section 12.**

**Figure 3. Juniper encroachment into sagebrush shrublands.**

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**Figure 4. Dead and dying sagebrush with marginal understory vegetation.**

Figure 5. Area where sagebrush has died out.

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