



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

Glenwood Springs Energy Office

August 2007

**Pete and Bill Creek Geographic Area Plan  
for Oil and Gas Development  
EA#CO140-07-115**



Prepared by

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for

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Bureau of Land Management  
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**FONSI**  
**CO-140-2007-115 EA**

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: It is my decision to approve the Applications for Permit to Drill (APDs) for wells and associated developments on two of the well pads (7K and 7L) identified in Tables 1 and 3 of the Environmental Assessment (EA) with the Conditions of Approval (COAs) identified in Appendix D.

To fully access the impacts related to the planned wells and associated developments on the 7O and 18A pads, final recommendations presented in a geotechnical report and complete road and pipeline design package must be submitted and accepted by the BLM. The wells, roads, and pipelines proposed for the 7O and 18A pads are not approved pending a review of the geotechnical report and engineering design work, the completion of visual and soil resource impact assessment, and the development of specific mitigation measures, as appropriate.

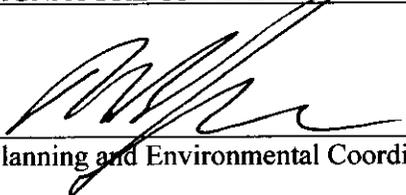
RATIONALE:

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 C and D will be incorporated as Conditions of Approval for both surface and drilling operations.

PREPARED BY: Wildlife Specialties, LLC; Western Ecological Resources, Inc.; and Jim Byers, Natural Resource Specialist with the BLM Glenwood Springs Energy Office.

SIGNATURE OF PLANNING AND ENVIRONMENTAL COORDINATOR:

  
\_\_\_\_\_  
Planning and Environmental Coordinator

Date 8/22/07

SIGNATURE OF AUTHORIZED OFFICER:

  
\_\_\_\_\_  
Authorized Officer

Date 08/22/07

**FONSI**  
**CO-140-2007-115 EA**

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.

**Amended DECISION RECORD**

**DECISION:** It is my decision to approve the Applications for Permit to Drill (APDs) for eight wells and associated developments (road and pipeline) on the 7O well pad identified in Tables 1 and 3 of the Proposed Action with the attached Conditions of Approval. In the original Decision Record signed 8/22/07, submittal and acceptance of geotechnical report and road/pipeline design package were required prior to approval of the 7O and 18A pads. The road/pipeline design package submitted recently by URS, Inc. has satisfied the geotechnical and engineering concerns initially identified for the 7O pad. At this time, Noble has not submitted road design work for the 18A pad; approval for that pad will continue to be deferred until the geotechnical report and engineering design work is reviewed, resource impact assessment is completed, and specific mitigation measures are identified.

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.

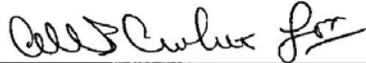
**RATIONALE:**

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:** Wildlife Specialties, LLC, Western Ecological Resources and Jim Byers, BLM Natural Resource Specialist

**SIGNATURE OF PLANNING AND ENVIRONMENTAL COORDINATOR:**

  
\_\_\_\_\_  
Planning and Environmental Coordinator

10-9-08  
\_\_\_\_\_  
Date

**SIGNATURE OF AUTHORIZED OFFICIAL:**

  
\_\_\_\_\_  
Authorized Officer

10-9-08  
\_\_\_\_\_  
Date

**CO-140-2007-115 EA**  
**Amended SURFACE USE CONDITIONS OF APPROVAL**  
**to be applied along with the original Surface COAs**  
**identified in original Record of Decision (signed 8/22/07)**

1. Road Design Adherence. The operator shall abide by the guidelines, specifications and drawings presented in URS' road design package (dated 8/15/08) "Access Road to 7O Pad from 7K Pad", URS' pad package (dated 8/15/08) "7O Pad Grading, Drainage and Erosion & Sediment Control Plan" and augmented by D.R. Griffin's revised APD survey plat package (dated 8/26/08).
2. Storm Water Controls. Once road and/or pipeline construction has commenced, the operator shall implement appropriate storm water practices to control surface water erosion from the construction area during the ongoing construction period and also during periods when construction has ceased but is not yet completed (e.g. winter timing limitation periods).
3. Facility Placement. Size and placement of surface facilities (separators and storage tank battery) shall be determined by BLM and Noble personnel after the pad has been constructed.
4. Road Right-of-Way Application. The operator shall apply for a BLM road right-of-way on the Walling Road alignment across portions of BLM lands in Section 1, T8S, R96W. The operator shall adhere to all terms and conditions attached to the new road and existing pipeline right-of-way grants. To protect winter habitat use by big game, the operator shall not use the Walling Road alignment for activities related to construction, drilling, and completion of oil and gas wells and associated facilities, during the 5-month period from December 1 through April 30.
5. Visual Resource Mitigation. To limit and mitigate the visual disturbance of the road, pipeline and pad construction, the slash generated during the tree and brush clearing shall be chipped or hydro-axed prior to topsoil segregation. A minimum of 6 inches of topsoil (with maximum of 12" depth if topsoil is available) shall be stripped from the construction area and windrowed along the edges of construction area. Tree stumps shall be scattered and buried along edge of construction area. Large boulders generated during construction shall also be randomly placed and bedded against fillslopes to provide texture variation and darker earth colors. Vegetation at the toe of fillslope shall remain intact to provide screening of the fillslope.
6. Revised Reclamation Policy. BLM Glenwood Springs Energy Office (GSEO) Reclamation Policy, including the Letter outlining Revisions to GSEO Revegetation Requirements (dated May 1, 2008) shall be referenced and implemented for reclamation procedures related to interim and final reclamation measures related to this pad.
7. Standard Conditions of Approval outlined in Appendix D of the Pete and Bill Creek GAP will apply and remain in full force and effect.

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

**Company/Operator:** Noble Energy, Inc.

**Surface Location:** SWSE, Section 7, Township 8 South, Range 95 West, 6<sup>th</sup> P.M.

<u>Well Name</u>	<u>Well No.</u>	<u>Bottomhole Location</u>	<u>Lease</u>
Federal	7-34D	SWSE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-43C	NESE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-43D	NESE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-44C	NESE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-44D	NESE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-34C	SWSE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-44A	NESE Sec. 7, T. 8S, R. 95W.	COC-23443
Federal	7-44B	NESE Sec. 7, T. 8S, R. 95W.	COC-23443

1. In accordance with 43 CFR 3162.4(b), the operator shall submit a complete set of electrical/mechanical logs in .LAS format with standard Form 3160-4, Well Completion or Recompletion Report and LOG. Please contact Karen Conrath at 970-947-5235 or karen\_conrath@blm.gov for clarification.
2. Twenty-four hours *prior* to (a) spudding, (b) conducting BOPE tests, (c) running casing strings, and (d) within twenty-four hours *after* spudding, the GSEO shall be notified. One of the following GSEO's inspectors shall be notified by phone: Steve Ficklin at 970-947-5212, Julie King shall at 970-947-5239, and Todd Sieber at 970-947-5220.
3. A GSEO petroleum engineer shall be contacted for a verbal approval prior to commencing remedial work, plugging operations on newly drilled boreholes, changes within the drilling plan, changes or variances to the BOPE, deviating from conditions of approval, and conducting other operations not specified within the APD. Please contact Dane Geyer at 970-947-5229 (office) or 970-589-6887 (cell) for verbal approvals. As a secondary contact, Bob Hartman may be contacted at 970-244-3041 (office) or 970-250-7002 (cell).
4. If a well control issue arises (e.g. kick, blowout, or water flow) Dane Geyer shall be notified within 24 hours from the time of the event.
5. The BOPE shall be tested and conform to Onshore Order #2 for a **3M** system.
6. The casing head shall be rated to 3000 psi or greater and a test plug shall be utilized during the BOPE test. BOPE test pressures shall not exceed the rated casing head pressure.
7. An electrical/mechanical mud monitoring equipment shall be functional prior to drilling out the next shoe. As a minimum, this shall include a pit volume totalizer, stroke counter, and flow sensor.
8. Gas detecting equipment shall be installed in the mud return system, prior to drilling out the next shoe, and hydrocarbon gas shall be monitored for pore pressure changes.
9. A gas buster shall be functional and all flare lines effectively anchored in place, prior to drilling out the next shoe. The discharge of the flare lines shall be a minimum of 100' from the well head and targeted at bends. The panic line shall be a separate line (not open inside the buffer tank) and effectively anchored. All lines shall be downwind of the prevailing wind direction and directed into a flare pit, which cannot be the reserve pit. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and maintain a continuous flare.
10. Submit the (a) mud/drilling log (e.g. Pason disc), (b) driller's event log/operations summary report, (c) production test volumes, (d) directional survey, and (e) Formation Integrity Test results with the well completion report. Please contact Dane Geyer for clarification.



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**PETE AND BILL CREEK GEOGRAPHIC AREA PLAN  
FOR OIL AND GAS DEVELOPMENT  
EA#CO140-07-115**

**INTRODUCTION**

Noble Energy, Inc. (Noble) is proposing a 2- to 3-year program of oil and gas development on approximately 1,790 acres of public land located approximately 6 air-miles south of Parachute, Garfield and Mesa Counties, Colorado (Appendix A, Figures 1 and 2). This program, referred to as the Pete and Bill Creek Geographic Area Plan (PBGAP), originally proposed the development of 42 Federal wells from 4 new Federal surface locations and 2 existing well pads. Associated facilities would include access roads, gas and produced water pipelines, and a variety of surface production equipment. Included in the proposal is a range of mitigation measures designed to minimize or eliminate impacts to surface and downhole resources. Since the time of the original proposal, four of the wells proposed for one of the existing well pads were approved via a Statutory Categorical Exclusion (SCE) under Section 390 of the Energy Policy Act of 2005 and the six wells proposed for the other existing pad were dropped from the proposal.

The Department of the Interior, Bureau of Land Management (BLM), Glenwood Springs Energy Office (GSEO) administers the Federal surface and mineral estate in the PBGAP area. The GSEO has prepared this environmental assessment (EA) in compliance with the National Environmental Policy Act (NEPA) according to the format established by the Council on Environmental Quality (CEQ) regulations that implement NEPA. This EA discloses the direct, indirect, and cumulative impacts of the development proposal and a no action alternative and determines whether significant environmental impacts necessitating an environmental impact statement (EIS) would result.

**PURPOSE AND NEED FOR ACTION**

The purpose of the action is to develop oil and gas resources on Federal lease COC 23443 consistent with existing Federal lease rights. The action is needed to increase the development of oil and gas resources for commercial marketing to the public.

The purpose and need for action would have been met by structuring the development of the lease as a series of individual proposals. However, the current Glenwood Springs Resource Area (GSRA) land use plan and more recent BLM policies specify the use of multiple-well development plan proposals as a means to more effectively manage Federal lease development (BLM 1999a).

**PROPOSED ACTION**

The PBGAP is intended to describe a future development strategy given current market conditions and company constraints. If fully developed, this proposal would result in up to 32 bottomhole locations drilled from four new well pads (7K, 7L, 7O, and 18A). Pending approval, Noble expects to directionally drill up to 20 wells in 2007 and 12 wells in 2008-2009. The total number of wells would depend on geologic conditions and economic factors.

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

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

The PBGAP area encompasses approximately 1,790 acres of Federal surface and mineral ownership within portions of Section 32, T7S, R95W, Sections 5, 6, 7, 8, 17 and 18, T8S R95W, Sixth Principal Meridian. As part of the proposed action, Noble would apply for BLM rights-of-way crossing the NE<sup>1</sup>/<sub>4</sub>SE<sup>1</sup>/<sub>4</sub>, Section 1, Township 8 South, Range 96 West to authorize the construction of new access road and pipelines to serve the proposed development.

Each major element of the proposed action is described below under the headings, **Development** (Construction/Drilling/Completion), **Production** (Operation and Maintenance), and **Abandonment and Reclamation**. Associated with these developments is a standard 13-Point Surface Use Plan (SUP) and a 10-Point Drilling Plan for gas well development (Appendices B and C). With the BLM's approval, all measures discussed in these plans would be implemented as part of the proposed action. Any deviations from the standard practices are identified in the standard and site-specific Conditions of Approval (COAs) (Appendix D).

### **Development – Construction, Drilling, and Completion**

Development would include numerous, simultaneous construction activities. The following is a description of construction methods proposed for well pads, access roads, and pipelines for gas gathering and produced water.

The locations of the various developments reflect the results of onsite investigations conducted by the BLM, the operator, and subcontractors to assess proposed pad and pit layout, proposed access routes, cuts and fills, topsoil stockpiling, erosion control, and reclamation potential. The primary purpose of the onsite inspections was to assess potential resource impacts associated with their construction. In some cases, revisions to the design of the proposed developments were made to minimize potential impacts.

#### **Construction**

##### Proposed Well Pads

The proposed well pads would be constructed from the native soil and rock materials present onsite using a bulldozer, grader, front-end loader, or backhoe. The pad would be constructed by clearing vegetation, stripping and stockpiling topsoil, and leveling the pad area using cut-and-fill techniques. All cut slopes associated with pad construction would be “step cut” and left rough to provide a seed catchment surface. The tops of the cut slopes and pad corners may be rounded to improve their appearance.

Initially, the size of the newly constructed pads would range from 5.6 to 6.2 acres (Table 1). The variation in the size of the pads is a function of topography and the number of bottomhole locations targeted. The construction of the 4 pads would result in an estimated 23.7 acres of new short-term surface disturbance; long-term disturbance, which would comprise the “working” area of the pad location during well production phase, would be an estimated 2 acres/pad for total of 8.0 acres.

On each pad, reserve pits would be excavated to contain drilling fluids. Given the variation in the size and dimensions of the proposed well pads and the number of proposed wells that may be drilled at any given location, the size of the reserve pits would vary. In order to safely contain

cuttings and drilling fluids, reserve pits would be constructed to allow for a minimum of two feet of free board between the maximum fluid level and the top of the pit's berm. In addition to the berm, catchments would be excavated around the pits to prevent the infiltration of storm water.

<b>Table 1. Well Pads, Roads, and Pipelines Proposed in the PBGAP.</b>					
<i>Well Pads</i>	<i>Mineral Lease</i>	<i>Legal Description</i>	<i>Surface Ownership</i>	<i>Acres of Disturbance Short-Term</i>	<i>Acres of Disturbance Long-Term</i>
7L	C-23443	T8S R95W, Sec 7, Lots 7, 11	100% Federal	6.0	2.0
7K	C-23443	T8S R95W, Sec 7, Lot 9	100% Federal	5.6	2.0
7O	C-23443	T8S R95W, Sec 7, SWSE	100% Federal	6.2	2.0
18A	C-23443	T8S R95W, Sec 18, NENE	100% Federal	5.9	2.0
<b>Subtotal</b>				<b>23.7 acres</b>	<b>8.0 acres</b>
<i>Roads and Pipelines</i>	<i>Length (miles)</i>				
7L	0.72	T8S R96W, Sec 1, NESE T8S R95W, Sec 7, Lots 7, 11	100% Federal	7.2	2.1
7K	0.49	T8S R95W, Sec 7, Lots 8,9,10	100% Federal	4.9	1.5
7O	0.55	T8S R95W, Sec 7, NWSE, SWSE	100% Federal	6.4	1.7
18A	1.48	T8S R95W, Sec 7, NWSE, E2SE, Sec 18, Lot 5, E2NE	100% Federal	17.5	4.5
<b>Subtotal</b>	<b>3.2 miles</b>			<b>36.0 acres</b>	<b>9.8 acres</b>
<b>TOTAL</b>	<b>3.2 miles</b>			<b>59.7 acres</b>	<b>17.8 acres</b>
<p>Note: The short-term disturbance area for proposed pads and road/ pipeline lengths for each well pad and the long-term disturbance area for roads and pipelines were taken from survey plats provided by DR Griffin &amp; Associates, Inc. of Rock Springs, WY in Jan-Feb 2007. All pipelines would be buried alongside proposed access roads with total width of short-term disturbance for both road and pipelines estimated at 75 feet.</p>					

A fence would be constructed around each pit to prevent access by livestock and reduce the potential for impacts to wildlife. The fence would remain until all wells have been drilled and completed.

After each well is drilled, the fluids would be allowed to evaporate unless an alternative method of disposal is approved. Because multiple wells would be drilled at each pad, the pit would not be reclaimed until all wells have been drilled on each respective pad.

After all wells are drilled, completed, and production facilities are installed at each pad, interim reclamation activities would begin. Generally, cuts would be revegetated and fills would be re-contoured to blend in with adjacent natural slopes and seeded to re-establish vegetative cover. These interim reclamation techniques would result in about a 70% reduction in surface disturbance that would remain over the long-term life of the project (i.e., 20 to 30 years) (see Table 1).

## Proposed Access Roads

In order to provide access to the proposed surface locations, approximately 3.2 miles of new roads are proposed. The existing road network would be extended east from the existing Cass-Garber access road in SWNE of Section 1, T8S, R96W, to the proposed well locations (see Appendix A, Figure 1). The roads would be constructed to meet standards for the anticipated traffic flow and all-weather requirements.

Roads and gathering pipelines would be constructed within a 75-foot disturbance corridor, which would be reduced to 25 foot finished road surface (including bar ditch) after interim reclamation (see Table 1). Bulldozers, trackhoes, and/or road graders would first clear vegetation and topsoil. The road would then be constructed using standard equipment and techniques approved by the BLM, which could include ditching, draining, crowning, surfacing, sloping, and dipping the roadbed as necessary.

The average road grade would be 10% or less, wherever possible. The 10% grade would only be exceeded in areas where physical terrain or unusual circumstances require it. Minimum horizontal curve radii would be 100 feet. Where terrain would not allow a 100-foot curve radius, the curve would be widened. Road and pipeline construction would result in approximately 36 acres of short-term ground disturbance. Following interim reclamation, the long-term surface disturbance associated with roads and pipelines would be approximately 9.8 acres. As summarized in Table 1, total short-term disturbed area for the PBGAP would be 59.7 acres with a long-term disturbance of 17.8 acres.

Where required, drainage crossings would be of the typical at-grade low water crossing (dry creek drainage crossing). Crossings would be designed to minimize excessive sedimentation and the accumulation of debris in the drainage crossing. Water diversions including lead out ditches would be placed at frequent intervals along access roads to prevent the erosion of drainage ditches, as described in the *Surface Operating Standards for Oil and Gas Exploration and Development – The Gold Book* (BLM and USFS 2006). If culverts are proposed, the U.S. Army Corps of Engineers (USACE) recommends design for 100-year flood as opposed to current 25-year flood Gold Book standard. This upgrade is based on the arid terrain and flashy precipitation events on area drainages. Small culverts often become blocked and require extensive maintenance. Such crossings will likely require a Department of the Army permit from the USACE pursuant to Section 404 of the Clean Water Act.

The access roads would be inspected and maintained on a quarterly basis, at a minimum, and could include such actions as:

- grading of the road surface
- cleaning relief ditches, culverts, and cattle guards
- implementing supplemental erosion control measures
- closing roads in periods of excessive soil moisture
- implementing road and slope stabilization measures
- conducting weed control
- applying dust abatement measures

A right-of-way authorization would be required for Noble to use a portion of proposed road crossing Section 1, T8S, R96W—a distance of approximately 1,550 feet. The right-of-way is

necessary because a portion of the proposed road and pipelines would not be within Noble's Federal lease.

#### Proposed Gas Gathering and Water Pipelines

A pipeline network for gas gathering and produced water would be needed to gather and deliver gas offsite to existing trunk pipelines and transport produced water to centralized tank batteries within and outside the project area.

Approximately 3.2 miles of pipelines would be collocated with the access roads and would be buried within the 75-foot access road right-of-way. Because they would be located with proposed access roads, the construction of the 3.2 miles of pipeline would result in no additional disturbance over the long-or short-term. The gas gathering and water pipeline(s) crossing Section 1, T8S, R96W, for 1,550 feet would require a right-of-way authorization from the BLM. If drainages will be crossed by culverts instead of the at-grade low water crossing, a Department of the Army permit will be required.

All pipelines would be buried to a minimum depth of 4 feet from surface to top of pipe. The pipeline trench would be excavated mechanically; pipe segments would then be welded together and tested, lowered into the trench, and covered with excavated material. Generally, a mile of pipeline would be constructed in 4 to 7 days.

Each pipeline would be pressure tested with fresh water and/or nitrogen gas to locate any leaks. Fresh water or nitrogen used for testing would be obtained offsite and transported to the testing location by truck. After testing, the water would be disposed of at an existing offsite evaporation pond facility, or discharged into surface water drainages if approved by the BLM and the State of Colorado. Nitrogen would be vented to the atmosphere if used instead of water.

#### Mitigation Common to All Construction Operations

All trees removed during construction activities would be cut to a maximum stump height of 6 inches, bucked into 4-foot lengths, and either stacked off location or windrowed to serve as silt catchments. Pinyon pine trees would be chipped, buried, or disposed to prevent the spread of the pinyon *Ips* beetle. Rootballs would be buried, placed offsite, or scattered over the disturbed area as part of final reclamation. Other vegetation, such as sagebrush and other shrubs, may be scattered offsite or placed on well pad fills to help screen the pads. Cleared and grubbed juniper trees could be windrowed along toe of pad or road fill slopes, and placed back over pad and pipeline reclamation areas.

#### Drilling and Completion

Up to 32 wells would be drilled as part of the proposed action. Table 2 provides surface and bottomhole locations for the proposed wells and well pads. A total of 20 wells are proposed to be drilled in 2007. When possible, all well bores planned on individual pads would be drilled and completed within one drilling season and the pad reclaimed. If, due to the exploratory nature of this proposal, not all well bores are drilled, Noble may request approval to leave the pad until the following drilling season. Fewer wells may be drilled than are proposed because of geologic and market uncertainties.

Noble's drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, and all applicable rules and regulations. Drilling operation would be conducted

in two phases. The first phase may use a small drilling rig to reach a depth of approximately 1,500 feet, or 50 feet below the base of any freshwater aquifers encountered. This surface hole would be cased with steel casing and cemented in place entirely from a depth of about 1,500 feet to ground level. The surface casing would serve the purposes of providing protection for any freshwater aquifers present and containing pressure that may be encountered while drilling deeper. The BLM would be notified in advance of running surface casing and cement in order to witness these operations. This part of the drilling operation would normally take 2 to 3 days to complete.

Prior to drilling below the surface casing, a Blowout Preventer (BOP) would be installed on the surface casing, and both the BOP and surface casing would be tested for pressure integrity. The BOP and related equipment would meet the minimum requirements of Onshore Oil and Gas Order No. 2, and the BLM would be notified in advance of all pressure tests. Following the use of the surface-hole rig, if used, a larger drilling rig would be used to drill to target depths of about 6,600 to 8,750 feet. A downhole mud motor may be used to increase penetration rate. The rig would pump drilling fluids to drive the mud motor, cool the drill bit, and remove cuttings from the well bore.

In order to achieve borehole stability, minimize possible damage to the formations, provide adequate viscosity to carry the drill cuttings out of the well bore, and reduce downhole fluid losses, various non-toxic chemicals and certain materials may need to be added to the mud system.

For the directional wells, an S-shaped directional design would be used to reach the targeted bottomhole locations. In general, a target radius of 200 feet would be used. Specific directional plans for each well would be included with the APDs. Downhole operations would be done with tools to facilitate proper direction and path of the well.

All well pads would have a lined reserve pit to receive the drill cuttings from the well bore (e.g., shale, sand, and miscellaneous rock minerals) and to contain drilling fluids carried over with the cuttings. No hazardous substances would be placed in the pit.

After drilling the bore to its final depth, logging tools would be run into the well to evaluate the potential hydrocarbon resource. If the evaluation indicates adequate hydrocarbon resources are present and recoverable, steel production casing would be run and cemented into place in accordance with the well design as approved by the BLM and any applicable conditions of approval. The proposed casing and cementing program would be designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. BLM approval is required prior to the use of any isolating medium other than cement.

After production casing has been cemented in place, the drilling rig would be removed, and a completion rig would be moved in. Well completion consists of running a Cement Bond log to evaluate cement integrity and correlate the cased hole logs to the open hole logs. The casing is then perforated across the hydrocarbon producing zones, and the formation is stimulated to enhance the production of oil and gas. The typical method used for stimulation consists of a hydraulic fracture treatment in which sand and non-toxic fluids are pumped into the producing formation with sufficient pressure to fracture the rock formation. The sand serves as a propellant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the well bore.

<b>Table 2. Proposed Wells and Well Pad Locations.</b>				
<i>Lease</i>	<i>Pad</i>	<i>Proposed Wells</i>	<i>Surface Location (T8S, R 95W)</i>	<i>Bottomhole Location (T8S, R 95W)</i>
<b>COC23443</b>	<b>7K Pad</b> <i>8 Wells</i>	Federal 7-23A	Section 7, 1980' FSL& 3049' FWL	Section 7, 2444' FSL, 2771' FWL
		Federal 7-23B	Section 7, 1972' FSL, 3049' FWL	Section 7, 2125' FSL, 2258' FWL
		Federal 7-33A	Section 7, 1964' FSL, 3050' FWL	Section 7, 2469' FSL, 2197' FEL
		Federal 7-33B	Section 7, 1956' FSL, 3050' FWL	Section 7, 2139' FSL, 2195' FEL
		Federal 7-33C	Section 7, 1948' FSL, 3050' FWL	Section 7, 1809' FSL, 2193' FEL
		Federal 7-33D	Section 7, 1940' FSL, 3050' FWL	Section 7, 1479' FSL, 2192' FEL
		Federal 7-34A	Section 7, 1932' FSL, 3050' FWL	Section 7, 1149' FSL, 2189' FEL
		Federal 7-34B	Section 7, 1924' FSL, 3051' FWL	Section 7, 819' FSL, 2187' FEL
	<b>7L Pad</b> <i>4 Wells</i>	Federal 7-12C	Section 7, 2668' FNL, 531' FWL	Section 7, 2140' FNL, 765' FWL
		Federal 7-12D	Section 7, 2668' FNL, 547' FWL	Section 7, 2470' FNL, 763' FWL
		Federal 7-13A	Section 7, 2667' FNL, 579' FWL	Section 7, 2440' FSL, 761' FWL
		Federal 7-13B	Section 7, 2667' FNL& 563' FWL	Section 7, 2110' FSL, 758' FWL
	<b>7O Pad</b> <i>8 wells</i>	Federal 7-43C	Section 7, 1014' FSL, 1911' FEL	Section 7, 1823' FSL, 693' FEL
		Federal 7-43D	Section 7, 994' FSL, 1943' FEL	Section 7, 1493' FSL, 692' FEL
		Federal 7-44A	Section 7, 994' FSL, 1911' FEL	Section 7, 1163' FSL, 690' FEL
		Federal 7-44B	Section 7, 994' FSL, 1927' FEL	Section 7, 833' FSL, 688' FEL
		Federal 7-44C	Section 7, 993' FSL, 1959' FEL	Section 7, 503' FSL, 680' FEL
		Federal 7-44D	Section 7, 993' FSL, 1975' FEL	Section 7, 173' FSL, 671' FEL
		Federal 7-34C	Section 7, 1916' FSL, 3051' FWL	Section 7, 489' FSL, 2187' FEL
		Federal 7-34D	Section 7, 1908' FSL, 3051' FWL	Section 7, 159' FSL, 2185' FEL
<b>COC23443</b>	<b>18A Pad</b> <i>12 Wells</i>	Federal 18-31A	Section 18, 573' FNL, 778' FEL	Section 18, 172' FNL, 2532' FWL
		Federal 18-31B	Section 18, 589' FNL, 777' FEL	Section 18, 546' FNL, 2532' FEL
		Federal 18-41A	Section 18, 572' FNL, 758' FEL	Section 18, 164' FNL, 1205' FEL
		Federal 18-41B	Section 18, 581' FNL, 778' FEL	Section 18, 495' FNL, 1195' FEL
		Federal 18-41C	Section 18, 597' FNL, 777' FEL	Section 18, 825' FNL, 1186' FEL
		Federal 18-41D	Section 18, 605' FNL, 777' FEL	Section 18, 1155' FNL, 1177' FEL
		Federal 18-42A	Section 18, 613' FNL, 777' FEL	Section 18, 1485' FNL, 1168' FEL
		Federal 17-11A	Section 18, 580' FNL, 758' FEL	Section 17, 101' FNL, 186' FWL
		Federal 17-11B	Section 18, 588' FNL, 757' FEL	Section 17, 438' FNL, 186' FWL
		Federal 17-11C	Section 18, 596' FNL, 757' FEL	Section 17, 769' FNL, 186' FWL
		Federal 17-11D	Section 18, 604' FNL, 757' FEL	Section 17, 1092' FNL, 186' FWL
		Federal 17-12A	Section 18, 612' FNL, 757' FEL	Section 17, 1424' FNL, 186' FWL

A natural gas well in this GAP would require about 8 to 10 days to drill and approximately 30 to 60 days to complete. Pads with multiple well bores would be occupied for a more extended period of time, depending on the number of well bores. When possible, all well bores planned on individual pads would be drilled and completed within one drilling season and the pad reclaimed.

## **Production – Operation and Maintenance**

### **Surface Facilities**

Surface facilities at each well pad location would consist of wellheads, separation/dehydration units, and aboveground condensate and produced water tanks with approximately 300- to 400-barrel capacities. Multi-well locations would share production equipment, whenever feasible, to minimize surface occupancy/disturbance. All production equipment would be painted to match the surrounding terrain and located to reasonably minimize visual impact. BLM would select the color for all facilities, including containment rings, at sites associated with Federal surface or with the development of Federal mineral estate.

The production equipment would be fenced to prevent contact with wildlife and livestock. Telemetry equipment would be used to remotely monitor well conditions after a reasonable level of development. The use of telemetry would minimize traffic to and from the well locations. A pumper truck will be required to visit the pads for tank gauging.

Tank batteries would be placed within secondary containment to prevent the offsite migration of accidentally spilled condensate or produced water. Secondary containment would consist of corrugated steel containment berms or earthen berms. Compaction and construction of earthen berms surrounding the tank batteries would be performed to prevent lateral movement of fluids through the utilized materials. Secondary containment would be sized to contain a minimum of 110% of the storage capacity of the largest tank within the berm. All loading lines would be placed inside the containment berm.

Noble Energy intends to use Williams Production RMT Company for their primary “market” pipeline system serving the field associated with the PBGAP. Centralized compression would be provided from existing and planned Williams-owned compression/gathering infrastructure. If production requirements make onsite compression necessary, a Sundry Notice (Form 3160) would be submitted for approval to the authorized officer detailing specifications prior to installation of compressors.

Produced water may be confined to the reserve pit for a period of 90 days after initial production. Produced water at well pads would be transported by truck or buried pipeline to existing water treatment facility and/or trucked offsite to an approved disposal facility. Condensate would be transported to market by tanker trucks.

### **Interim Reclamation**

After completion activities, Noble would reduce the size of the well pad to the minimum surface area needed for production facilities and future workovers, while providing for reshaping and stabilization of cut and fill slopes. In brief, interim reclamation would be accomplished by grading, leveling, and seeding, as recommended by the BLM in the Surface Use Conditions of Approval (Appendix D). Interim reclamation would reduce the disturbed area at each pad to approximately 2.0 acres after well development.

The following is a summary of interim reclamation activities that would take place immediately after well completion:

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

- All pits, cellars, rat holes, and other bore holes not necessary for further lease operations, excluding the reserve pit, would be backfilled immediately to conform to surrounding terrain. Pits, cellars, rat holes, other boreholes required for further lease operations would be fenced.
- Any hydrocarbons in the reserve pit would be removed in accordance with 43 CFR 3162.7. The reserve pit would then be completely dried and all cans, barrels, pipe, etc. would be removed. The accessible portion of pit liner would be removed to the local landfill and the remaining buried part of liner would be backfilled in place with native soils and materials. The backfilling of the reserve pit would be done in such a manner that the mud and associated solids would be confined to the pit and not squeezed out and incorporated into the surface materials. The backfilled pit would be covered with a minimum of 3 feet of overburden. When work is complete, the pit area would support heavy equipment without sinking.
- Areas not necessary for production and future workovers would be reshaped to resemble the original landscape contour. Stockpiled topsoil would be redistributed and disked on the area to be reclaimed and reseeded according to BLM recommendations. In the case of private surface and mineral locations, a seed mixture would be recommended to the landowner.

Interim reclamation would be completed within 90 days from the date of well completion, weather permitting. Dry or non-producing well locations would be plugged, abandoned and reclaimed within 90 days of well completion, weather permitting.

Some locations would require special reclamation practices. These practices could include hydromulching, straw mat application, fertilizing, seedbed preparation, contour furrowing, watering, terracing, water barring, and topsoil replacement. In order to prevent grazing pressure, pads would be fenced for the first two growing seasons or until the seeded species have established.

### **Workovers or Recompletion**

Periodically, the workover or recompletion of a well may be required to ensure that efficient production is maintained. Workovers can include repairs to the well bore equipment (casing, tubing, rods, or pump) the wellhead, or the production facilities. These repairs would usually be completed during daylight hours; however, it may sometimes be necessary to complete repairs at night. The frequency of this type of work cannot be accurately projected because workovers vary well by well. A typical duration for a workover is 7 to 10 days. In the case of multi-well pads, space for equipment would usually be limited to the “working” (i.e., disturbed) area of the surface location, although it is possible that interim reclamation could be delayed by workover operations.

## **Abandonment and Reclamation**

### **Well and Pipeline Plugging and Abandonment**

Upon abandonment, each borehole would be plugged, capped, and its related surface equipment removed. Subsurface pipelines would be 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 Colorado Oil and Gas Conservation Commission (COGCC) standards for

plugging would be followed. The Sundry Notice would include a configuration diagram, summary of plugging procedures, and summary of techniques used to plug the well bore (e.g., cementation).

### **Final Reclamation**

All surface disturbances would be recontoured and revegetated in accordance with the GSEO Reclamation condition of approval (Appendix D). Briefly, this condition sets standards for the successful reestablishment of native vegetation and provides guidelines for seeding rates, seed selection, seedbed preparation, and mulching. One of Noble's goals is to accomplish as much reclamation during the life of the well as possible, even on pads with a large final reclamation or "in use" area. Unreclaimed areas or reclaimed areas that do not meet the objective of 3-to-4 years of sustained reclamation (i.e., operator complete) would undergo the reclamation retreatment measures until the success criteria are achieved.

Noble would restore the well locations and access roads to approximately their original contours. During reclamation of these sites, fill material would be pushed into cuts and over the backslope. No depressions would be left that would trap water or form ponds. Upon completion of backfilling, leveling and recontouring, the stockpiled topsoil would be evenly spread over the reclaimed areas(s). All disturbed surfaces, including temporary topsoil stockpiles, would be reseeded with a seed mixture designated by the operator using the "seed selection menu" as provided in the 2007 GSEO Reclamation condition of approval (Appendix D). The seedbed would then be prepared by disking and roller packing following the natural contours. Seed would be drilled on contours at a depth no greater than 0.5 inch. In areas that cannot be drilled-seeded, seed would be broadcast-seeded at double the seeding rate and harrowed into the soil. Finally, all areas would be mulched with a certified weed-free straw or hay unless erosion control matting is specified. If the seeding is unsuccessful, Noble would be required to make further efforts until the area is reclaimed.

Reclamation would be considered successful when the objectives described in the 1998 Glenwood Springs Resource Area Draft Supplemental Environmental Impact Statement, Oil and Gas Leasing and Development are achieved. To summarize these objectives, revegetation would be considered successful when the following objectives are met:

- 1) Noxious weeds and other undesirable species meet the following standards. If the area adjacent to the project site contains less than a 25% cover of undesirable species, interim reclamation will be considered acceptable when the cover of undesirable species on the project site does not exceed 5%. If the area adjacent to the project site contains a 25% to 50% cover of undesirable species, interim reclamation will be considered acceptable when the cover of undesirable species on the project site does not exceed 10%. If the area adjacent to the project site contains more than a 50% cover of undesirable species, interim reclamation will be considered acceptable when the cover of undesirable species on the project site does not exceed 25%.
- 2) Desirable vegetation appears vigorous and self sustaining. The plants have an opportunity to complete their annual life cycles.
- 3) Adequate diverse vegetation is present and is similar to vegetation found in adjacent undisturbed sites.

## **Weed Management**

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 outlined in the GSEO *Noxious and Invasive Weed Management Plan for Oil and Gas Operators*, which is a condition of approval for the project (Appendix D). 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.

## **THE 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 the APDs associated with the proposed action.

However, the development of 29 Federal wells was previously approved in the PBGAP area. All of these wells have not yet been drilled. Although the development of these wells would not result for the selection of the no action alternative *per se*, impacts to the affected environment will occur from their development (BLM 2006a, 2006b, 2006c, 2006d, 2006e, 2007). These effects provide the basis of comparison to the impacts of the proposed action. This comparison is important because it shows what would happen if the proposed action was not taken.

## **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 (BLM 1984).

Date Approved: Amended in November 1991 - Oil and Gas Leasing and Development – Final Supplemental Environmental Impact Statement; amended in March 1999 – Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement

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

Decision Language: “697,720 acres of BLM-administrated mineral estate within the Glenwood Springs Resource Area are open to oil and gas leasing and development, subject to lease terms and (as applicable) lease stipulations.” This decision was carried forward unchanged in the 1999 RMP amendment (BLM 1999a).

“In areas being actively developed, the operator must submit a Geographic Area Proposal (GAP) that describes a minimum of two to three years activity for operator controlled leases within a reasonable geographic area” (BLM 1999a).

Discussion: The proposed action is in conformance with the 1991 (and 1999) RMP amendments because the Federal mineral estate 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, as such, is in conformance with decision to require operators to submit GAPs.

### SUMMARY OF LEASE AND GRANT STIPULATIONS

Each of Noble's Federal oil and gas leases include stipulations intended to protect natural resource values. Table 3 provides a summary of lease and grant stipulations that would apply to the proposed action.

<b>Table 3. Summary of Lease Stipulations and Rights-of-Way Grants within the PBGAP Area</b>		
<i>Lease Number</i>	<i>Description of Lands Within GAP Area</i>	<i>Lease Stipulations</i>
<b>COC23443 (1976)</b>	<p>ALL LANDS within lease</p> <p>T.8S., R.95W., 6<sup>TH</sup> P.M. Section 6: Lots 9-13</p> <p>Section 7: Lots 5-12, E½, E½NW¼</p> <p>Section 17: W½NW¼NE¼, W½SW¼NE¼, NW¼</p> <p>Section 18: Lots 5-7, E½NE¼</p>	<ol style="list-style-type: none"> <li>1. An Environmental Analysis will be made for the purpose of insuring proper protection of the surface, the natural resources, the environment, existing improvements, and for assuring timely reclamation of disturbed lands.</li> <li>2. Upon complete of Environmental Analysis, the authorized officer shall notify lessee of the conditions to which the proposed surface disturbing operations will take place. Said conditions may relate to:               <ol style="list-style-type: none"> <li>(a) The location of drilling or other exploratory or developmental operations or the manner in which they are to be conducted;</li> <li>(b) The types of vehicles that may be used and the areas in which they may be used; and</li> <li>(c) The manner or location in which improvements such as roads, buildings, pipelines, or other improvements are to be constructed.</li> </ol> </li> <li>3. The plan of operations must assure adequate protection of drainages, waterbodies, springs, or fish and wildlife habitat, steep slopes, or fragile soils. The lessee agrees that during periods of adverse conditions due to climatic factors such as thawing, heavy rains, or flooding, all activities creating irreparable or extensive damage, as determined by the authorized officer, will be suspended or the plan of operations modified and agreed upon.</li> <li>4. Protection of Cultural Resources stipulation requiring cultural resource inventory, submittal of survey report to authorized officer, mitigation requirement concerning protection, preservation, or disposition of any sites discovered. Lessee shall immediately bring to attention of lessor any and all antiquities or other objects of historic or scientific interest...or artifacts discovered as result of operations under this lease and shall leave such discoveries intact until told to proceed by authorized officer.</li> <li>5. Oil Shale Stipulation requiring measures to protect existing oil shale resources on lease.</li> </ol>

### STANDARDS FOR PUBLIC LAND HEALTH

In January 1997, Colorado BLM approved the Standards for Public Land Health. The five standards cover upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. The environmental analysis must address whether the proposed action or alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions relative to these resources.

These analyses are conducted in relation to baseline conditions described in land health assessments (LHAs) completed by the BLM. The proposed action would be located in an area that was included in the Battlement Mesa LHA (BLM 2000). These analyses are presented below.

## AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides a description of the human and natural environment resources that could be affected by the proposed action and no action alternative. In addition, the section presents comparative analyses of the direct and indirect consequences 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. Not all of the critical elements that require inclusion in this EA are present or, if they are present, may not be affected by the proposed action and alternative (Table 4). Only those mandatory critical elements that are present and affected are described in the following narrative. In addition to the mandatory critical elements, additional resources would be impacted by the proposed action and alternative. These are described in the section titled, **Other Affected Resources**.

Table 4. 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 WSAs		X		X
Native American Religious Concerns	X			X					

\* Public Land Health Standard

### **Critical Environmental Elements**

#### **Air Quality**

**Affected Environment:** The proposed action area (i.e., Garfield and Mesa Counties) is described as an attainment area under CAAQS and NAAQS (Colorado Ambient Air Quality Standards and National Ambient Air Quality Standards). 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 RMPA and EIS describe potential effects from oil and gas development (BLM 2006:4-26 to 4-37). A dispersion model analysis was completed with regard to greenhouse gas emissions while near-field and far-field analyses were completed for carbon monoxide, particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), sulfur dioxide, and hazardous air pollutants (benzene, ethylbenzene, formaldehyde, hydrogen sulfide, toluene, and xylenes). Sulfur and nitrogen deposition analysis, acid neutralizing capacity, and visibility screening-level analyses were also completed in the Roan Plateau RMPA and EIS. Estimates of possible future concentrations of these constituents 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 unlikely have adverse effects on air quality.

Garfield County currently is conducting air quality monitoring throughout the County (Rada, personal communication 2007). Data collected to date are preliminary and have not been reviewed for accuracy. Early indications suggest that no single source of contaminants is distinguishable, but that higher quantities of PM<sub>10</sub> (but still within standards) exist in the Rifle and Parachute areas compared to the lower quantities of PM<sub>10</sub> found in the rural areas where oil and gas development is occurring. Generally, levels of volatile organic compounds (VOCs) are low with the exception of acetone, for which no explanation is available at this time. Levels of benzene, toluene, ethylbenzene, and xylenes are roughly equivalent to levels recorded in Glenwood Springs and Newcastle and generally somewhat higher in winter than summer.

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. 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 authorized officer (Appendix D, Number 1).

*No Action Alternative:*

Environmental Consequences: The development of the 29 approved wells would be result in the same type of short-term vehicle and equipments emissions, fugitive dust and VOC emissions as the proposed action. However, the degree of the impact would be less because the 32 new wells described under the proposed action would not be developed.

**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 requires Federal agencies to take into account the effects their actions will have on cultural resources for any endeavor that involves Federal monies, Federal permitting or certification, or Federal lands. Because of this, consideration of the environmental consequences of the proposed action extends to all proposed actions within the PBGAP, whether the surface ownership is Federal or private.

The PBGAP study area covers a total of 2,336 acres. Within this area, seven cultural resource investigations (Glenwood Springs Field Office [GSFO] numbers 1175, 1105-3, 1105-10, 1105-

19, 1106-19, 1107-32 and 14506-3) have been conducted covering the proposed well pads, access roads, pipelines, and seismic lines, and a block inventory area.

One of these studies (1106-19) was a large block survey conducted by Grand River Institute (GRI) specifically for the PBGAP in areas not previously inventoried. This survey resulted in an intensive inventory (Class III survey) of 650 acres. Much of the PBGAP is heavily vegetated or contains slopes greater than 30%. These environmental categories are exempt from Class III survey according to the BLM/SHPO [State Historic Preservation Officer] Colorado Protocol and Colorado BLM Handbook. An additional survey (1107-32) was conducted by GRI for the rerouted access road into the 7L, 7K, 7O, and 18A pad locations. In sum, 38% of the PBGAP acreage has been surveyed after 1990, and all are considered adequate by current standards.

The PBGAP study area includes 29 recorded cultural resources. Of these, four (14.7%) are eligible or potentially eligible for inclusion on the National Register of Historic Places (NRHP) and are considered to be “historic properties.” These properties include three prehistoric open camps and one prehistoric hearth feature. Five (17.9%) are sites considered not eligible and 20 (71.4%) are isolated finds (IF), which by definition are considered ineligible for listing on the NRHP.

*Proposed Action:*

Environmental Consequences: The proposed action has the potential to affect cultural resources identified in the PBGAP study area. For archaeological sites, direct impacts result primarily from disturbance of surface and subsurface sediments. For historic properties with protohistoric or historic structural remains, direct impacts result from damage to or destruction of these structures. Direct impacts are generally concentrated in the development phase of the proposed action, though they can happen any time the ground is subject to alteration. 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 and/or areas of concern (see section on **Native American Religious Concerns**). Direct impacts to historic properties would be avoided by the proposed action, assuming adherence to the mitigation measures proposed in Appendix D (Numbers 2 and 3). Five “not eligible” cultural resources are within or adjacent to areas proposed for pads, access roads, and pipelines and will be directly impacted. Avoidance is not required for these resources as recording is deemed to fulfill the intellectual information inherent in these resources.

The proposed action would alter the environmental setting of the project area from a nearly inaccessible area devoid of development to one with well pads, access roads, and pipelines and the associated dust and noise. New roads and thus new and/or easier access increases the potential for direct, indirect, and cumulative effects which could result in illicit collection to vandalism. 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 PBGAP area will result in degradation of the condition and integrity to most sites due to the potential for increased surface collection, increased casual travel (which may physically impact sites), and to the integrity of setting, location, association, and feeling for which the surrounding landscape is a part of the site’s significance. Mitigation measures designed to reduce these types of impacts are presented in Appendix D (Number 3). Strict adherence to the Education/Discovery Condition of Approval by Noble and all of their subcontractors would avoid or reduce the potential for impacts to cultural resources.

No formal consultation was initiated with the State Historic Preservation Officer (SHPO) for the Class III inventories conducted specifically for this GAP, as all historic properties identified were avoided by various methods including rerouting and/or relocation of facilities. Based on the avoidance of all historic properties the BLM made a determination of “**No Historic Properties Affected**” for the proposed actions within this GAP. This determination was made in accordance with Section 106 of the National Historic Preservation Act as revised (16 U.S.C. 470f), the BLM/SHPO Programmatic Agreement (1997) and Colorado Protocol (1998).

*No Action Alternative:*

Environmental Consequences: Under this alternative drilling and development of 29 previously approved APDs would still occur. No new well pad locations, access roads, or pipelines would be built. This action would reduce the potential for direct, indirect, and cumulative impacts to known and undiscovered cultural resources. The Education/Discovery condition of approval would still apply (Appendix D, Number 3).

### **Invasive Non-Native Species**

Affected Environment: No large populations of invasive non-native species were observed within the PBGAP project site. However, cheatgrass (*Bromus tectorum*) is prevalent throughout the understory of the pinyon-juniper woodland and in many areas of the mountain shrubland. Less common noxious weeds include tamarisk (*Tamarix ramosissima*), houndstongue (*Cynoglossum officinale*), and Scotch thistle (*Onopordum acanthium*), all of which were found along or near Pete and Bill Creek.

*Proposed Action:*

Environmental Consequences: Noxious weed populations are a threat to land health by contributing to loss of rangeland productivity, increased soil erosion, reduced species richness, reduced wildlife habitat quality, and reduced aesthetic quality. 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, heavy machinery and vehicles used by oil and gas personnel have the potential to transport weed seed from other areas. Although no large populations of noxious and invasive weeds are present in the PBGAP project area, they may be present in adjacent oil and gas development areas. Therefore, the potential risk for weed invasion following construction is high. However, the GSEO’s *Invasive and Noxious Weed Management Plan for Oil and Gas Operators* is a condition of approval for this project and would help to limit the spread of noxious weeds (Appendix D, Number 4).

*No Action Alternative:*

Environmental Consequences: Under the no action alternative, additional wells would be limited to existing pads, with no new access roads or pipeline corridors. Therefore, the potential for additional infestations of invasive, non-native species would be limited to the additional vehicular traffic, which can spread weed seeds along access roads.

### **Migratory Birds**

Affected Environment: The PBGAP project area is comprised primarily of pinyon-juniper and Gambel oak woodlands intermixed with mountain shrubs. This diversity of habitat types

provides cover, forage, and nesting habitat for a variety of migratory birds. Historical activities, including gas development, have contributed to habitat fragmentation within the PBGAP area. These activities include the development of 5 existing well pads totaling 12.64 acres of long-term disturbance and 1.6 km (1.9 mile) of road and pipeline along Pete and Bill Creek.

According to the Southern Rockies/Colorado Plateau Birds of Conservation Concern (BCC) list (USFWS 2002) and the Colorado Breeding Bird Atlas (Colorado Bird Atlas Partnership 1998), four species of conservation concern, the pinyon jay (*Gymnorhinus cyanocephalus*), gray vireo (*Vireo vicinior*), black-throated gray warbler (*Dendroica nigrescens*), and Virginia's warbler (*Vermivora virginiae*) could occur in the project area. Other species that are not on the BCC list but are associated with these habitat types 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 (*Poliophtila caerulea*).

The results of one recent habitat assessment and raptor survey indicate that no nests are presently located within a 0.4-km (0.25-mile) buffer of the proposed developments (Wildlife Specialties, L.L.C., 2006). However, the project area offers suitable foraging and nesting habitat for a variety of raptor species.

*Proposed Action:*

Environmental Consequences: The proposed action would result in the development of four new well pads with up to 32 bottomhole locations and associated roads and pipelines in mostly undisturbed avian habitat, causing the direct loss of a maximum of 59.7 acres currently available for foraging and nesting. With interim reclamation, long-term habitat loss would total 17.8 acres. Interim reclamation would provide some benefits but a long-term loss of nesting habitat is likely where woodlands are affected.

In addition to direct habitat loss, the implementation of the proposed action would result in a larger area being impacted due to habitat fragmentation. Fragmentation could alter species composition and abundance. Species that require interior habitat could be displaced, while species that prefer open areas or forest edges could benefit.

Another important mechanism leading a change in breeding bird density and species richness in fragmented habitats is nest predation, which occurs more frequently near forest edges (Dobkin 1994). The most common avian and mammalian nest predators (e.g., American crow, raccoons, and domestic cats) typically occur in higher densities around forest edges (Bider 1968, Whitcomb et al. 1981).

Fragmentation can also increase the risk of nest parasitism by brown-headed cowbirds (*Molothrus alter*), causing declines in local bird populations, including BCC species. These impacts, in conjunction with existing fragmentation and disturbance within and adjacent to the PBGAP area, would reduce the value of the largely intact interior habitat available to migratory birds.

Research indicates that the noise associated with development and production activities can also lead to lower avian diversity and density in both adjacent and distant areas (Forman 2000, Forman and Deblinger 2000). Noise can decrease usable habitat for birds by reducing the distance at which calls made by males are heard, impacting mate selection and reproductive potential.

If vegetation is removed for infrastructure development between April 1 and August 15, direct “take” (i.e., destruction) of active nests could occur. Indirect take (e.g., failure due to abandonment of one or both adults) of nearby nests can also occur as a result of intolerance to disturbance, although reactions vary between bird species. Reactions can range from subtle body changes undetectable to human observers to aggressive defense behavior. Some birds may fly away from the nest, appearing undisturbed, leaving nestlings vulnerable to overheating, chilling, predation, or starvation.

The development of reserve pits in the project area may be expected to attract waterfowl and other migratory birds for purposes of resting, foraging, or as a source of free water. The extent and nature of the problem is not well-defined, but birds should be prevented from contacting with produced water and drilling and completion fluids which may pose a problem (e.g., acute or chronic toxicity, compromised insulation). Mitigation measures to minimize impacts resulting from contact with these fluids are presented in Appendix D (Number 5).

These impacts may result in a short-term decrease in the local populations of some species such as the pinyon jay and Virginia’s warbler, although a loss of species viability within its overall range is not expected. Other species such as the gray vireo and black-throated gray warbler would not be likely to be impacted, because either the project area is on the edge of their geographic range or the scale of habitat loss is relatively minor.

No direct effects to nesting raptors are expected as a result of the proposed action. Upland foraging habitat for raptors is abundant in the area, and the proposed action should not indirectly affect raptor foraging behavior. Raptor nest surveys for the PBGAP area in 2007 did not result in location of raptor nest structures within 0.25 mile of a proposed well pad or 0.125 mile of an access road, pipeline, or other surface facility. Although BLM considers surveys conducted for a NEPA Environmental Assessment to be valid for 5 years, new nests may be built and occupied between the initial surveys and project implementation. To ensure compliance with the Migratory Bird Treaty Act, Noble would be encouraged to initiate construction or drilling activities outside the raptor nesting season (February 1 to August 15) if practicable. If initiation of construction or drilling during these dates cannot be avoided, Noble would be responsible for complying with the Migratory Bird Treaty Act, which prohibits the “take” of birds or active nests (those containing eggs or young), including nest failure caused by noise and human activity (Appendix D, Number 6).

#### *No Action Alternative:*

Environmental Consequences: Under the no action alternative, 29 additional wells would be developed from existing well pads. No direct habitat loss or fragmentation beyond what has already been permitted would result. Impacts to migratory birds would be minimal compared to the proposed action. The greatest increase in disturbance to migratory birds would be related to noise during well development and workovers. These would be localized, short-term events that are not expected to have a negative impact on the breeding population.

#### **Native American Religious Concerns**

Affected Environment: The PBGAP is located within a larger area identified by the Ute Tribes as part of their ancestral homeland. Cultural resource inventories (see **Cultural Resources**) were conducted to determine if there were any areas that might be culturally sensitive to Native Americans. No areas were identified during the inventories and none are currently known by the GSFO within the PBGAP area. Additionally, the Ute Tribe (Northern Ute), Southern Ute, and

Ute Mountain Ute Tribes were notified of the proposed PBGAP on February 14, 2007. No responses, questions, or requests for additional information were received. If new data is subsequently disclosed, new terms and conditions may have to be added to the permit(s) to accommodate their concerns.

*Proposed Action:*

Environmental Consequences: Direct impacts of construction have the potential to irreparably damage or destroy buried culturally sensitive sites. Additionally, impacts that affect the physical setting could result in a loss of what makes an area significant. There may also be other unidentified culturally sensitive or significant locations in the area that have not been identified by the Ute tribes. Direct impacts could occur with unauthorized modification of roads, pipelines, and well pads which may lead to adverse impacts.

The proximity of Native American sites to planned development within the PBGAP area may result in indirect impacts that may adversely impact the significance of the resource by changing the setting, location, association, and feeling. Cumulative impacts of increased development, accesses, construction, operation, and maintenance may also adversely impact these sites, possibly degrading the cultural significance by either destroying the sensitive area or its landscape setting. Impacts to the auditory and visual environment may be of importance in considering values placed on some sites by Native American tribes thus impacting them. Mitigation measures designed to protect resources of potential Native American concern are presented in Appendix D (Numbers 2 and 3).

*No Action Alternative:*

Environmental Consequences: Under this alternative, no new well pad locations, access roads, or pipelines would be built. As a consequence, both known and undiscovered Native American resources would be more protected and the potential degradation of site condition and integrity would be reduced or eliminated. The same conditions of approval developed for these existing well pad locations would remain in effect (Appendix D (Numbers 2 and 3)).

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

Affected Environment:

*Federally Listed, Proposed, or Candidate Species*

According to the latest species list from the U. S. Fish and Wildlife Service (<http://mountain-prairie.fws.gov/endspp/CountyLists/COLORADO.htm>), the following Federally listed, proposed, or candidate plant species may occur within or be impacted by actions occurring in Garfield and Mesa Counties: Uinta Basin hookless cactus (*Sclerocactus glaucus*), Parachute beardtongue (*Penstemon debilis*), and DeBeque phacelia (*Phacelia submutica*).

*BLM Sensitive Plant Species*

BLM sensitive plant species 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*).

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

The U. S. Fish and Wildlife Service list of threatened or endangered species (<http://mountain-prairie.fws.gov/endspp/CountyLists/COLORADO.htm>) for Garfield and Mesa Counties identifies the following listed, proposed, or candidate animal species as potentially occurring in the PBGAP area or potentially being impacted by the proposed action: Canada lynx (*Lynx canadensis*), Mexican spotted owl (*Strix occidentalis lucida*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), razorback sucker (*Xyrauchen texanus*), Colorado pikeminnow (*Ptychocheilus lucius*), bonytail chub (*Gila elegans*), and humpback chub (*Gila cypha*).

Of these species, suitable habitat is present for only two: the razorback sucker and Colorado pikeminnow. For both of these fishes, the Colorado River its 100-year floodplain, located a minimum of approximately 4.2 km (2.6 miles) north of the project area, is Designated Critical Habitat. Ecological information for the two endangered fishes may be summarized as follows:

- Razorback Sucker – The razorback sucker is one of the largest suckers in North America, growing to lengths exceeding 3 feet and weighing up to 13 pounds. Once widespread throughout most of the Colorado River Basin, this species is now found only in the upper Green River in Utah, the lower Yampa River in Colorado, and occasionally in the Colorado River near Grand Junction. The current population is estimated to be about 500 individuals (<http://www.fws.gov/coloradodriverrecovery/Crrpch.htm>). Razorback suckers inhabit large rivers and are not found in smaller tributaries or headwater streams. Adults are associated with backwaters and areas of strong current in depths from 4 to 10 feet.
- Colorado Pikeminnow – The Colorado pikeminnow is the largest minnow in North America, growing to nearly 6 feet in length and weighing up to 80 pounds. It was historically found throughout the entire Colorado River Drainage but is now restricted to the lower reaches of the Green, Yampa, White, Colorado, Gunnison, Dolores and Animas Rivers (Woodling 1985). Within the Colorado River, this fish is found from Palisade, Colorado, downstream to Lake Powell. Adults are found in large, deep eddies, pools, and other areas adjacent to the main current flow; young inhabit shallow, quiet backwater areas off main river channels.

### *BLM Sensitive Animal Species*

BLM sensitive wildlife species with habitat and/or occurrence records in the area include the milk snake (*Lampropeltis triangulum taylori*), midget faded rattlesnake (*Crotalus viridis concolor*), and Great Basin spadefoot (*Spea intermontana*). In addition, three BLM sensitive fish species—the flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), and roundtail chub (*Gila robusta*)—are known to inhabit the Colorado River. Habitat requirements and known distribution information for these species are as follows:

- Milk Snake – The milk snake occurs in a wide variety of habitats in Colorado, including shortgrass prairie, sand prairie, shrubby hillsides, canyons, open stands of ponderosa pine, pinyon-juniper woodland, and arid river valleys (Hammerson 1999). Although the subspecies likely to be found in Garfield and Mesa Counties is the Utah milk snake, the species is listed as sensitive throughout Colorado.
- Midget Faded Rattlesnake – The midget faded rattlesnake is a small, pale-colored subspecies of the common and widespread western rattlesnake (*Crotalus viridis*). Recent genetic work suggests that this is a separate species; Hammerson (1999) reports that

rattlesnakes from Mesa, Delta, and Garfield counties are characteristic of *C. v. concolor*. The midget faded rattlesnake is endemic to a small area of southwestern Wyoming, northwestern Colorado, and adjacent Utah, including Garfield and Mesa Counties. Suitable habitats include sandy and rocky areas in pinyon-juniper and semi-desert shrub (Hammerson 1999). Because of the rugged topography, this species could be encountered at any location throughout the PBGAP area.

- Great Basin Spadefoot – This species is found in rocky canyons, broad dry basins, and stream floodplains scattered throughout northwestern Colorado. It is inactive most of the year, emerging from the substrate of seasonal ponds or ephemeral streams to breed and feed during periods of protracted surface moisture.
- 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 in 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 river runs, while juveniles concentrate in eddies.

*Proposed Action:*

Environmental Consequences:

*Federally Listed, Proposed, or Candidate Plant Species*

During biological surveys conducted on September 11 and 12, 2006, no individuals, populations, or suitable habitat for any Federally listed or candidate plants were found in the PBGAP area.

- Uinta Basin Hookless Cactus – Federally listed as threatened, this species is limited to desert shrub community types that do not occur in the PBGAP project area.
- Parachute Beardtongue – This species, a Federal candidate species, is limited to steep, white shale talus of the Parachute Creek Member of the Green River Formation. This habitat type does not occur in the PBGAP area.
- DeBeque Phacelia – Also a Federal candidate species, the DeBeque phacelia is limited to sparsely vegetated steep clay slopes on Atwell Gulch and Shire Members of the Wasatch Formation. Although the Shire Member of the Wasatch Formation is mapped on a portion of the project site (Donnell et al. 1986, 1987), and outcrops of this formation do occur north of Pete and Bill Creek, appropriate habitat was not found during surveys and is not likely present because the project appears to be out of the known range of the species. The nearest known populations of DeBeque phacelia occur approximately 6.2 miles southwest of the project area (CNHP, 2006). In addition, the PBGAP generally lies

almost entirely at elevations above the known elevation range for the species (i.e., 4,700 to 6,200 feet).

Based on the above, the proposed action would have “**No Effect**” on any Federally listed, proposed, or candidate plant species.

#### *BLM Sensitive Plant Species*

Six BLM sensitive plant species are listed as being potentially present or have been found on lands administered by the Glenwood Springs Field Office within Garfield County. These include the DeBeque milkvetch (*Astragalus debequaeus*), Naturita milkvetch (*Astragalus naturitensis*), adobe thistle (*Cirsium perplexans*), Piceance bladderpod (*Lesquerella parviflora*), Roan Cliffs blazing star (*Mentzelia rhizomata*), and Harrington’s penstemon (*Penstemon harringtonii*). Potential habitat was found to be present in the project area for the Roan Cliffs blazing star and the Piceance bladderpod, although no individuals or populations of either species have been found during onsite surveys.

The Roan Cliffs blazing star and Piceance bladderpod are known to occur on shale talus slopes of the Green River Formation. This formation is present within the PBGAP area, southeast of proposed pad 18A; however, the proposed action would not directly impact this area. The nearest known location of Roan Cliffs blazing star is approximately 7 miles north of the PBGAP area. This species is known to occur in the Glenwood Springs Field Office, north of I-70. The nearest known location of Piceance bladderpod is located approximately 32 miles north of the PBGAP area. This species has never been found in the Glenwood Springs Field Office. No potential habitat was identified for the remaining BLM sensitive plant species.

While no direct impacts to BLM sensitive plants are anticipated, indirect impacts to the habitat could result from noxious weed invasion following soil disturbing activities in the project area. Appendix D (Numbers 4 and 7) lists mitigation measures intended to control or reduce the risk of weed infestations.

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

None of the species listed above, or their habitat, and no state-listed species or their habitat, occurs within the project boundaries. However, Designated Critical Habitat for the following two endangered fish species is located near the PBGAP boundary.

- Razorback Sucker and Colorado Pikeminnow – Both the development and operational phases of the proposed action would increase the potential for soil erosion and sedimentation and for chemical pollutants of surface waters. The mitigation measures presented in Appendix D (Numbers 1, 7, and 8) would reduce that potential. Although a minor temporary increase in sediment transport to the Colorado River may occur, it is not likely that the increase would be detectable above current background levels. In any case, all of these Federally listed fishes are adapted to naturally high sediment loads. Therefore, the proposed action would have “**No Effect**” on the razorback sucker or Colorado pikeminnow.

#### *BLM Sensitive Animal Species*

BLM sensitive wildlife species with habitat and/or occurrence records in the area include the milk snake, midget faded rattlesnake, Great Basin spadefoot (toad), flannelmouth sucker, bluehead sucker, and roundtail chub.

- Milk Snake, Midget Faded Rattlesnake, and Great Basin Spadefoot – Direct effects on these species could include injury or mortality as a result of construction, production, and maintenance activities. These effects would be most likely during the active season for these species, which are April to October for the milk snake, March to October for the midget faded rattlesnake, and May through September for the Great Basin spadefoot. Indirect effects for the two snake species could include a greater susceptibility to predation if the road or pad is used for temperature regulation. The potential for injury or mortality as a result of vehicles traveling on new roads and pads would increase for individuals of all three species. However, the potential for effects is low and impacts at the population level are not expected.
- Flannelmouth Sucker, Bluehead Sucker, and Roundtail Chub – Although minor temporary increases in sediments may occur, they are unlikely to be detectable above background levels. For this reason, and because the flannelmouth sucker, bluehead sucker, and roundtail chub are adapted to high sediment loads, the proposed action would not be expected to adversely affect these species. Mitigation measures in Appendix D (Numbers 1, 7, and 8\_ would be implemented to minimize sedimentation of the Colorado River and tributary streams and the potential for discharges of chemical pollutants.

*No Action Alternative:*

Environmental Consequences:

*Federally Listed, Proposed, or Candidate and BLM Sensitive Plant Species*

Under the no action alternative, oil and gas development would be limited to existing pads, access roads, and pipelines. Consequently, impacts to potential habitat for special status plant species would be limited to those associated with current conditions and land uses, including grazing of livestock and ongoing oil and gas activities. Increased vehicle and equipment operations would be likely to create additional fugitive dust from access roads. However, because no special status plants have been found within the PBGAP area, the increased dust emissions would not affect any of these species.

*Federally Listed, Proposed, or Candidate Animal Species*

The no action alternative would have “**No Effect**” on the razorback sucker or Colorado pikeminnow, because continued development of approved wells on existing pads would not increase erosion and sediment loading over naturally occurring levels.

*BLM Sensitive Animal Species*

Impacts to BLM sensitive wildlife species under the no action alternative would be negligible due to the small scope of development.

Analysis on the Public Land Health Standard for Special Status Plant and Animal Species and their Habitats. The PBGAP is part of the Battlement Mesa landscape. The BLM conducted the Battlement Mesa Area Land Health Assessment in 2000 (BLM 2000). The assessment

concluded that Standard 4 was being met for all species of concern. Perennial grasses and forbs were common, and cheatgrass was not abundant. The landscape appeared to be providing enough quality habitats to sustain the limited number of special status species with potential habitat occurring in the area.

The proposed action would increase natural gas development and further fragment habitat, reduce habitat connectivity, and reduce habitat patch size within the Battlement Mesa landscape. When considered in conjunction with natural gas development that has occurred since the LHA, this Federal action could contribute to a declining trend and reduce the potential for Standard 4 to meet or maintain certain threatened, endangered, and BLM sensitive species over the long term.

The assessment also concluded that Standard 4 is currently being met for Harrington's penstemon, but populations are at risk due to unavoidable direct losses of the plant, and indirect effects of concentrated livestock trampling, competition from increased numbers of noxious weeds and other non-native plants, and habitat loss.

However, because potential habitat for BLM sensitive plant species will not be directly impacted in the PBGAP project area, and indirect impacts to BLM sensitive species habitat will be minimal, the proposed action will have very little effect on BLM sensitive species. Because there is no potential habitat for Federally listed, proposed, or candidate plant species, the proposed action would not affect on these species. Therefore, the proposed action should not result in a failure of the area to achieve Standard 4 for special status plant and animal species.

### **Wastes, Hazardous or Solid**

Affected Environment: A variety of wastes would be generated during drilling, well completion, and post-completion operations. Hazardous materials would also be used on site. These wastes and hazardous materials are described below.

During drilling operations, drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) and drilling fluids (mud) will be generated and contained in the reserve pit. The mud, primarily bentonite clay, is amended as necessary with various chemicals in order to achieve borehole stability, minimize possible damage to the formation, provide adequate viscosity to carry the drill cuttings out of the wellbore, and reduce downhole fluid losses.

During well completion operations, liquid hydrocarbons and produced water will be stored in tanks on the location. As described below, these materials will be taken offsite for proper disposition during post-completion operations, or as required during well completion operations. Other solid wastes associated with drilling and well completion would include human waste and trash. Portable, self-contained chemical toilets will be provided for human waste disposal. Upon completion of operations, or as required, the toilet holding tanks will be pumped and contents therein disposed of in an approved sewage disposal facility. Sewage disposal will be in strict accordance with Colorado State rules and regulations regarding sewage treatment and disposal. All garbage and non-flammable waste material will be contained in a self-contained, portable dumpster or trash cage. Upon completion of operations, or as needed, the accumulated trash will be hauled offsite to a State of Colorado approved sanitary landfill.

During post-completion operations, a separation/dehydration unit will be used to remove condensate (liquid hydrocarbon) from the gas, and aboveground tanks will be used to contain the gas condensate and additional produced water. Produced water would be transported by tanker

trucks to existing nearby water treatment facilities in the near vicinity of the Project Area and/or trucked offsite to an approved disposal facility. The produced water may be collected directly at the well pad, or from centralized tank batteries within and outside the Project Area. Fiberglass pipe would be used to transport the produced water from the well pad to the tank batteries. Gas condensate would be transported to market by tanker trucks.

Last, a variety of materials typical of oil and gas development could be at the site during construction and operations including: lubricants, diesel fuel, gasoline, solvents, and hydraulic fluids. Hazardous materials which may be found at the site may include drilling mud and cementing products, which are primarily inhalation hazards, and materials that may be necessary for well completion/stimulation activities such as flammable or combustible substances and acids/gels (corrosives).

Hazardous materials are defined by the BLM 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 U.S.C 9601 et seq., and its regulations. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 U.S.C 9601 et seq., and its regulations. The term 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 U.S.C. 9601 (14), nor does the term include natural gas. All hazardous and Extremely Hazardous Substances and commercial preparations will be handled in an appropriate manner to minimize the potential for leaks or spills to the environment.

The Environmental Protection Agency (EPA) has exempted certain waste materials generated in oil and natural gas exploration and production from regulation as hazardous wastes (USEPA 1988). To classify as exempt waste, these materials must be intrinsic or uniquely associated with the production of oil and natural gas. Examples of these exempt wastes include produced water, drilling fluids, and drill cuttings. Although specifically exempted from regulation 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:

Potential impacts from waste generation and hazardous material use on the PBGAP project area include potential releases to the environment of well cutting and drilling muds, produced water, gas condensate, and fuels, lubricants and other potentially hazardous products.

On each pad, reserve pits would be excavated to contain well cuttings and drilling muds. Drilling muds may contain small concentrations of a variety of contaminants, including mercury, cadmium, arsenic, and hydrocarbons, which could adversely effect soil and water resources. In order to safely contain cuttings and drilling muds, reserve pits would be constructed to allow for a minimum of two feet of free board between the maximum fluid level and the top of the berm around the pit. In addition, the reserve pit would be designed to prevent the collection of surface runoff by constructing it with a minimum of one-half the total depth below the original ground level at the lowest point within the pit.

Last, to prevent leakage the reserve pit contents to the subsurface, the reserve pit would be lined with 12-millimeter (mm) reinforced UV and hydrocarbon resistant synthetic liner with a

permeability greater than or equal to  $1 \times 10^{-7}$  cm/sec. The top of the liner would be buried in the pit berms, and if hard rocks are present in the pit, bedding material may be installed to protect the liner material. After well completion, 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. The cuttings would then be buried in place. Backfilling of the pit would be performed in a manner to confine the mud in the pit and avoid incorporating the mud with surface soils.

Produced water and gas condensate will be stored in separate tanks at the pad. The tanks would have 300- to 400-barrel capacities. The produced water may also be transported by buried fiberglass pipe to a centralized tank battery. Produced water is typically high in salinity and may contain other contaminants. Gas condensate, which resembles light crude oil, is composed of hydrocarbons in a liquid state. Potential releases of produced water and gas condensate could occur from tanking, piping, and transport trucks. This could be the result of an accident, or tank/piping failure.

Tank batteries for the storage of produced water and gas condensate would be placed in secondary containment to prevent migration of contaminants offsite. These may consist of either corrugated steel surrounds, earthen berms, or both. In the event of an accidental release, produced water and condensate would be confined for clean-up in the secondary containment area and would not migrate to surrounding soils and water. Secondary containment would be sized to contain a minimum of 110% of the storage capacity of all tanks within the berm. Also, all loading lines would also be placed inside the containment berm.

In order to minimize the potential for leakage of produced water from the transport lines to the offsite tank batteries, the water lines will be designed to operate at 400 pounds per square inch (psi), be tested to 750 psi with fresh water, and have a burst pressure of 2,800 psi.

Fuels, lubricants and other hazardous materials would be temporarily stored in transportable containment trailers or tanks on the proposed well pads. All hazardous materials would be handled in an appropriate manner to minimize the potential for leaks or spills to the environment.

Any release (leaks or spills) of hazardous substances in excess of the reportable quantity, as established by 40 CFR Part 117, be it a result of an accident or tank/piping failure, would be reported as required by the CERCLA of 1980, as amended. In addition, all releases to soil or water of 10 gallons or more of any substance would be immediately reported verbally to the BLM and proof of cleanup provided for the project record. Noble would implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize potential impacts from unintentional releases. Spill reporting and cleanup would be applicable to all stages of the project including drilling, completion, operation, and abandonment of the wells.

In consideration of these precautionary measures, impacts to human health and natural resources from the accidental release of solid or hazardous wastes is considered remote. See Appendix D (Number 9) for a description of pertinent mitigation measures.

*No Action Alternative:*

Environmental Consequences: Potential impacts of the no action alternative would be similar to the proposed action. However, the no action alternative is associated with a much smaller number of new wells, with proportionally less potential for environmental impacts associated with the release of hazardous or solid wastes.

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

### Affected Environment:

#### *Surface Water*

Existing pads and roads are within the 4,486 acre Pete and Bill Creek sub-watershed while the majority of the proposed new activities are within the 2,242 acre Spring Creek sub-watershed with a small portion of proposed new road within the 17,893 acre Colorado River below Rifle Creek sub-watershed (Appendix A, Figure 3). Major drainages within the project area include the ephemeral to intermittent Pete and Bill Creek and several ephemeral tributaries to Spring Creek. Pete and Bill Creek is characterized as a high gradient, slightly sinuous, moderately entrenched stream with channel widths from 10 to 15 feet at bank-full conditions. The tributaries to Spring Creek vary in width from 1 to 4 feet at or near the proposed road crossings and increase in size downstream of the PBGAP project area. Both of the drainages are directly tributary to the Colorado River southwest of the town of Parachute and are influenced heavily by seasonal storm and snowmelt runoff.

According to the *Stream Classifications and Water Quality Standards* (CDPHE, Water Quality Control Commission) (<http://www.cdphe.state.co.us/regulations/wqccregs/37tables12007.pdf>), Spring Creek and Pete and Bill Creek are within the Lower Colorado River Basin stream segment 2 that includes all tributaries to the Colorado River from immediately below the confluence with Parachute Creek to immediately above the confluence with the Gunnison River,

Segment 2 is classified aquatic life warm 1, recreation 1a, water supply, and agriculture. Aquatic life cold class 2 refers to waters not capable of sustaining a wide variety of coldwater or warmwater biota due to habitat, flows, or uncorrectable water quality conditions. Recreation class 2 refers to waters that are not suitable or intended to become suitable for primary contact recreation. The water supply class refers to waters suitable or intended to become suitable for potable water supplies. The agriculture class refers to waters that are suitable for irrigation or livestock use.

The State of Colorado has developed a *303(d) List of Water Quality Limited Segments Requiring TMDLS* (CDPHE, Water Quality Control Commission, Regulation No.93) identifying stream segments that are not currently meeting water quality standards with technology based controls alone. Spring Creek and Pete and Bill Creek are within the Lower Colorado River Basin segment COLCLC02, which is listed as impaired due to sediment and has been given medium priority for remediation and protection by the State of Colorado.

#### *Waters of the U.S.*

All of the major and minor streams as depicted in Figure 3 (Appendix A) would be considered waters of the U.S. as defined by Section 404 of the Clean Water Act (33 CFR part 328) and are regulated by the USACE. These streams have a defined bed and bank that vary in width from 1 to 15 feet and are tributary to the Colorado River. As described in the “Wetlands and Riparian Zones” section below, these streams generally lack any wetland development, although scattered hydrophytes (plants of wet places) and riparian plants (species found along stream corridors) do occur. One small wetland seep occurs in the northern portion of the PBGAP project area; however the seep appears to be isolated and therefore is not expected to be regulated by the USACE.

### *Groundwater*

Groundwater resources in the PBGAP area are located within alluvium along shallow stream channels and in perched zones within the Wasatch Formation. Although the Mesaverde Group contains some water-bearing intervals (Glover et al. 1998), the depth to the top of the Mesaverde Group beneath the project area is more than 5,000 feet below ground surface (bgs). Therefore, these water-bearing zones are too deep to be considered aquifers. See Appendix D (Number 10) for detailed mitigation requirements.

The PBGAP is not located within a designated ground water basin or ground water management district. No permitted domestic water wells were identified in the PBGAP (CDWR 2007). Permitted wells likely to be used as a domestic water supply are present west of the PBGAP in Section 1 of T8S, R96W.

### *Proposed Action:*

#### *Surface Water*

Environmental Consequences: Potential impacts to surface water associated with the proposed action include increased sedimentation of streams due to changes in channel morphology resulting from road and pipeline crossings and increased sedimentation from nearby sediment sources such as roads, pads, and pipeline corridors. There is also a potential for water quality degradation through possible contamination by drilling fluids, produced water, or condensate. See Appendix D (Numbers 1, 7, and 8) for mitigation measures specific to the protection of surface water resources.

Although surface waters would be most susceptible to sedimentation over the short-term, access roads would remain in place over the life of the well (i.e., 20 to 30 years) and would transport runoff during precipitation events. Sedimentation and channel degradation associated with roads would be reduced through the implementation of Best Management Practices (BMPs) and other preventative measures. As proposed, these measures would include limiting cut slope gradient, bench cuts, limiting road grade to 10%, crowning road surfaces, and installing culverts and drainage features.

Other elements of the proposed action are designed to mitigate risks to surface waters associated with the release of drilling fluids, produced water, and condensate. The reserve pit used to contain drilling fluids would be lined with an impermeable material designed to prevent infiltration into surrounding soils. Once completion operations are implemented, excess fluids would be allowed to evaporate, and backfilling of the pit would be performed in a manner that would avoid mixing the drilling slurry with surrounding soils.

Tanks used to store produced water and condensate would be placed in secondary containment to prevent offsite release. In the event of an accidental release, produced water and condensate would be confined for cleanup in a containment area that would prevent migration to surrounding soils or surface waters. Pipelines associated with the transport of these liquids would be pressure tested to detect leakage prior to use.

Through the use of the BMPs associated with construction activities, prompt interim reclamation, and the implementation of the preventative measures associated with the treatment of fluids, impacts to surface waters would be minimized and should be minor.

## *Waters of the U.S.*

Environmental Consequences: 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. Department of the Army permits are required for both permanent and temporary discharges. However, at-grade low water crossings are generally exempt from permitting unless the low water crossing involves the placement of rip-rap or other structures into the stream channel (Nall, personal communication). Installation of culverts into waters of the U.S. would be considered an impact that would require a USACE permit. As illustrated by Figure 3 (Appendix A), the proposed roads to pad 7O and pad 18A involve the crossing of 13 waters of the U.S. These are generally very narrow (1-to-2-foot-wide) ephemeral channels that drain into Spring Creek. As a standard condition of approval, Noble would obtain all necessary USACE permits prior to working in these drainages (Appendix D, Number 8).

It should be noted that the USACE recommends designing the drainage crossings for 100-year flood events due to the flashy nature of the area drainages and anticipated culvert maintenance. In addition, due to the proximity of the Spring Creek drainage to the Colorado River, rip rap and revegetation practices should be used to stabilize road fills at crossings. Improperly designed drainage crossings, in particular undersized culverts and poorly aligned culverts, could result in channel degradation that may include: excessive bank erosion at culvert outlets, ponding of flows and excess sedimentation at culvert inlets, and channel scour both at inlets and outlets. The standard conditions of approval listed in Appendix D (Numbers 1, 7, and 8) would be implemented to protect waters of the U.S.

## *Groundwater*

Environmental Consequences: Potential impacts to groundwater resources following implementation of the proposed action include contamination of groundwater from drilling fluids or petroleum constituents. Isolation of water-bearing formations during the installation of production casing would be required to minimize the potential for adverse effects. Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected, and the presence of these zones reported to the BLM and Colorado Oil and Gas Conservation Commission (COGCC).

To accommodate protection and isolation of usable water zones, 8 5/8-inch surface casing would be set at 1,500 feet, below the average depth of known aquifers. Cement would be circulated to surface to assure an adequate seal between the pipe and the rock formations. The 4½-inch production casing would be set at total depth of the well, and cement volumes will be sufficient to fill the annulus between the rock formations and the exterior of the casing to 200 feet above the Mesaverde Formation (for additional information, see **Geology and Minerals**).

If a water-bearing, gas productive, lost circulation or pressured zone is encountered, cement volumes will be adjusted to isolate the zone or zones. This configuration is designed to prevent accidental contamination or leakage of hydrocarbons or fracturing fluids from reaching usable water or other productive zones within the wellbore. No domestic groundwater wells exist within the PBGAP area; the nearest wells are located to the west. These wells are not expected to be impacted by the proposed action. Appendix D (Number 10) presents mitigation measures, to be attached to APDs as conditions of approval, intended to protect groundwater resources.

*No Action Alternative:*

*Surface Water*

Environmental Consequences: Potential impacts to surface waters would be generally similar to the proposed action except at a smaller scale because all of the new wells would be on existing pads. Because the no action alternative would involve no additional surface area of pads, roads, or pipelines, incremental impacts to surface waters from transport of sediments would be minor. The BMPs used to control stormwater runoff, soil erosion, and sediment transport already in place would continue to be applied.

*Waters of the U.S.*

Environmental Consequences: Under the no action alternative, no new roads or pipeline corridors would be constructed. Consequently, no additional impacts to waters of the U.S. from crossings of drainages would occur, and hence no USACE Section 404 permits would be required.

*Groundwater*

Environmental Consequences: Because the same protective measures would be employed for new wells under the no action alternative as for existing wells and for new wells under the proposed action, the potential for impacts to groundwater would be similar. However, the potential would be substantially less under the no action alternative than under the proposed action because of the much smaller number of total wells to be drilled.

Analysis on the Public Land Health Standard No. 5 for Water Quality. With the implementation of BMPs, the use of proposed protective measures, and applicable conditions of approval (Appendix D, Number 1, 7, 8, and 10), neither the proposed action or the no action alternative would likely prevent water quality standards from being met.

**Wetlands and Riparian Zones (includes an analysis of Public Land Health Standard 2)**

Affected Environment: As mentioned above, the PBGAP project area is dissected by one major drainage—the ephemeral to intermittent Pete and Bill Creek—as well as several small tributaries to Spring Creek. No mapped Federal Emergency Management Agency (FEMA) floodplains are present within the project area; however, each of the streams in the PBGAP area does have a small floodplain that varies in size depending on local topography and stream flow. Figure 3 (Appendix A) illustrates the location of these streams on the PBGAP project area.

No riparian habitat is present within the project area, and only one known small, isolated wetland associated with a seep north of Pete and Bill Creek. Two springs are mapped on the United States Geological Survey (USGS) 7.5-Minute Topographic Quadrangle map that includes the project area. However, these springs were not visited, and the extent of hydrophytic vegetation around them is not known. In general, it appears that wetland and riparian plant development has been naturally precluded from Pete and Bill Creek by its extremely incised banks (as much as 15 to 20 feet high) and its susceptibility to flash flood events. Nevertheless, a few isolated riparian/wetland trees and shrubs do occur, including plains cottonwood (*Populus deltoides*) and sandbar willow (*Salix exigua*), as well as the non-native and invasive tamarisk.

Upland vegetation along Pete and Bill Creek dominated by Utah juniper (*Juniperus osteosperma*), basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), rubber rabbitbrush

(*Chrysothamnus nauseosus*), and greasewood (*Sarcobatus vermiculatus*), along with herbaceous plants such as gray aster (*Eucephalus glaucus*), a rhizomatous forb that often blankets the steep sideslopes, goldenrod (*Solidago* sp.), and muhly (*Muhlenbergia* sp.). Herbaceous noxious weeds such as houndstongue, Scotch thistle, and cheatgrass are present as well. At the time of assessment in mid-September 2006, portions of Pete and Bill Creek had a small trickle of water.

The small wetland seep which occurs just north of Pete and Bill Creek (UTM NAD 83 Z12 0754902mE 4363853mN) contains an overstory of plains cottonwood and a dense understory of common reed (*Phragmites australis*), both of which are wetland indicator species. Upland plants such as skunkbrush sumac (*Rhus trilobata*) and goldenrod also occur. At the time of assessment in mid-September 2006, no surface water was present at this small seep.

No Surface Occupancy (NSO) and Controlled Surface Use (CSU) stipulations are commonly used to protect riparian and wetland zones for new oil and gas leases. Although the leases granted for the PBGAP project area do not have these specific stipulations, Federal Lease COC23443 includes the following language:

“The plan of operations must assure adequate protection of drainages, waterbodies, springs, or fish and wildlife habitat, steep slopes, or fragile soils.”

*Proposed Action:*

Environmental Consequences: The proposed action would result in temporary impacts to streams at 13 locations associated with either at-grade low water crossings and/or the installation of drainage culverts for road crossings and collocated pipelines. See section on **Water Quality, Surface and Ground**. Appendix D (Number 1, 7, and 8) includes measures intended to protect streams and associated riparian or wetland vegetation. FEMA mapped floodplains would not be impacted by the proposed action, and no wetlands or riparian habitats would be impacted

*No Action Alternative:*

Environmental Consequences: Floodplains, wetlands, and riparian habitats would not be affected by the development of approved wells on the existing pads

Analysis on the Public Land Health Standard No. 2 for Riparian Systems. A Land Health Assessment was completed for the Battlement Mesa Area which included the PBGAP project area (BLM, 2000). None of the streams within the project area was assessed for Standard No. 2 for riparian systems. However, the North Fork of Pete and Bill Creek and Dry Creek, both located directly north of the project site, were analyzed. The North Fork of Pete and Bill Creek was found to be “functioning at risk” with an upward trend due to an irrigation diversion from Dry Creek which has altered its natural hydrologic regime. During the Land Health Assessment, Dry Creek was found to be in “proper functioning condition” (BLM 2000). Neither the proposed action or the no action alternative would effect the functioning condition of these streams.

### **Other Affected Resources**

In addition to the critical elements, the resources presented in Table 5 were considered for impact analysis relative to the proposed action and no action alternative. Resources that would be affected by the proposed action and no action alternative are discussed below.

**Access and Transportation**

Affected Environment: Interstate 70 provides regional access through Garfield County to the PBGAP project area. Primary access would be provided from I-70 at the Parachute exit. Secondary access to the sites would be provided by an existing I-70 frontage road, continuing to the Parachute-Una Road, along Spring Creek Road and then along County Road 306 (CR 306). CR 306 is an unpaved road extending southeast for approximately three miles, looping back to Spring Creek Road. The road crosses private lands for which the public has no legal access, including a private parcel (Duncan). Existing CR 306 is open for public use, and is considered suitable by the county for use by drilling, construction and operations traffic. Typically, traffic volume on CR 306 is moderate to light.

From CR 306, an existing private road extends approximately 0.7 miles and provides access to the PBGAP area across a new road segment on Duncan property.

**Table 5. Other Resources Considered in the Analysis**

<i>Resource</i>	<i>Present</i>		<i>Affected</i>		<i>Resource</i>	<i>Present</i>		<i>Affected</i>	
	Yes	No	Yes	No		Yes	No	Yes	No
Access and Transportation	X		X		Realty Authorizations	X		X	
Cadastral Survey		X		X	Recreation	X		X	
Fire/Fuels Management	X			X	Socio-Economics	X		X	
Forest Management		X		X	Soils	X		X	
Geology and Minerals	X		X		Vegetation	X		X	
Law Enforcement		X		X	Visual Resources	X		X	
Noise	X		X		Wildlife, Aquatic	X		X	
Paleontology	X		X		Wildlife, Terrestrial	X		X	
Range Management	X		X						

*Proposed Action:*

Environmental Consequences: Under the proposed action, substantial increases in the volume of both heavy and light traffic would occur. The greatest increase would be during the construction, drilling and completion phases of the project. Assuming that wells would take 12 to 15 days to drill and 30 to 45 days to complete, it can be estimated that the development of each well would require approximately 1,070 to 1,080 truck trips and 88 to 90 tractor trailer trips on CR 306 and the access roads from I-70. If all 32 proposed wells are eventually developed, a total of approximately 34,240 to 34,560 truck trips and 2,816 to 2,880 tractor trailer trips would occur over a 2- to 3-year period. This traffic would be in addition to the approximately 31,000 truck trips and 2,600 tractor trailer trips expected to develop the 29 previously permitted wells.

Once the wells are completed, the volume of traffic would decrease dramatically. During the 20- to 30-year operations phase of the project, project-related traffic would be limited to a weekly visit to each well pad for inspection and maintenance. Tanker trucks would remove condensate

from the storage tanks on the well pads at rates ranging from twice per day to once per week. Each well may be recompleted once per year, requiring approximately three to five truck trips per day for approximately seven days.

Traffic on CR 306 could be affected. Increased development traffic may cause temporary conflicts with normal traffic, including travel delays and increased vehicle collision rates. Degradation of the road surface may occur due to heavy equipment travel and fugitive dust and noise would be created.

*No Action Alternative:*

Environmental Consequences: Because of the smaller scale of development under the no action alternative, a smaller volume of traffic would be required to implement the developments that were previously authorized. However, this traffic would be substantial under the no action alternative, including an estimated 31,000 truck trips and 2,600 tractor trailer trips to complete the construction, drilling, and completion phases of the previously authorized wells.

## **Geology and Minerals**

Affected Environment: The PBGAP project area is located within the southern Piceance Basin. The Piceance Basin is a broad, asymmetric structural basin located western Colorado within the geomorphic region of the Colorado Plateau. The Colorado Plateau area is composed of generally flat-lying, sedimentary strata from Tertiary to Paleozoic age with minor amounts of igneous and metamorphic rock; in the area east of the PBGAP area, predominantly Tertiary basaltic flows and intrusions. The Piceance Basin trends southeast-northwest and contains over 20,000 feet of Cambrian through Tertiary strata. The basin is flanked by the White River uplift in the northeast, the Gunnison and Uncompahgre uplifts to the south, and is separated from the Uinta basin on the west by the Douglas Creek Arch.

The youngest rocks in the project area are Quaternary in age and are distributed as unconsolidated sedimentary surface deposits. Most of the alluvial terrace and valley fill deposits (Qga) located along Pete and Bill Creek consist of pebble, cobble, and boulder gravel of basalt and variable amounts of sedimentary rock.

Surface deposits in Sections 7, 8, and 18 are made up of alluvial terrace and valley fill deposits (Qga), pediment gravel deposits (Qop) underlain by the Shire Member of the Wasatch Formation (Tws), Anvil Points Member of the Green River Formation (Tga) and Garden Gulch Member (Tgg) of the Green River Formation.

The Wasatch Formation is divided into three members named the Shire, Molina and Atwell Gulch. The depositional environment is dominated by non-marine fluvial (stream) processes. The Wasatch Formation is known to be locally fossiliferous, including early horses and primates, as well as a variety of rodents, birds, turtles, fishes, snails, and plants (BLM, 1999). However, no areas of critical environmental concern for the Wasatch Formation are present within the project area.

The Shire Member of the Wasatch Formation (Tws) is variegated purple, lavender, red, gray and brown claystone with some locally lenticular fine to coarse-grained sandstone. Although the Housetop Mountain Quadrangle shows the Shire Member (Tws) being present in much of the PBGAP area, most outcrop is covered by overlying Quaternary deposits.

The Anvil Points Member of the Green River Formation (Tga) is a brown and buff, massive fine to coarse-grained sandstone that forms conspicuous ledges in the PBGAP area. To the west of the PBGAP area the member grades into increasingly more fine-grained facies, dominated by fissile oil-shales and interbedded, oolitic limestone, algal limestone, and minor sandstone. The maximum thickness in this area is about 1,000 feet.

The Garden Gulch Member of the Green River Formation (Tgg) is light gray marlstone, dark brown to black paper shale, or light gray oolitic limestone with some massive brown, fine to medium-grained sandstone.

Although the nearby Battlement Mesa contains layers of Tertiary Miocene basalt flows and basaltic intrusions, and older Eocene Uinta and Green River Formations, most of these rocks have been eroded from the PBGAP area.

The Wasatch Formation (Tws) underlies the Anvil Point member of the Green River Formation. Beds of the Wasatch are relatively flat lying, but at depth beneath the PBGAP area begin to dip to the west-northwest at approximately 3 to 4 degrees. Gas production has been associated with the Wasatch Formation within the Piceance basin. Sands of the Wasatch produce natural gas in the Rulison Field located approximately 7 miles east of the PBGAP.

The target of the proposed drilling operations is the Mesaverde Group, which lies unconformably below the Wasatch Formation. The Mesaverde can be over 7,000 feet in thickness within the Piceance basin, but within study area is estimated to be approximately 4,000 feet thick. The Mesaverde Group is often called the Mesaverde "Formation" and includes informal subdivisions based on gas productivity characteristics including the barren Ohio Creek, the stacked lenticular, fluvial non-marine sandstones, freshwater limestone and coals of the Williams Fork Formation, and the underlying marine sandstone and shale of the Iles Formation.

The proposed PBGAP drilling project would target sandstone layers within the Williams Fork (including the Cameo Coal and un-named sandstones) and upper Iles Formations (including the Rollins sandstone) between 7,900 feet and 9,600 feet TVD (total vertical depth). The Williams Fork Formation sandstones are considered "tight" because of their low permeability reservoir characteristics. Individual sandstones are stacked and concentrated into 400- to 500-foot thick potentially productive sequences, and distributed throughout a vertical interval of about 3,000 feet. Sand bodies originating from a river or fluvial depositional setting typically demonstrate irregular and spatially limited reservoir distributions. Studies of the Rulison Gas Field, located north and east of the project area, show that these Williams Fork sandstone packages have limited horizontal extent, based on the lack of pressure communication between existing wells spaced less than 1,000 feet apart (Vargas, 2004). Natural gas wells drilled in the Rulison Gas Field penetrate four to six of these sandstone packages (USDOE 2004) on 20-acre bottomhole spacing. These "tight" sandstone gas reservoirs will require hydraulic fracturing to produce economical quantities of gas.

Mineral resources within the southern portion of the Piceance Basin include oil and gas deposits, coal, and minor sand and gravel. Oil and gas deposits are found throughout the Piceance Basin, and the entire area is considered to be a potential resource. The tight gas sands within the Mesaverde Formation in the Piceance Basin are estimated to contain more than 300 trillion cubic feet of gas (USDOE, 2004). Oil and gas production is generally from unconventional tight sands. Deeper pay intervals within the lower Mesaverde include the Rollins, Cameo, Cozzette, and Corcoran sands. Most of the gas reservoirs also produce varying amounts of oil/gas condensate. The PBGAP area is located south and west of the Rulison field which was part of a complex of

early 1990s Mesaverde natural gas development successes including Mamm Creek, Cave Hollow, Buzzard, and Divide Creek fields, currently responsible for several trillion cubic feet of gas from over 1,550 existing wells. Well spacing has steadily decreased from an initial conventional 80-acre spacing to as low as 10-acre spacing to accommodate the limited reservoir size of many of the Williams Fork pay zones (Thomasson 2003, PTTC 2004). The PBGAP action includes four new surface locations, required to directionally drill to a total of 32 bottomhole locations for natural gas from sands of the Williams Fork and Rollins.

The entire project area is underlain by the Cameo-Fairfield Coal group of the Mesaverde Formation. However, there are currently no coal leases within the project area, owing to the subsurface depth to coal zones greater than 6,000 feet predicted within the PBGAP area. Mining depths generally do not exceed 3,000 feet. Coalbed natural gas production is (among other parameters) limited by rock permeability, which deteriorates with depth. Coalbed natural gas production has been cited above depths of 7,000 feet within the Piceance Basin (RMAG 2003). Coal beds in the upper Mesaverde Williams Fork/Coal Ridge section have the potential for future production of natural gas where permeability has been preserved.

Limited amounts of salable mineral resources are located within the project area. These minerals include sand and gravel. Sand and gravel are found in Quaternary deposits located along the stream valleys and in terrace deposits on mesa tops. According to the Colorado Geological Survey (CGS 1999) these deposits are of little commercial value because the gravels contain abundant silt and clay matrix and secondary calcium carbonate cements.

*Proposed Action:*

Environmental Consequences: Impacts associated with geologic and mineral resources include the following:

- Topography – The construction of new roads and well pads for the Proposed Action would result in changes to the local topography. Well pads 7L and 7K would cut into unconsolidated Quaternary Pediment gravel deposits (Qop) south of Pete and Bill Creek. Well pad construction for pads 7O and 18A would likely cut into the bedrock of the Anvil Points Member (Tga) and Garden Gulch Member (Tgg), respectively. The well pads and roads leading to them have been positioned to minimize changes to the visual and topographic character of the area.
- Fragile Soils – Portions of the proposed road to pad 18A are located in areas of fragile soils with a slope class of 30 to 50% or over 50%. Bucklon-Inchau loams (25 to 50% slopes) and Torriorthents-Rock outcrop complex are present along the alignment. The thickness of soils on top of bedrock and the angle of the contact between soil and bedrock would be taken into account during design and construction of the roadway.
- Slope Stability – The sloping contact between overlying soil and the Garden Gulch Member (Tgg) of the Green River Formation and the Shire Member (Tws) of the Wasatch Formation may constitute a plane of weakness which could cause slope instability along proposed roads in areas of steep slopes. Additional stabilization may be required for road cuts in steep slopes where there is thick soil over clay-rich bedrock, such as the proposed road to well pad 18A.
- Gas Production – If the proposed PBGAP project wells were to be productive, implementation of the proposed action would result in natural gas and associated water being produced from the hydrocarbon-producing sands within the Mesaverde Formation. The

amount of natural gas that may be potentially produced from the proposed wells cannot be estimated accurately, but in nearby fields reserves have been estimated to approach 2 Bcf per well (Vargas 2006). However, if the wells become productive, initial production rates would be expected to be highest during the first few years of production, then steadily decline during the remainder of the wells' economic life. Natural gas production from the proposed wells would contribute to the draining of hydrocarbon-bearing reservoirs within the Mesaverde Group in this area, an action that would be consistent with the BLM objectives for mineral production.

Casing programs have been designed to specifically prevent hydrocarbon migration from gas producing strata penetrated by the wellbore during drilling, initial production and after completion of the well. Identification of potential fresh-water bearing zones, aquifers, gas producing zones, and under-pressured or over-pressured formations are incorporated into drilling scenarios for the proposed wells. Estimates of what depth these zones will be encountered are used to determine drilling fluids, fluid densities, surface casing depths and production planning. In the PBGAP, the proposed casing and cementing program has been designed to protect and isolate all usable water zones, potentially productive zones, lost circulation zones, and abnormally high-pressure zones. (Lost circulation can occur in zones of rock where the formation pressure is much lower than the pressure exerted by the drilling fluid, causing wellbore fluids to invade into the rock formation. When the volume of wellbore fluids being lost into the rock formation is sudden and substantial, the continuous circulation of drilling fluid is interrupted and fluid ceases to reach the mud pumps; thus the phrase "lost circulation.")

To accommodate protection and isolation of usable water zones, 8 5/8-inch surface casing will be set at 1,500 feet, below the average depth to known aquifers. Cement will be circulated to surface to assure an adequate seal between the pipe and the rock formations. The 4½-inch production casing will be set at total depth of the well and cement volumes will be sufficient to fill the annulus between the rock formations and the exterior of the casing to 200 feet above the Mesaverde Formation top. If a water bearing, gas productive, lost circulation or pressured zone is encountered, cement volumes will be adjusted to isolate that zone or zones. This configuration is designed to prevent accidental contamination or leakage of hydrocarbons or fracturing fluids from reaching usable water or other productive zones within the wellbore.

Injection of large quantities of waste liquids at or exceeding litho-pressure (the pressure necessary to hydraulically fracture rock) has historically caused earthquakes, notably near Denver, Colorado. However, the likelihood of fluid-induced earthquakes caused by the completion practice of hydraulically fracturing the productive zone is considered to be very low, as indicated by the absence of recorded historic earthquake epicenters in the region. Accordingly, the PBGAP drilling and hydraulic fracturing programs would have negligible impact on the risk of fault-generated earthquakes.

- Gravel – The proposed access roads would have a gravel surface. Construction materials (sand and gravel) may be indirectly affected in that they are likely to be used from local sources for surfacing materials for the access roads and fill material for well pads. Known accumulations of local materials may become depleted and additional sources would need to be identified and used. However, as discussed above, the sand and gravel deposits within the project area are considered to be of poor quality and limited commercial value.

Refer to Appendix D (Number 10) for conditions of approval pertinent to geologic and hydrogeologic (groundwater) resources.

*No Action Alternative:*

Environmental Consequences:

- Topography – Activity under the no action alternative would consist of drilling and development of 29 approved wells. No new access roads would be required, and the existing gathering system would serve the previously approved wells.
- Slope Stability – Under the no action alternative, no new roads or well pads would be built and there would be no excavation in addition to the previously approved well pads and roads.
- Gas Production – Under the no action alternative, natural gas would be produced from 29 wells drilled from existing pads. The development of up to 32 wells from proposed pads 7L, 7K, 7O and 18A and associated access roads and pipelines would not occur.

**Noise**

Affected Environment: Current noise levels are typical of a rural area with occasional traffic noise from oil and gas and ranching activities. Some noise is muffled by the pinyon-juniper and mountain brush vegetation common to the PBGAP area. Based on this setting, estimated current background noise levels are between 35 and 45 decibels (dBA). These levels are similar to a rural area at night or a recreational (park) area during the day (EPA 1974).

Noise levels reported for various elements of oil and gas development are between 50 dB(A) for the operation of typical compressor station to approximately 68 dB(A) for truck traffic and crane operation (Table 6). These levels are a function of distance; the closer to the source, the greater the noise.

<i>Source</i>	<i>Reported Noise Level</i>
Typical compressor station	50 dB(A) (375 feet from property boundary)
Pumping units	50 dB(A) (325 feet from well pad)
Fuel and water trucks	68 dB(A) (500 feet from source)
Crane for hoisting rigs	68 dB(A) (500 feet from source)
Concrete pump used during drilling	62 dB(A) (500 feet from source)
Average well construction site	65 dB(A) (500 feet from source)
Source: La Plata County (2002)	

*Proposed Action:*

Environmental Consequences: Implementation of the proposed action would result in increased noise levels particularly during road and well pad construction, well drilling, and completion.

Short-term (7 to 14 day) increases in noise levels would characterize each site associated with road and well pad construction. Based on the Inverse Square Law of Noise Propagation (Harris 1991) and an average construction site noise level of 65 dB(A) at 500 feet, construction noise would equal approximately 59 dB(A) at 1,000 feet. At 1,000 feet, noise levels would approximately those of an active commercial area (EPA 1974).

Noise impacts from drilling and completion activities would last approximately 45 to 60 days at each well. Noise would occur continuously, 24 hours per day, during the drilling and completion period. Based on a measured noise level of 68 dB(A) at 500 feet, actions associated with drilling and completion would generate approximately 55 dB(A) at 1,000 feet. This level of noise approximates that associated with light industrial activities (EPA 1974).

Traffic noise levels would also be elevated as a consequence of the proposed action. The greatest increase would be along County and BLM access roads during the drilling and completion phases. Based on the La Plata County data presented in Table 6, approximately 68 dB(A) of noise (at 500 feet) would be created by each fuel and water truck that travels these roads. Less noise would be created by smaller trucks and passenger vehicles such as pickup trucks and sport utility vehicles. Although the duration of increased noise from this source would be short, it would occur repeatedly during the drilling and completion phases.

Noise impacts would decrease during the production phase. Pumping units and compressor noise levels would be approximately 50 dB(A) at 325 to 375 feet and continued small truck traffic would generate somewhat less. These levels would be less than the construction phase but greater than background noise levels. During maintenance and workovers, noise would increase above noise levels associated with routine well production.

No residences that could be negatively impacted exist near any of the proposed well pads. Refer to Appendix D (Number 11) for mitigation measures related to noise.

*No Action Alternative:*

Environmental Consequences: Although noise levels would increase in ways similar to that described for the proposed action, the duration of the increase would be shorter because fewer wells would be developed and no new roads or pads would be constructed.

## **Paleontology**

Affected Environment: Surficial geology of the PBGAP area consists of outcrops of the Anvil Point and Garden Gulch Members of the Green River Formation of Eocene age. The Shire Member of the Wasatch Formation of Eocene age is mapped as being present in some areas, but was not readily identifiable during onsite inspection of the project area. The Shire Member of the Wasatch Formation is not believed to be Class I (likely to produce fossils) and in most cases it is covered with Quaternary alluvial and gravel deposits to a depth which would not be impacted by proposed road and pad grading.

*Proposed Action:*

Environmental Consequences: Fossilized material was not noted during onsite inspection of the project area; therefore, systematic field surveys were not conducted. It is unlikely that the proposed action would impact paleontological resources. However, the standard paleontological condition of approval would be applied to the APDs (Appendix D, Number 12).

*No Action Alternative:*

Environmental Consequences: No impacts to paleontological resources would occur because the developments would take place on existing pads.

### **Range Management**

Affected Environment: The entire 1,790 acres of the PBGAP area is within Dry Creek Pete and Bill Allotment #08125 (Figure 4). The entire allotment is 7,271 acres in size and supports 372 animal unit months (AUMs). Table 7 summarizes the permitted grazing use of this allotment.

<b>Table 7. Range Management Allotments</b>					
<i>Allotment</i>	<i>Permittee</i>	<i>Livestock Kind and Number</i>	<i>Period of Use Begin Date-End Date</i>	<i>% Public Land</i>	<i>Animal Unit Months (AUMs)</i>
Dry Creek Pete and Bill # 08125	Hyruip	118 Cattle	05/01 to 06/15	100	178
		118 Cattle	10/01 to 10/31	100	120
	Gardner	36 Cattle	05/01 to 06/15	100	54
		21 Cattle	10/01 to 10/31	100	21

*Proposed Action:*

Environmental Consequences: Development of the proposed PBGAP would result in a total of 59.7 acres of short-term surface disturbance within the allotments and a loss of up to 3 AUMs of available livestock forage. This loss would last for approximately three years or until grasses and forbs seeded during interim reclamation became productive. Long-term loss, which would last 20 to 30 years, would then be reduced to approximately 17.8 acres or 1 AUM.

In addition to the loss of forage, an increase in human activity related to development and maintenance of the developments 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 reach because of thick brush and/or steep slopes. Improvement in livestock distribution would improve forage utilization throughout the allotment.

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 allotment and if necessary, adjustments in livestock use will be made to protect land health. Appendix D (Number 13) presents standard conditions of approval related to range management resources.

*No Action Alternative:*

Environmental Consequences: No impacts to range management resources would occur because the drilling of an additional 10 wells would take place on two existing well pads.

## **Realty Authorizations**

Affected Environment: Noble must apply for and be granted BLM right-of-way authorizations for routes (proposed or existing) that are outside or “off” their Federal lease holdings. The proposed route for which an ROW authorization would be required is indicated in Figure 5 (Appendix A).

The right-of-way would be 1,550 feet long and 75 feet wide for the new access road and pipeline. This new grant would contain terms and conditions to effectively limit all construction, drilling, and completion traffic within the PBGAP between December 1 and April 1. No additional right-of-way grants are located within the PBGAP area.

*Proposed Action:*

Environmental Consequences: Under the proposed action, a right-of-way authorization would be granted subject to appropriate terms and conditions. These authorizations would provide Noble legal access for the construction and use of proposed routes and for the construction and development of all proposed pads within the PBGAP area. Appendix D (Site-specific COAs) presents mitigation measures required for the right-of-way authorization.

*No Action Alternative:*

Environmental Consequences: No new realty authorizations would be necessary.

## **Recreation**

Affected Environment: The project area is adjacent to private lands on the west that limit public access from that direction. Overall recreational use of the project area by the public is low due to the steep, rugged terrain and the lack of public road access. Some private hunting or other dispersed recreation such as off-road vehicle uses may occur. The White River National Forest, located approximately 2 miles south of the project area, provides indirect access to the project sites, but the steep terrain and lack of established roads or trails limit the amount of public use.

The primary recreational uses of the adjacent National Forest System and BLM lands within the PBGAP vicinity is seasonal hunting of big game (deer and elk). Hunting is managed and licensed by the Colorado Division of Wildlife (CDOW) and permitted for a 1-month archery season from the end of August to the end of September. Muzzleloader rifle season occurs in September, and rifle season extends from October through November. One existing special use permit holder operates within the PBGAP. Andy Harris conducts big game hunting expeditions within the project area on BLM lands, with 684 service-days for hunting and 150 days for summer use.

No developed recreational facilities such as campgrounds, picnic areas, or improved hiking/biking trails are located within the project area. The portion of the White River National Forest adjacent to the PBGAP does not include developed recreational resources, although informal camping and recreational uses are generally allowed.

*Proposed Action:*

Environmental Consequences: The proposed action would result in increased vehicle traffic, noise, dust, and human activity during construction, and continuing to a more limited degree, throughout the operational life of the project. Construction and well-drilling activities would

likely displace game species in localized areas within close proximity to these activities, and both hunters and game would be displaced to other locations within and outside the project area.

The project area is located within the Semi-Primitive Motorized (SPM) recreation opportunity class as designated through the BLM Recreation Opportunity Spectrum (ROS) classification system for recreational lands. The SPM recreation opportunity class is characterized as predominately unmodified natural environment of moderate to large size that provides (1) some opportunity for isolation from the sights and sounds of man, (2) an opportunity to have a high degree of interaction with the natural environment, (3) an opportunity for moderate challenge and risk and the ability to use outdoor skills, and (4) an explicit opportunity to use motorized equipment.

Over the 20- to 30-year operating life of the project, the presence of natural gas wells, production equipment, and other facilities would alter the recreational character of the project area from generally natural to relatively developed. The recreation setting of the project area may change from Semi-Primitive Motorized (SPM) to Roaded-Natural (RN).

The RN designation is applied to settings providing (1) an equal opportunity to affiliate with other users or to be isolated from the sights and sounds of man, (2) an opportunity to have a high degree of interaction with the natural environment, (3) an ability to practice outdoor skills, and (4) opportunities for both non-motorized and motorized recreation. Providing opportunities for moderate challenge and risk and the ability to use outdoor skills is not highly important. The RN setting is characterized by a moderate evidence of the sight and sound of humans. Resource modifications and uses are evident, but they harmonize with the natural environment.

Changes in the physical and social recreation setting would impact the recreational experience of traditional users, especially big game hunters, due to displacement of big game animals. Hunters may be replaced by recreational users seeking different activity opportunities and experiences. The existing hunting outfitter (Andy Harris) may experience negative effects due to changes in the physical and social recreation settings. Specifically, increased truck traffic along CR 306 may impact hunting activities.

The proposed action is unlikely to generate an increase in public recreational use even with the increased motorized access to and through the project area. Use of the area is limited by the lack of public road access, and the access road created or used by Noble would be signed and/or gated at private property boundaries to restrict public use. Appendix D (Number 14) presents conditions of approval related to recreation resources.

*No Action Alternative:*

Environmental Consequences: Due to the relatively small scale of development, the long-term displacement of big game is not likely to be widespread, and big game hunters would not be substantially affected. The development of additional wells on existing pads is not likely to result in a change in the recreational character of the area. Under this alternative, the area would likely retain its Semi-Primitive Motorized (SPM) recreational class designation.

### **Socio-Economics**

Affected Environment: The PBGAP area is located within Garfield County, Colorado. The population of Garfield County grew by approximately 2.8% per year from 2000 to 2005, resulting in an increase from 44,300 to 51,000 residents (U.S. Bureau of the Census 2005). The annual

population growth rate is projected to decline gradually through the year 2030, growing to a population of about 97,000 by the year 2030 (Colorado Department of Local Affairs 2003).

In the year 2000, industry groups in Garfield County with the highest percentage of total employment were construction (20%); education, health and social services (15%); arts, entertainment, recreation, accommodations, and food service (11%); and retail trade (14%) (Colorado Department of Local Affairs-Colorado Demography Section 2003). An estimated 13% of the population was retired in the year 2000 and did not earn wages. Employment in agriculture, forestry, hunting, and mining accounted for 5% of total employment. In the year 2001, an estimated 239 persons were employed within the mining industry in Garfield County.

In 2006, oil and gas assessed valuation in Garfield County amounted to \$1,745,277,070 or about 68% of total assessed value in the county (Garfield County Assessor's Office 2007). Total tax revenues from property taxes and special district levies were \$117,971,396. Based on this assessed value, the top five taxpayers in the county in 2006 were mining companies.

Federal mineral royalties are levied on oil and gas production from Federal mineral leases. For oil and gas production in Garfield County in 2003, total Federal royalties collected amounted to \$125,683,586. Half of those royalties of \$62,841,784 was paid to the State of Colorado. The state's share of the revenue was then distributed to a variety of state and local agencies. Counties where oil and gas were produced received 8% of total revenues, local towns in those counties received 5%, and local school districts received 5%. In 2003, the Garfield County share of Federal mineral lease royalties was \$1,332,000.

*Proposed Action:*

Environmental Consequences: The proposed action would positively impact the local economies of Garfield County through the creation of additional job opportunities in the oil and gas industry and in supporting trades and services. In addition, local governments in Garfield County would experience an increase in tax and royalty revenues.

Some minor economic loss to private land owners and may result from the potential displacement of big game and resulting reduction in private big game hunting within the project area.

The proposed action could result in negative social impacts including (1) a change in the recreational character of the area (see **Recreation**), (2) a reduction in scenic quality (see **Visual Resources**), (3) increased dust levels especially during construction (see **Air Quality**), and (4) increasing traffic (see **Access and Transportation**).

*No Action Alternative:*

Environmental Consequences: The small scale of development that would occur under this alternative would create few additional job opportunities. Local governments would not benefit from Federal mineral royalties because the development would occur on private mineral estate from a private surface location.

On the other hand, landowners and permitted outfitters and guides should not be impacted because the displacement of big game should not be widespread. This alternative would cause only nominal change in the recreational and visual character of the area. Because there would be little new surface disturbance and few new wells, dust levels would not increase substantially, and increases in traffic would be localized and short term.

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

Affected Environment: The *Soil Survey of Rifle Area, Colorado, Parts of Garfield and Mesa Counties* (USDA 1985) indicates that six different soil map units occur within the PBGAP project area (Appendix A, Figure 6). Four of these soil map units are considered to be fragile soils with severe to very severe erosion potentials (Table 8 and Appendix A, Figure 7). Fragile soils occur in approximately 96.8% of the PBGAP project area with 64.4% of the project area having fragile soils on slopes in excess of 30%.

<b>Table 8. Soil Associations in the PBGAP Area</b>			
<i>Map Unit Number – Soil Association Name</i>	<i>Soil Description</i>	<i>Slope</i>	<i>Erosion Potential</i>
12 – Bucklon-Inchau Loam	Shallow well-drained soils formed in sandstone and shale residuum. Found on ridges and mountainsides. Surface runoff is rated as medium.	25-50%	Severe
17 – Cochetopa Loam	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	Deep, well-drained, moderately sloping to hilly soil on mesas, benches, and sides of valleys; formed in mixed alluvium derived primarily from basalt. Surface runoff is medium.	6-25%	Moderate
34 – Ildefonso Stony Loam	Deep, well-drained hill to steep soil on mesa breaks, sides of valleys, and alluvial fans; formed in mixed alluvium derived primarily from basalt. Surface runoff is medium.	25-45%	Severe
66 – Torriorthents-Camborthids-Rock outcrop complex	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. Runoff is very rapid.	15-70%	Very severe
67 – Torriorthents-Rock outcrop complex	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. Runoff is very rapid.	15-70%	Very severe

A stipulation to Federal Lease COC 23443 which applies to the proposed action states that, “the plan of operations must assure adequate protection of ...steep slopes or fragile soils.”

*Proposed Action:*

Environmental Consequences: As summarized in Table 1, implementation of the proposed action would initially disturb up to 59.7 acres of soils. The disturbance would be caused by the construction of the well pads (23.7 acres), and collocated access roads and gas gathering pipelines (36.0 acres). Most of this area would be reclaimed and revegetated upon the completion of construction. The remaining 17.8 acres would remain disturbed for the life (i.e., 20 to 30 years) of the project.

The most important potential consequence of these disturbances would be an increase in erosion and offsite sedimentation. Potential increases in erosion and sedimentation would be variable across the PBGAP project area depending on the steepness of the terrain and the erosion potential of the soil. The potential would be greatest where proposed construction activities coincide with steep slopes and fragile soils. Parts of the proposed access or pads themselves associated with

7K, 7O, and 18A would be located on fragile soils on slopes of 30% or greater. The potential for erosion, including slumping and landslides, and sediment transport associated with these access road sections, would be substantial. However, mitigation measures may lessen these effects. Final recommendations of ongoing geotechnical review and road/pipeline design would be required prior to any approvals for the 7O and 18A pads, roads and pipelines to fully assess impacts to soil resource.

Less erosion and sediment transport potential would be associated with the construction of the other proposed developments. Although some of these developments would be located on fragile soils, none would be located on slopes of 30% or steeper.

In all cases, the greatest risk would occur when the most soil is exposed, especially during periods of runoff and precipitation events. This situation would exist between completion of construction activities and prior to the reestablishment of vegetation. These risks would be mitigated, in part, through the implementation of Lease Stipulation 3 attached to Federal Lease COC 23443. This lease stipulates that the “lessee agrees that during periods of adverse conditions due to climatic factors such as thawing, heavy rains, or flooding, all activities creating irreparable or extensive damage, as determined by the authorized officer, will be suspended or the plan of operations modified and agreed upon.” Additional conditions of approval designed to protect soil resources are presented in Appendix D (Numbers 1, 7, and 8).

After successful revegetation, the erosion rate and potential sediment yield would drop to near baseline conditions but would remain at slightly elevated levels due to the presence of new access roads.

Analysis on the Public Land Health Standard for Upland Soils. According to the Battlement Mesa Area Land Health Assessment (BLM 2000), upland soils currently meet Standard 1 within the PBGAP project area. With timely implementation of the requirements of lease stipulations and mitigation measures found in the APDs, the implementation of applicable conditions of approval, and timely interim reclamation of disturbed areas; the proposed action would not likely prevent Standard 1 from being met.

*No Action Alternative:*

Environmental Consequences: Since the approved wells would be drilled from existing well pads and would not involve any new disturbance of fragile soils, the impact on soils would be limited to those associated with current conditions and land uses. These include grazing of domestic livestock and erosion associated with overland flow of runoff during severe precipitation events in combination with the naturally sparse vegetation cover and steep slopes of much of the area.

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

Affected Environment: The primary vegetation types in the PBGAP project area are pinyon-juniper woodlands and mountain (oak-serviceberry) shrublands (Appendix A, Figure 8). Other types include small areas of basin big sagebrush shrublands and one small wetland seep (see **Wetlands and Riparian Zones**), as well as existing disturbed areas.

#### *Pinyon-Juniper Woodland*

Pinyon-juniper woodlands dominate the south and west facing slopes of the project site. These woodlands generally consist of Utah juniper of varying densities interspersed with small stands of

mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Pinyon pine is less common and occurs at the higher elevations. Several other shrub species also occur in this community, including broom snakeweed (*Gutierrezia sarothrae*), antelope bitterbrush (*Purshia tridentata*) and roundleaf snowberry (*Symphoricarpos rotundifolius*). The sparse herbaceous layer is represented by graminoids such as cheatgrass, a non-native annual; Kentucky bluegrass (*Poa pratensis*), a non-native perennial grass; and native perennial grasses such as galleta (*Hilaria jamesii*), Indian ricegrass (*Achnatherum hymenoides*), and bottlebrush squirreltail (*Elymus elymoides*). Common forbs include rock goldenrod (*Petrorhiza pumila*), milkvetch (*Astragalus* sp.), twisted-stalk (*Streptanthus cordatus*), bastard toadflax (*Comandra umbellata*), cryptantha (*Oreocarya* sp.), tapertip onion (*Allium acuminatum*), rose heath (*Chaetopappa ericoides*), scarlet gilia (*Ipomopsis aggregata*), and lobeleaf groundsel (*Packera multilobata*). Several cacti also occur, including Simpson hedgehog (*Pediocactus simpsonii*), claret cup (*Echinocereus triglochidiatus*) and prickly pear species (*Opuntia polyacantha*, *O. fragilis*).

On most of the steep south-facing slopes, the juniper woodland is less dense and occurs with more xeric shrub species such as green joint-fir (*Ephedra viridis*), mountain-mahogany (*Cercocarpus montanus*), low rabbitbrush (*Chrysothamnus depressus*), and prickly pear. Common forbs include hairy golden-aster (*Heterotheca villosa*), Fendler sandwort (*Chamaesyce fendleri*), lobeleaf groundsel, twisted-stalk, rose heath, and rock goldenrod. Numerous individuals of Osterhout's penstemon (*Penstemon osterhoutii*) were observed in several openings of the pinyon-juniper woodland.

#### *Mountain Shrubland*

The mountain shrubland vegetation type dominates the north and northeast facing slopes of the project area. Gambel oak (*Quercus gambelii*), Saskatoon serviceberry (*Amelanchier alnifolia*), and mountain-mahogany shrubs are common. In the more mesic sites such as north facing slopes, Gambel oak forms an impenetrable thicket with serviceberry, chokecherry (*Prunus virginiana*), skunkbrush, and snowberry. Elk sedge (*Carex geyeri*) is a common understory perennial graminoid in these areas. In the more xeric sites, the mountain shrubland community is dominated by mountain-mahogany, bitterbrush, and green joint-fir. A few scattered Utah junipers also occur. Common forbs in the mountain shrubland include woollycup buckwheat (*Eriogonum lachnogynum*), Patterson milkvetch (*Astragalus pattersonii*), arrowleaf balsamroot (*Balsamorhiza sagittata*), Colorado bedstraw (*Galium coloradense*), western rock-jasmine (*Androsace occidentalis*), and rock goldenrod.

#### *Basin Big Sagebrush Shrubland*

Several low terraces above Pete and Bill Creek support basin big sagebrush communities. Common shrub associates include rubber rabbitbrush, greasewood, skunkbrush sumac, snowberry, and shadscale saltbush (*Atriplex confertifolia*). The herbaceous vegetative component includes Great Basin wildrye (*Leymus cinereus*), sticky gumweed (*Grindelia squarrosa*), and white prince's plume (*Stanleya albescens*). Two Colorado state-listed noxious weeds were found in these areas: scotch thistle and houndstongue. None of proposed well pads or access roads and pipelines would impact the basin big sagebrush shrublands.

#### *Talus Slopes and Rock Outcrops*

Talus Slopes and Rock Outcrops occur within the PBGAP project area. The talus slopes are especially common southeast of proposed pad 18A where they support a sparse cover of joint-fir, mountain-mahogany, bitterbrush, and the occasional Utah juniper. Rock outcrops typically occur

along the ephemeral drainages and are also present north of Pete and Bill Creek. As with the talus slopes, the vegetation cover is typically low and composed of plant species from adjacent communities, mostly commonly pinyon-juniper woodland.

*Disturbed Vegetation*

Disturbed vegetation occurs along the existing road corridor which parallels Pete and Bill Creek. These areas typically support a varying cover of emerging seeded graminoids with a few adventives (non-native species). Weedy non-natives including cheatgrass, prickly lettuce (*Lactuca serriola*), redstem filaree (*Erodium cicutarium*), and yellow and white sweet clovers (*Melilotus officinale*, *M. albus*) are present in these disturbed areas.

*Proposed Action:*

Environmental Consequences: Construction of the proposed pads, pipelines and access roads would result in both direct and indirect effects to vegetation. Direct effects would include short- and long-term loss of vegetation and long-term modification of community structure and composition. Indirect effects could include increased potential for noxious weed invasion, increased soil erosion and sedimentation, reduced wildlife habitat quantity and/or quality, and changes in fire regime. The proposed action would result in the loss of approximately 59.7 acres of vegetation, mainly pinyon-juniper woodlands and mountain shrublands (Table 9)

<b>Table 9. Acres of Disturbance by Vegetation Type</b>		
	<i>Acres of Disturbance (short-term)</i>	<i>Acres of Disturbance (long-term)</i>
<b>Proposed Well Pads</b>		
Pinyon-Juniper	15.6	5.3
Pinyon-Juniper/Mountain Shrub Mix	7.8	2.6
Pinyon-Juniper/Oak Mix	0.3	0.1
<b>Subtotal</b>	<b>23.7</b>	<b>8.0</b>
<b>Roads (including collocated pipelines)</b>		
Pinyon-Juniper	16.6	4.5
Pinyon-Juniper/Mountain Shrub Mix	9.1	2.5
Pinyon-Juniper/Oak Mix	4.3	1.2
Pinyon-Juniper/Big Sagebrush Mix	4.5	1.2
Sagebrush/Mesic Mtn Shrub Mix	0.9	0.3
Talus Slopes and Rock Outcrops	0.6	0.1
<b>Subtotal</b>	<b>36.0</b>	<b>9.8</b>
<b>GRAND TOTAL</b>		
	<b>59.7</b>	<b>17.8</b>
Calculations based on vegetation mapping depicted in Figure 8 (Appendix A). Vegetation communities may differ slightly from those described in the text.		

Of the 59.7 acres of physical disturbance, approximately 17.8 acres would not be reclaimed during the life of the wells. With implementation of reclamation practices identified in the GSEO Reclamation condition of approval, desirable forbs and grasses on the unused portions of the pads, roads, and pipelines could be established within 2 to 3 years (Appendix D, Number 1). However, because of periodic workovers and the potential for additional well bores in the future, it is likely that vegetation would remain in an early seral stage for the life of the wells. This would result in an increase in the proportion of herbaceous (i.e., non-woody) species in the areas of disturbance. Although the mountain shrublands would regenerate over time, this process could take several decades, depending on the growth and persistence of seeded species and the intensity of grazing by livestock and/or wildlife. Pinyon-juniper woodlands could take hundreds of years to return to pre-disturbance conditions. Refer to Appendix D (Numbers 1, 4, and 15) for mitigation measures specific to revegetation, weeds, and pinyon pine removal.

*No Action Alternative:*

Environmental Consequences: Under the no action alternative, no new well pads, pipelines, or access roads would be constructed. Therefore, impacts to vegetation would be the same as those associated with current conditions and land uses. These include impacts from grazing of domestic livestock, colonization by invasive weeds along existing road and pipeline alignments, deposition of dust onto above-ground plant tissues from existing roads and pads, and soil loss during severe precipitation events in combination with sparse vegetation cover and steep slopes.

Analysis of the Public Land Health Standard for plant and animal communities (partial, see also Wildlife, Aquatic and Wildlife, Terrestrial): Of the 35 upland sites visited within the Battlement Mesa Land Health Assessment, and the eight sites visited within the Dry Creek Pete & Bill Range Allotment (BLM 2001), two sites were located within the PBGAP project area (BTM 35 and BTM 36). Both of these sites are located along Pete and Bill Creek and meet Standard 3 for healthy plant and animal communities. However, one problem identified in the Dry Creek Pete & Bill Allotment was the widespread invasion of cheatgrass and a corresponding loss of other functional groups such as native perennial grasses and forbs. Many portions of the PBGAP already support a cover of cheatgrass, and the surface disturbances associated with the proposed action have the potential to encourage expansion and dominance of this noxious weed. However, the required condition of approval for invasive weed management and revegetation would limit the development and spread of noxious weeds. Therefore, the proposed action would not contribute to the failure of the area to meet Standard 3 in the future.

The no action alternative would have no bearing on the ability of the area to meet the public land health standard for plant and animal communities.

### **Visual Resources**

Affected Environment: The BLM classifies the PBGAP area as being Class III and IV visual resource management (VRM) areas (BLM 2005; Appendix A, Figure 9). The objective of Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape may be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The management of visual resources in Class IV areas allows major modifications of the existing character of the landscape. In these areas, alterations may dominate the view and may be the

major focus of viewer attention. Usually, however, impacts in Class IV areas are minimized through careful location, minimizing disturbance, and repeating basic landscape elements.

At the present time, the PBGAP project area is dominated visually by native plant communities, with some modifications evident within the natural characteristic landscape due to energy development (e.g., pads, wellheads, separator/dehydration tanks, product storage tanks, pipelines, and access roads). However these contrasts in line, form, color, and texture are not visible from key transportation corridors or adjacent communities because of topography.

To determine and document whether visual impact associated with the PBGAP meet established management objectives Key Observation Points (KOPs) were selected. Criteria used in the election of the KOPs include:

- Critical viewpoints
- Areas with high sensitivity due to large numbers of potential observers or unique landscapes

For this analysis the KOPs, selected include I-70 and County Road (CR) 306.

*Proposed Action:*

Environmental Consequences: Short-term contrasts to visual resources would occur due to construction, drilling, and completion activities on the new pads. 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.

Construction would occur over a 2- to 3-year period. At a particular location, activity would occur 24 hours per day for the 42- to 60-day drilling and completion phases. Consequently, a strong degree of contrast would occur with drill rigs, other large equipment, lights, and well flaring which could be visible in the night sky for up to two months at each well location.

Because of the distance from the I-70 corridor, short-term construction and drilling-related visual impacts would be barely visible in the background. Pads 7O and 18A, because of their location and aspect, will be more visible than the 7L and 7K pads. The construction of the roads accessing all pads, but more so with the 7O and 18A pads, proposed pads, and pad construction and drilling would be visible in the middle ground along CR 306. Construction and drilling activities would not be visible from the towns of Rifle, Parachute, or Debeque because of intervening topographic barriers and distance.

Long-term impacts of the proposed action throughout the PBGAP 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 existing visual contrasts associated with existing human modifications present in the PBGAP area. However, interim reclamation, the use of natural colors on production equipment, and the mitigation measures presented in Appendix D (Number 16) would avoid or minimize the anticipated potential impacts.

The 7O and 18A pads and related access roads would be located in a VRM Class III area dominated by dense Gambel oak. The proposed disturbance would alter the existing viewshed and could dominate the view from CR 306 because of their elevation on the slope above existing visual impacts. Contrasts are expected to the basic elements of form, line, color, and texture in the existing landscape during construction and drilling. Preliminary onsite review of the access road and pads 7O and 18A identified specific mitigation measures designed to meet VRM Class III objectives by minimizing the visual contrasts resulting from the access road and well pads. These measures included no side casting of material along the access road during construction and installation of low-profile storage tanks. However, a geotechnical review of the 7O and 18A access roads and pipelines is being required prior to implementing the 7O and 18A pads to determine environmental consequences to visual resources and any subsequent mitigation needed in order to satisfy the Class III objectives.

Proposed well pads 7L and 7K and related access road and pipeline would be located in VRM Class IV and would be visible from portions of CR 306. However, these proposed facilities will not be visible to the casual observer from areas close to the PBGAP. During onsite review of the 7L and 7K pad, the proposed access road was moved south from the edge of ridge to reduce visual impacts. The proposed action for the 7L and 7K pads and associated infrastructure will meet VRM class IV objectives.

*No Action Alternative:*

Environmental Consequences: Because no new pads, roads, or pipelines would be built, additional visual impacts would be minimal and mostly limited to the drilling of additional wells and associated additional surface facilities (e.g., tanks).

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

Affected Environment: The PBGAP area encompasses the headwaters and portions of Pete and Bill Creek. Although portions of Pete and Bill Creek are perennial, its limited flows and movement barriers created by natural geological result in an absence of fish within the PBGAP area. The creek is incised in areas and carries a large detritus load during storm events or heavy runoff. However, the Colorado River, approximately 2.6 miles north of the project area, supports numerous native and non-native fish species and a variety of aquatic macroinvertebrates.

*Proposed Action:*

Environmental Consequences: Since Pete and Bill Creek does not support fish, the proposed action would not affect any fish species directly. However, extreme precipitation events could increase erosion and sedimentation from areas of exposed soil such as well pads or roads to the Colorado River. The small amount of sediment anticipated to ultimately reach the Colorado River from this source would have minimal impact on fisheries, because it would likely be well within the background levels for the Colorado River. Minor increases in sediment associated with the proposed action would be undetectable. Some of the conditions of approval in Appendix D (Numbers 1, 7, and 8) are intended to protect aquatic resources.

*No Action Alternative:*

Environmental Consequences: Oil and gas development under the no action alternative would have negligible additional impacts to fish species compared to existing conditions. This conclusion is based on the fact that no new pads, roads, or pipelines would be constructed.

However, the additional drilling and completion activities and associated vehicular traffic compared to current conditions would create a greater risk of transport of sediments from roads and pads and of releases of chemical pollutants into streams.

Analysis on the Public Land Health Standard for Aquatic Wildlife. In the Battlement Mesa Area Landscape Land Health Assessment (BLM 2000), the BLM determined that within all habitat types Standard 3 was not being met or lands were functioning at risk or not functional on 48% of the assessment area. Pete and Bill Creek does not currently support fish and has very limited fisheries potential. The limited potential is a result of highly seasonal flows, heavy sedimentation caused by flashy runoff, local geologic conditions, and proximity to existing roads, pads, and pipelines. The report stated that as natural gas production and development continues to increase, it will be increasingly difficult to maintain Standard 3 for aquatic wildlife. Although the impacts associated with the proposed action and no action alternatives are not considered substantial, they have the potential to, at least minimally, move the area farther away from meeting Standard 3.

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

Affected Environment: The primary vegetation types in the project area are pinyon-juniper woodlands, Gambel oak shrublands, and sagebrush shrublands. Less common are riparian-wetland habitats, small stands of aspen, and disturbed areas. The PBGAP area provides cover, sources of food, and breeding habitat for a variety of wildlife. Big game species expected to occur within the PBGAP area include mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus nelsoni*), mountain lion (*Felis concolor*), and black bear (*Ursus americanus*). Habitat mapping by CDOW classifies the entire 1,790 acres of the PBGAP as elk winter range and 1,188 acres as deer winter range (Appendix A, Figures 10 and 11).

CDOW is responsible for managing wildlife populations in the state and manages big game within specific Data Analysis Units (DAUs). Each DAU comprises smaller, more manageable units known as Game Management Units (GMUs). The PBGAP lies within deer DAU D-12, GMU 42 and elk DAU E-14, GMU 42. Population estimates of these species are reviewed periodically to determine management objectives based on the carrying capacity of existing habitat. From this assessment, a determination of the number of individuals of each species within each DAU is established. The updated population objective for deer DAU D-12 is 28,000 to 30,000; the post-hunt 2006 population estimate was 33,000, about 10% above the long-term objective (LTO). The projected 2005 population for DAU D-12 was 26,340 individuals; the harvest objective was 1,600 individuals (CDOW 2007). Elk numbers in DAU E-14, and throughout Colorado, are above the statewide LTO (Duckett, personal communication).

Federal Lease COC 23443 does not have a Timing Limitation (TL) for the protection of seasonally important wildlife habitats. However, as described in **Realty Authorization** section, Noble would apply for and be granted a road and pipeline right-of-way across a portion of Section 1, T8S, R96W, authorizing their “off-lease” GAP operations. The terms and conditions of this right-of-way would include a big game winter timing limitation that would restrict construction, drilling, or completion traffic from December 1 through April 30.

#### *Proposed Action:*

Environmental Consequences: Potential impacts to big game include habitat loss, displacement into less suitable habitat, and increased physiological stress. These impacts are most significant during critical times of the year, such as winter or birthing.

The proposed action would result in the initial loss or fragmentation of 59.7 acres of wildlife habitat in the PBGAP (see Table 1). Following reclamation of pads, pipelines, and access roads, permanent direct habitat loss would be reduced to 17.8 acres.

Additional indirect habitat loss may occur if increased human activity associated with infrastructure causes mule deer to be displaced or alter their habitat use patterns. These disturbances may cause mule deer to use habitats of lower quality during periods of stress, adversely affecting deer during periods when habitats of higher quality are essential for maintaining a zero energy balance (i.e., where energy intake equals energy expended). Similar effects could be expected for elk.

Using a 0.125-mile buffer for proposed and existing pads and associated infrastructure, approximately 390.7 acres of big game winter range habitat would be effectively lost by the proposed action (Appendix A, Figure 12). Some level of avoidance by big game could be expected in areas indirectly affected. Because of site fidelity of female deer, movement to other locations may further weaken these individuals due to additional stress, potentially leading to direct mortality or lower birthrates.

Winter range adjacent to the PBGAP could be indirectly affected and decline in quality as a result of increased use by displaced animals, thereby decreasing the overall carrying capacity of the area (Bartmann et al. 1992; White and Bartmann 1998). Forcing more animals onto remaining areas available for use could increase the spread of disease within the population. In addition, concurrent gas development in surrounding areas may be reducing areas available to big game on a population level, resulting in a reduction in suitable habitat for displaced animals.

The terms and conditions for the proposed right-of-way grant would mitigate the impact in part by precluding development traffic for a 5-month period during the winter season (Appendix D, site-specific COAs). Other reductions in winter disturbance, such as use of remote sensing to monitor the wells and on routine operations to the hours between 10:00 a.m. 3:00 p.m. would further reduce adverse impacts on wintering big game (Appendix D, Number 17).

Noxious weeds can also impact the amount and quality of available habitat and are already present within the PBGAP area, particularly in areas near existing pads, roads, and pipelines. The likelihood of noxious weeds spreading increases as more ground is disturbed. The mitigation measures in Appendix D (Numbers 1 and 4) would minimize the impact of noxious weeds on wildlife habitat in the PBGAP area.

*No Action Alternative:*

Environmental Consequences: The addition of 29 wells on the existing pads would result in no new habitat loss or fragmentation because it would not require construction of additional pads, roads, or pipelines. However, this previously authorized development would cause a temporary increase in vehicular traffic and equipment operations on the pads and access roads. This could cause individual wildlife to temporarily avoid the areas of increased activity. Overall, however, the relatively short duration and intensity of oil and gas operations under the no action alternative would result in much lower impacts to terrestrial wildlife than under the proposed action.

Analysis on the Public Land Health Standard for Animal Communities (Standard 3 – partial, see also Vegetation and Wildlife, Aquatic): The Battlement Mesa Area Landscape Land Health Assessment Report (BLM 2000) determined that sagebrush and pinyon-juniper habitats vary from good to poor condition across the landscape whereas mixed mountain shrub and oak habitats are

generally in good to excellent condition. Within the Dry Creek Pete and Bill allotment eight upland sites were assessed; six of the eight sites (96% of the allotment) are achieving the standard. Most of the area within the PBGAP would meet the standards for a Reference Area as it is largely unaltered by development or noxious weeds.

## **PUBLIC INVOLVEMENT**

The Council on Environmental Quality (CEQ) regulations require an “early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a Proposed Action” (40 CFR 1501.7). In order to satisfy this CEQ requirement, the BLM requested input from the public to determine their concerns and issues with Noble’s proposal, to develop alternatives to the proposal that respond to those issues, to analyze the environmental effects of the proposed action and to prepare the environmental document for the PBGAP.

The BLM posted Public Notice of the PBGAP in the Glenwood Post Independent on March 29 and April 5 and 12, 2007 and in the Rifle Citizen Telegram on April 5, 12, and 19, 2007. In response to these notices, the BLM received comments from five nearby landowners. Key points of concern were related to:

- Dust. Residents are concerned that the amount of dust will increase in relation to the amount of traffic.
- Restricting Public Access. Adjacent landowners request that the access road preferably be gated and locked, but at a minimum request a cattle guard.
- Rights-of-Way. Noble must obtain the necessary ROW agreements.
- Traffic. The number of vehicles and associated noise will increase.

## **SUMMARY OF CUMULATIVE IMPACTS**

The *Glenwood Springs Oil and Gas Leasing and Development Final Supplemental EIS* (FSEIS) (BLM 1999b) analyzed three alternatives for oil and gas development in the Glenwood Springs Resource Area (GSRA). The assessment included an analysis of impacts of past, present, and reasonable foreseeable future actions, including predicted future oil and gas development, on both public and private lands. Since the FSEIS presents the most current analysis of cumulative impacts in the project area, it is incorporated by reference.

Until relatively recently, modifications of the region have been characteristic of agricultural and ranching lands, with localized industrial impacts associated with the railroad and I-70 highway corridors. More recently, these changes are cumulative to the growth of residential and commercial uses, utility corridors, oil and gas developments, and other rural industrial uses. 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 1999: 4-1 to 4-68).

Although none of the cumulative impacts described in the FSEIS were characterized as significant, and while new technologies and regulatory requirements have reduced the impacts of some land uses, it is nonetheless clear that past, present, and reasonably foreseeable future actions has had and would continue to have adverse affects on various elements of the human environment. The anticipated impact levels for existing and future actions range from negligible to locally major, and primarily negative, for specific resources. The primary reasons for this assessment are twofold: (1) the rate of development, particularly

oil and gas development, is increasing in the area, resulting in an accelerated accumulation of individually nominal effects; and (2) the majority of residential and commercial expansion, as well as oil and gas development, have occurred, and is likely to continue to occur, on private holdings where mitigation measures designed to protect and conserve resources are not in effect.

It is clear that the proposed action would contribute to the collective adverse impact for some resources. Although the contribution would be minor, additional ground disturbance would occur and additional habitat would be lost. Thus, the proposed action would contribute incrementally to the collective impact to vegetation, migratory birds, terrestrial wildlife, and other resources. However, the contribution to the accumulated effects would be minor because the scale of the proposed development is relatively small and mitigation measures represented by the conditions of approval for resource protection are mandated for implementation (Appendix D).

## **FUTURE IMPLEMENTATION ACTIONS USING STATUTORY CATEGORICAL EXCLUSIONS**

Section 390 of the Energy Policy Act of 2005 established statutory categorical exclusions (SCEs) under the National Environmental Policy Act (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 for which an environmental analysis has previously been conducted.

The SCEs apply to five categories of action:

- Individual surface disturbance of less than five 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 right-of-way corridor, as long as the corridor was approved within 5 years prior to the date of placement of the pipeline.
- Maintenance or other minor activity, excluding construction or renovation of a building or other facility.

In reviewing an Application for Permit to Drill (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 Best Management Practices (BMPs), would apply.

The use of these SCEs would allow Noble to seek expedited approval of future actions that constitute minor alterations of the proposed PBGAP (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.)

that do not exceed the maximum number of wells and pads analyzed in this document. However, new implementation actions beyond the scope and intent of the SCEs would require addition environmental analysis prior to approval.

**ORGANIZATIONS CONSULTED**

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

- Noble Energy, Inc.
- Garfield County Health Department
- Colorado Division of Wildlife
- Northern Ute Tribe
- Southern Ute Tribe
- Ute Mountain Ute Tribe
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service

**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. Jerry Powell of Wildlife Specialties, LLC, was the primary contractor; collaborating individuals working for other firms are noted in Table 10. Resource management direction and final EA review was provided by BLM resource specialists as noted in Table 11 on the following page.

<b>Table 10. List of Preparers</b>	
<i>Resource Parameter/Area of Responsibility</i>	<i>Responsible Person</i>
Project Management	Jerry Powell (Wildlife Specialties, L.L.C.)
Socio-Economics, Transportation, Recreation	Jane Boand (David Evans and Assocs. Inc.)
Cultural Resources	Carol Conner, Grand Valley Institute
Wastes, Hazardous or Solid	Mike Anderson (Summit Technical Resources, Inc.)
Vegetation, Wetlands & Riparian Zones, Range Management, Invasive Non-Native Species, Special Status Species (plants), Soils	Rea Orthner (Western Ecological Resources, Inc.)
Air Quality, Special Status Species (wildlife), Migratory Birds, Water Quality, Noise, Paleontology, Realty Authorizations, Visual Resources, Wildlife Aquatic & Terrestrial, Editing	Jerry Powell (Wildlife Specialties, L.L.C.)
Geology and Minerals	Craig Carter (Carter Burgess Inc.)

<b>Table 11. List of BLM Interdisciplinary Reviewers</b>	
<i>Resource Parameter/Area of Responsibility</i>	<i>Responsible IDT Member</i>
<b>CRITICAL ELEMENTS</b>	
Air Quality	Jeff O'Connell
Cultural Resources	Cheryl Harrison
Environmental Justice	Jim Byers
Invasive Non-Native Species	Beth Brenneman
Migratory Birds	Jeff Cook
Native American Religious Concerns	Cheryl Harrison
Special Status Species	Beth Brenneman (plants), Jeff Cook (wildlife)
Wastes, Hazardous or Solid	Marty O'Mara
Water Quality, Surface and Ground	Jeff O'Connell
Wetlands and Riparian Zones	Jeff O'Connell
<b>NON-CRITICAL ELEMENTS</b>	
Geology and Minerals	Karen Conrath
Noise	Jim Byers
Paleontology	Fred Conrath
Range Management	Isaac Pittman
Realty Authorizations	Jim Byers, D.J. Beaupeurt
Recreation	Brian Hopkins
Socio-economics	Brian Hopkins
Soils	Jeff O'Connell
Transportation	Jim Byers
Vegetation	Beth Brenneman
Visual Resources	Kay Hopkins
Wildlife, Aquatic and Wildlife, Terrestrial	Jeff Cook

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## **Appendix A**

### **Figures**



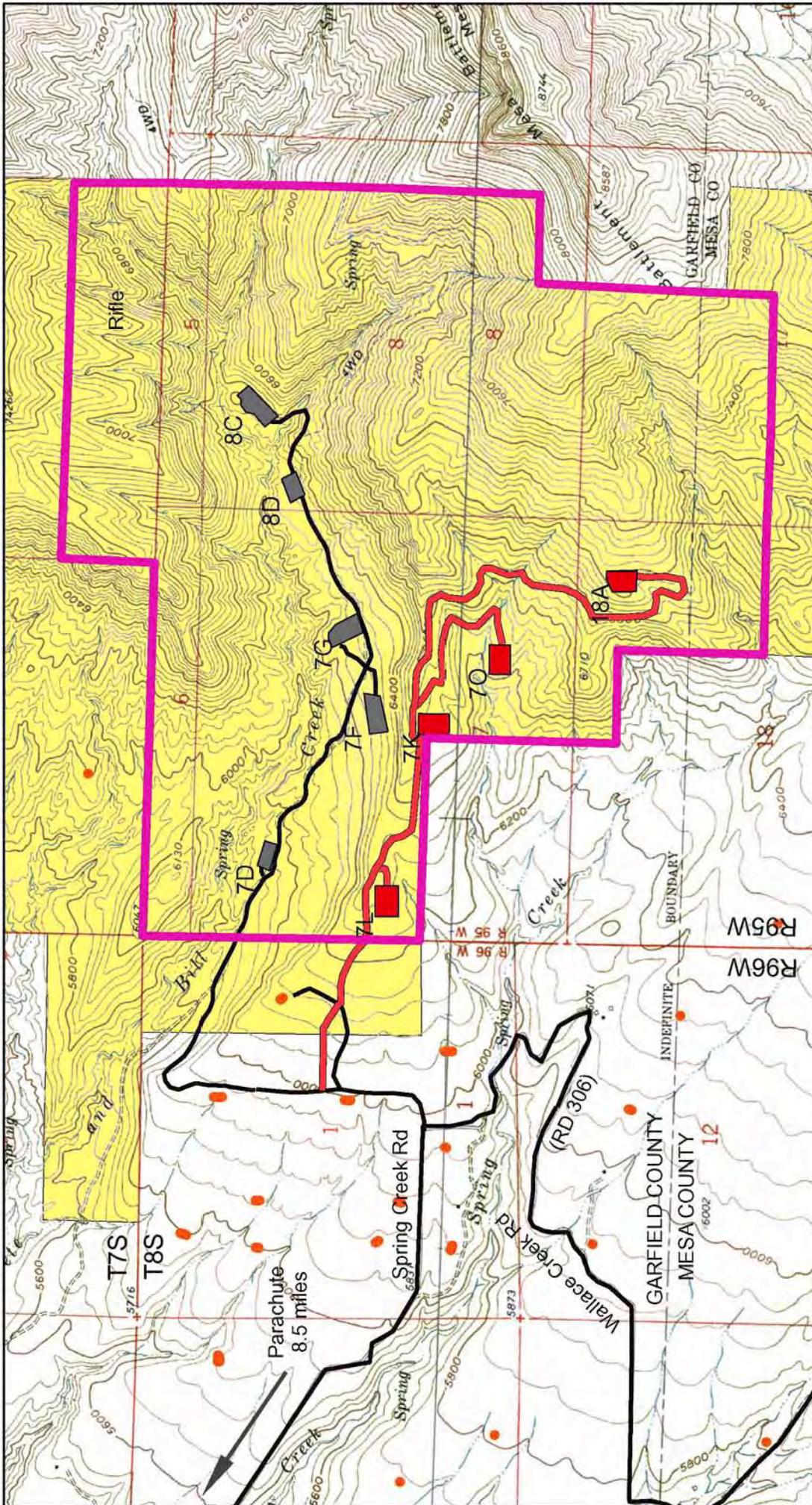
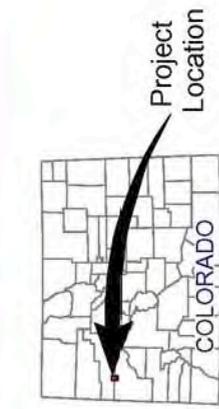


Figure 1. Pete and Bill Creek GAP Map



- Legend**
- GAP Boundary
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - Existing PG&EP Pads
  - Proposed PG&EP Pads
- Land Ownership**
- BLM
  - Private

1 inch equals 2,000 feet  
 Contour interval = 40'  
 Date: July 2007

BASE: USGS 7.5 Minute Parachute and Housetop Mountain, Colorado Quadrangles

prepared by:  
 Western Ecological Resource, Inc.  
 711 Walnut Street  
 Boulder, CO 80302  
 (303) 449-9009 FAX (303) 449-9038





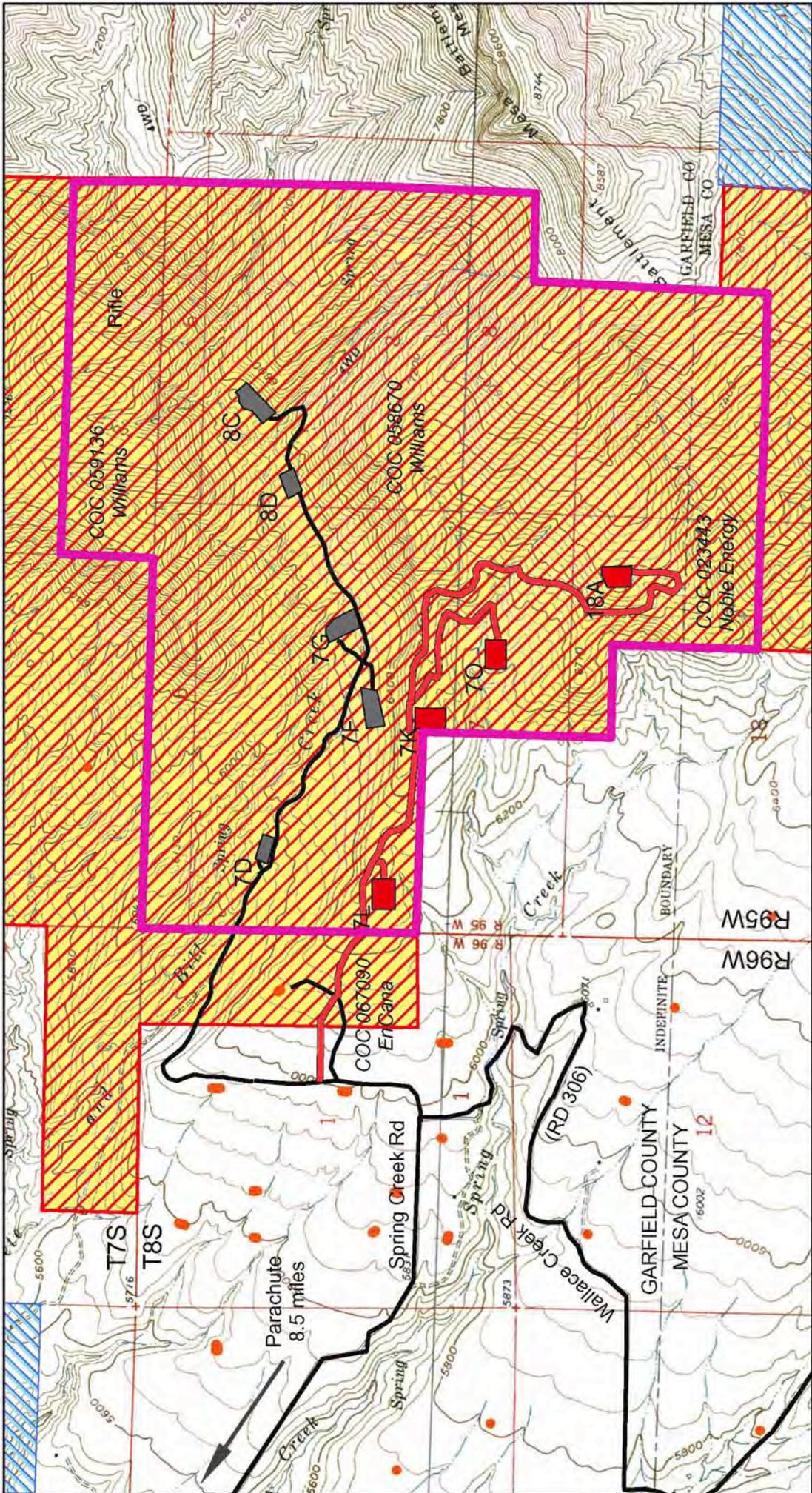


Figure 2. Surface and Mineral Ownership Pete and Bill Creek GAP



- Legend**
- GAP Boundary
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - Existing PBGAP Pads
  - Proposed PBGAP Pads
  - Mineral Ownership: F-FM (Federal Minerals)
  - Mineral Ownership: P-OTHER (Other Minerals)
  - Land Ownership: BLM
  - Land Ownership: Private

1 inch equals 2,000 feet  
 Contour interval = 40'  
 Date: July 2007

BASE: USGS 7.5 Minute  
 Parachute and Housetop  
 Mountain, Colorado Quadrangles

prepared by:  
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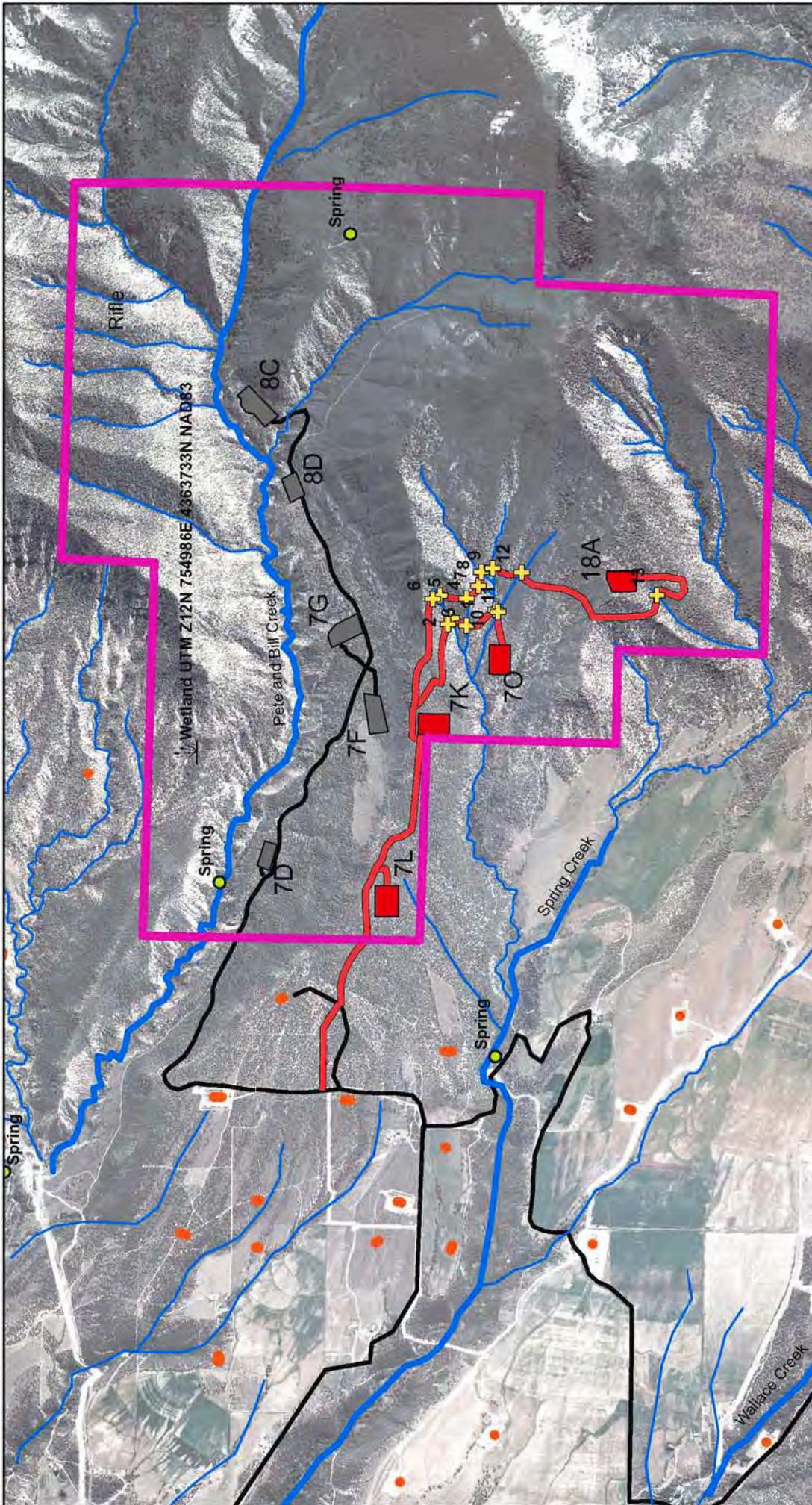


Figure 3. Riparian Habitat, Wetlands, and Streams Pete and Bill Creek GAP



- 1 inch equals 2,000 feet  
Date: July 2007
- Legend**
- GAP Boundary
  - Minor Streams
  - Existing Wells (COGCC)
  - Major Streams
  - Proposed Roads & Pipelines
  - Existing Roads
  - Wetland
  - Springs (USGS)
  - Proposed Stream Crossings
- PBGAP Pads**
- Existing
  - Proposed

Note: All streams along proposed access roads and pipelines were field verified. Others mapped based upon aerial photography and USGS maps.

BASE: USGS 7.5 Minute Parachute and Housetop Mountain, Colorado Quadrangles

prepared by:  
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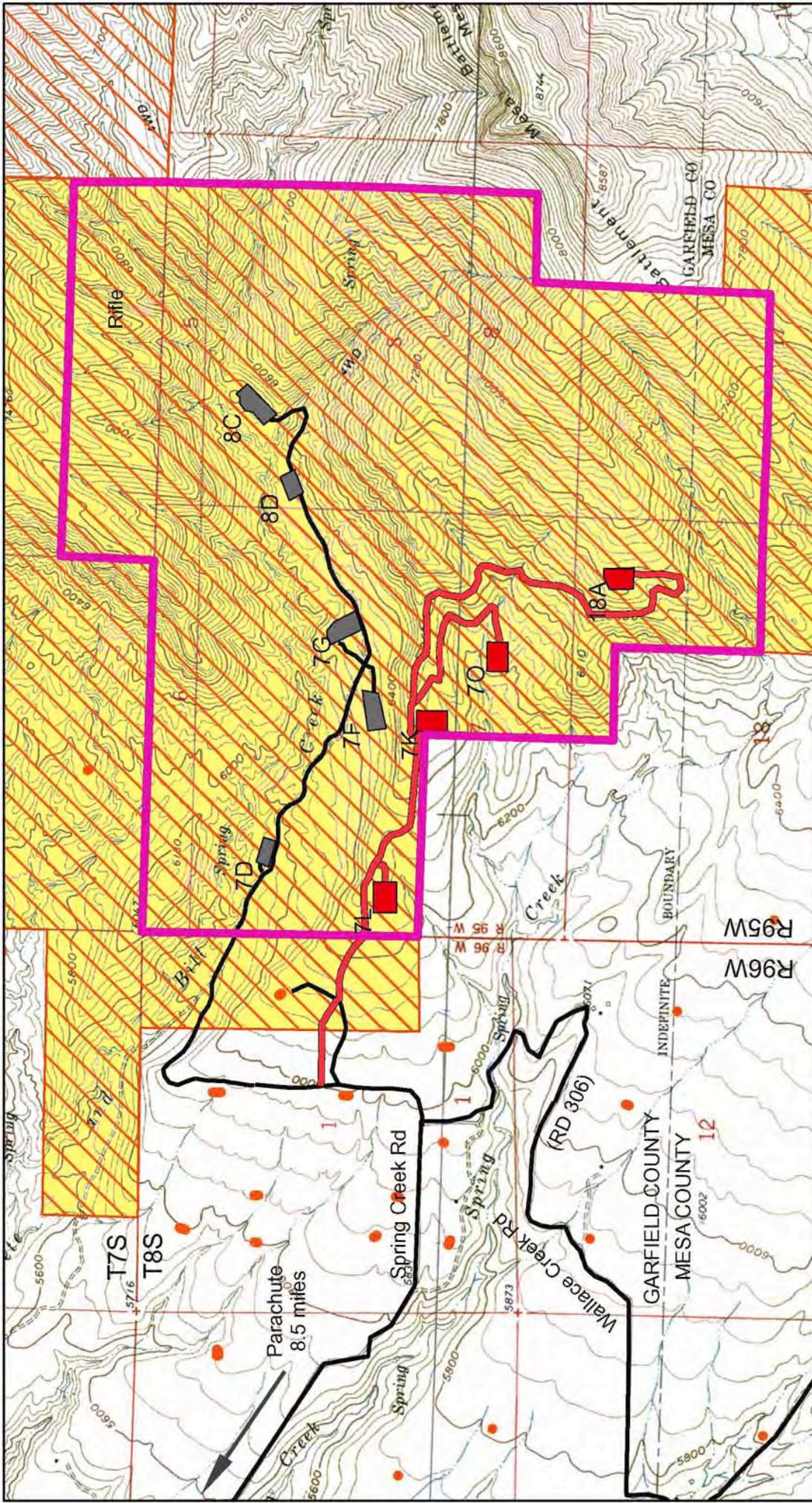
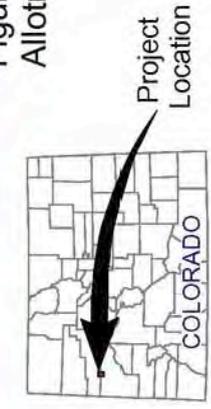


Figure 4. Range Management Allotments Pete and Bill Creek GAP



1 inch equals 2,000 feet  
 Contour interval = 40'  
 Date: July 2007

- Legend**
- GAP Boundary
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - Existing PBGAP Pads
  - Proposed PBGAP Pads
  - BLM Land Ownership
  - Private Land Ownership
  - Range Management Allotments
  - Dry Creek Pete & Bill

BASE: USGS 7.5 Minute Parachute and House Top Mountain, Colorado Quadrangles

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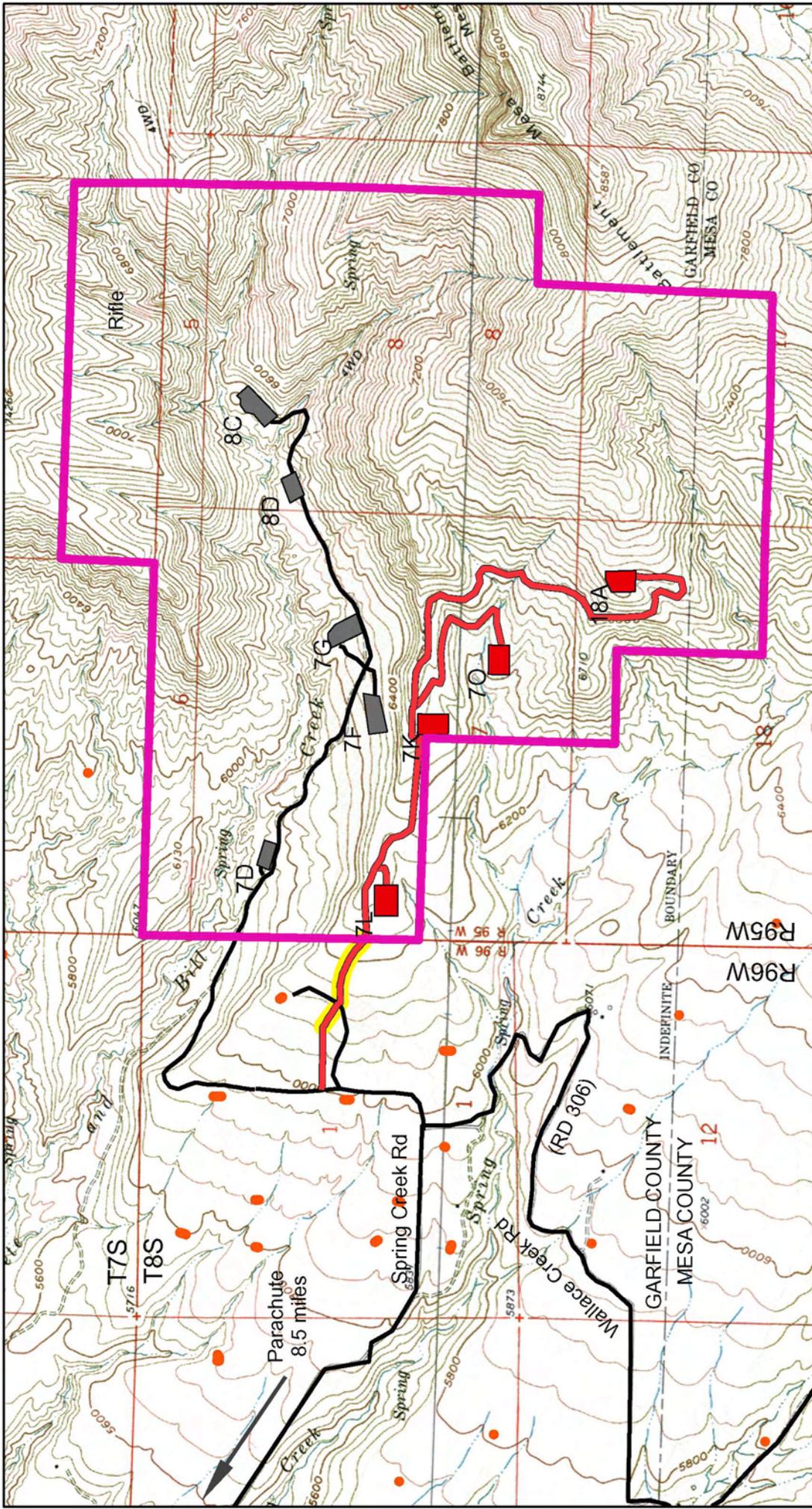


Figure 5. Right-of-ways  
Pete and Bill Creek GAP

**Legend**

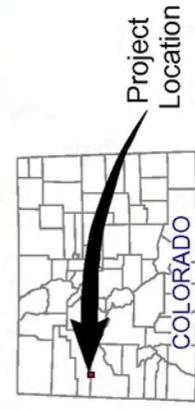
- GAP Boundary
- Existing Wells (COGCC)
- Proposed Roads & Pipelines
- Existing Roads
- PBGAP Pads**
- Existing
- Proposed

Road and Pipeline Right-of-Way To Be Authorized

N

1 inch equals 2,000 feet  
Contour interval = 40'

Date: July 2007



BASE: USGS 7.5 Minute  
Parachute and Housestop  
Mountain, Colorado Quadrangles

prepared by:  
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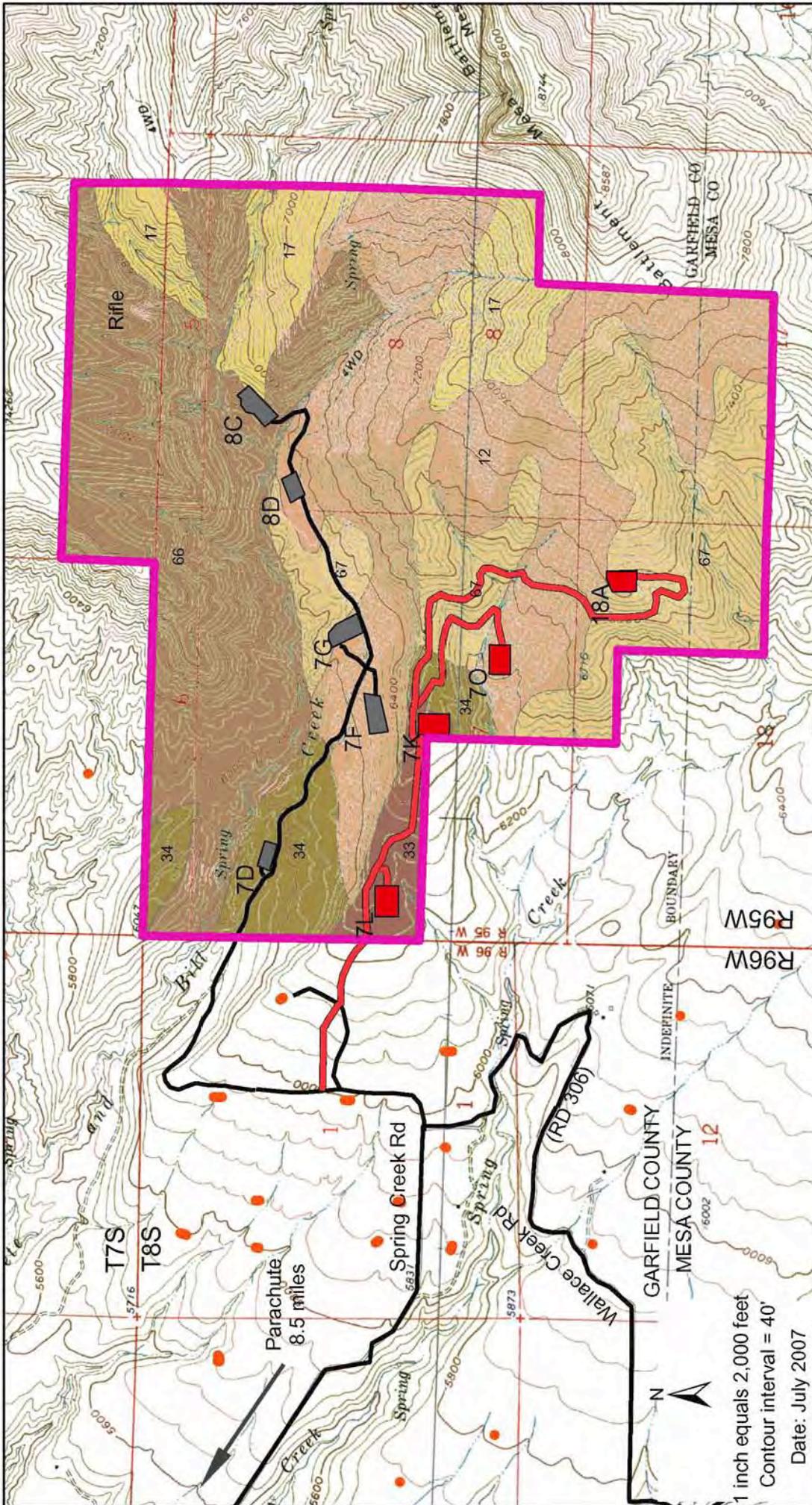


Figure 6. Soil Types  
Pete and Bill Creek GAP



- Legend**
- GAP Boundary
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
- PBGAP Pads**
- Existing
  - Proposed
- Soils**
- 12 - Bucklon-Inchou loams, 25 to 50 % slopes
  - 17 - Cochetopa loam, 9 to 50 % slopes
  - 33 - Ildefonso stony loam, 6 to 25 % slopes
  - 34 - Ildefonso stony loam, 25 to 45 % slopes
  - 66 - Torriorthents-Camborthids-Rock outcrop complex
  - 67 - Torriorthents-Rock outcrop complex

1 inch equals 2,000 feet  
Contour interval = 40'  
Date: July 2007

BASE: USGS 7.5 Minute  
Parachute and House Top  
Mountain, Colorado Quadrangles



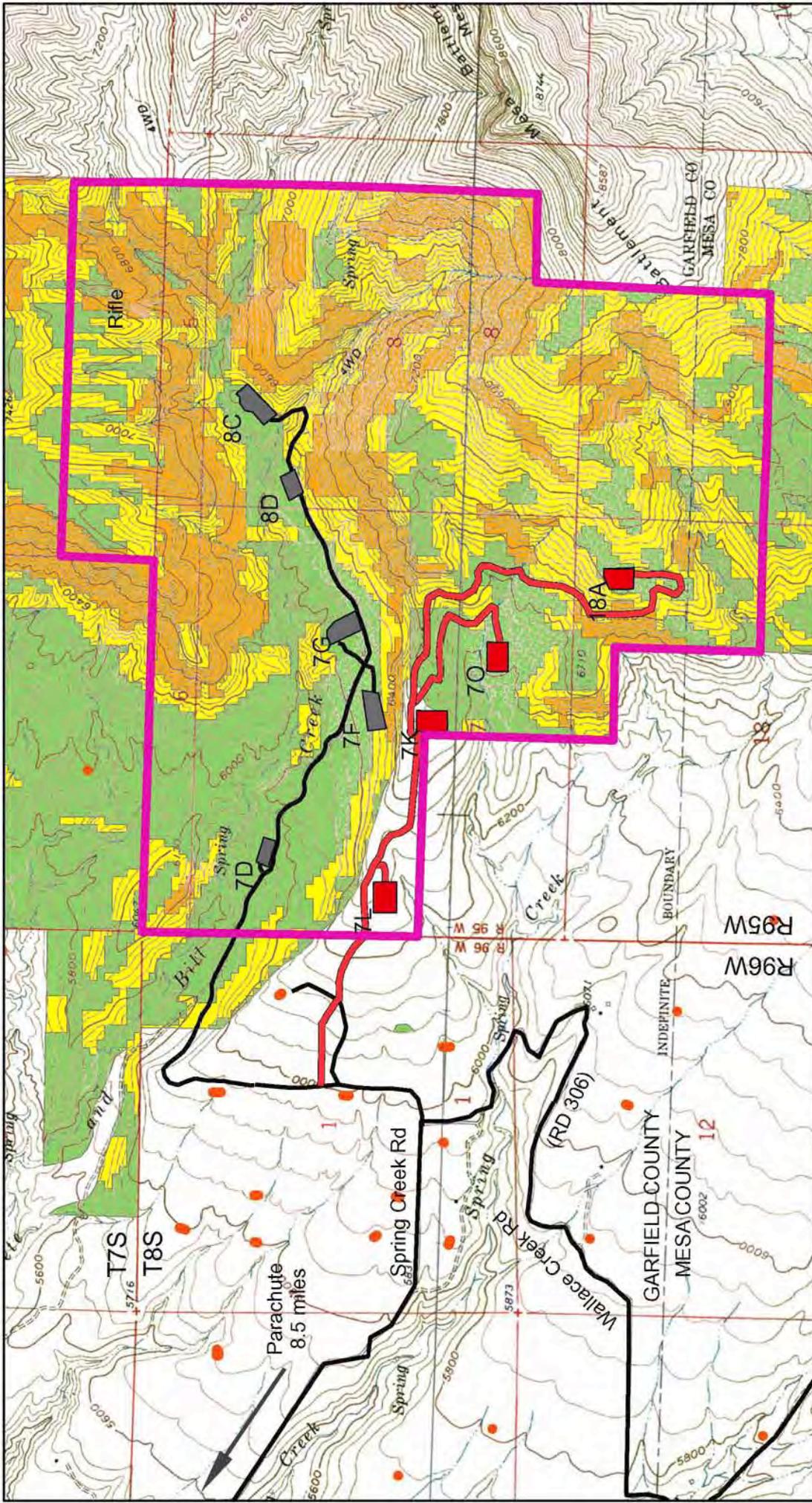


Figure 7. Fragile Soils  
Pete and Bill Creek GAP

- Legend**
- GAP Boundary
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - PBGAP Pads**
    - Existing
    - Proposed
  - Fragile Soils**
  - Slope Class**
    - 0 TO 30%
    - 30 TO 50%
    - OVER 50%



1 inch equals 2,000 feet  
Contour interval = 40'

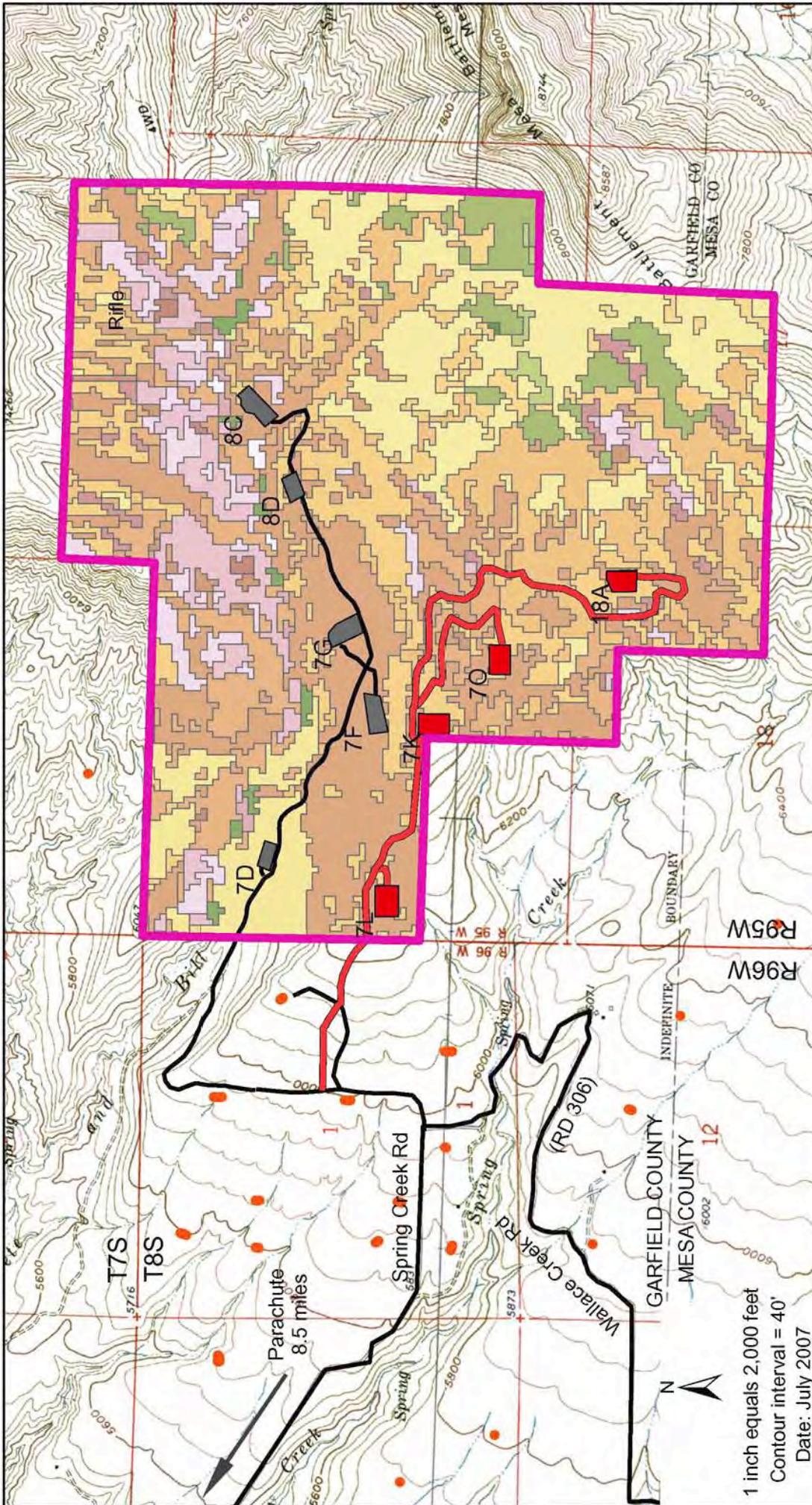
Date: July 2007



BASE: USGS 7.5 Minute  
Parachute and Housetop  
Mountain, Colorado Quadrangles

prepared by:  
Western Ecological Resource, Inc.  
711 Walnut Street  
Boulder, CO 80302  
(303) 449-9009 FAX (30) 449-9038

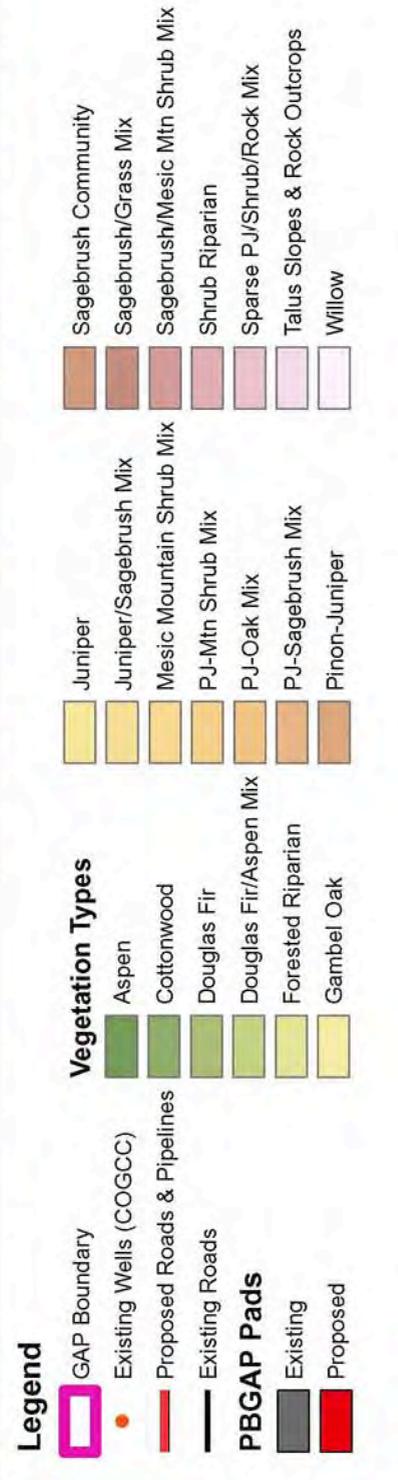




**Figure 8. Vegetation Types**  
**Pete and Bill Creek GAP**

BASE: USGS 7.5 Minute  
 Parachute and Housetop  
 Mountain, Colorado Quadrangles

prepared by:  
 Western Ecological Resource, Inc.  
 711 Walnut Street  
 Boulder, CO 80302  
 (303) 449-9009 FAX (303) 449-9038





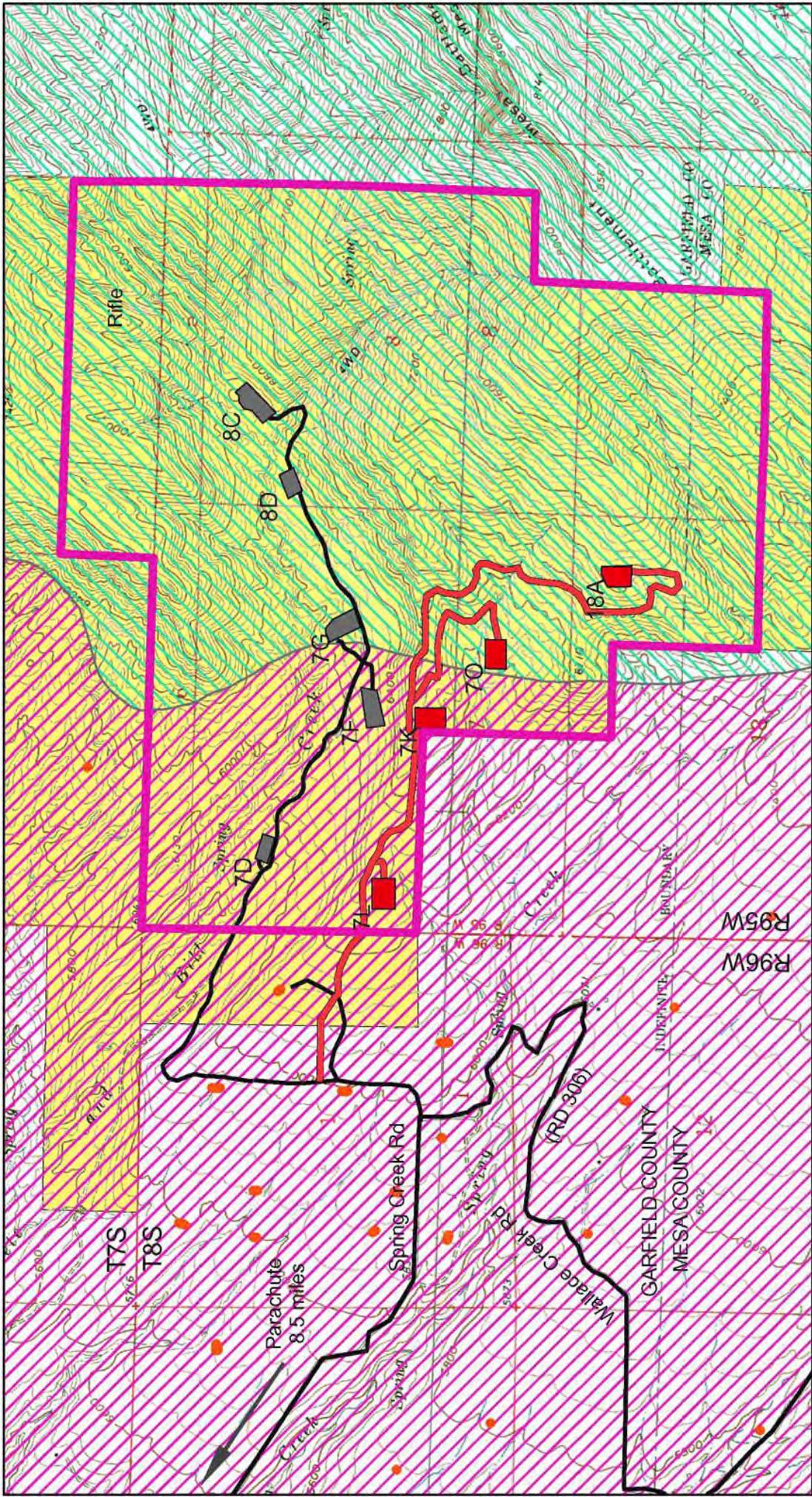


Figure 9. VRM Classes within the PBGAP Area Pete and Bill Creek GAP



BASE: USGS 7.5 Minute Parachute and Housetop Mountain, Colorado Quadrangles

**Legend**

	GAP Boundary	<b>Visual Resource Management Allotment</b>		Class 3	<b>Land Ownership</b>		BLM
	Existing Wells (COGCC)		Class 4		Private		
	Proposed Roads & Pipelines						
	Existing Roads						
	<b>PBGAP Pads</b> Existing						
	Proposed						

1 inch equals 2,000 feet  
Contour interval = 40'  
Date: July 2007



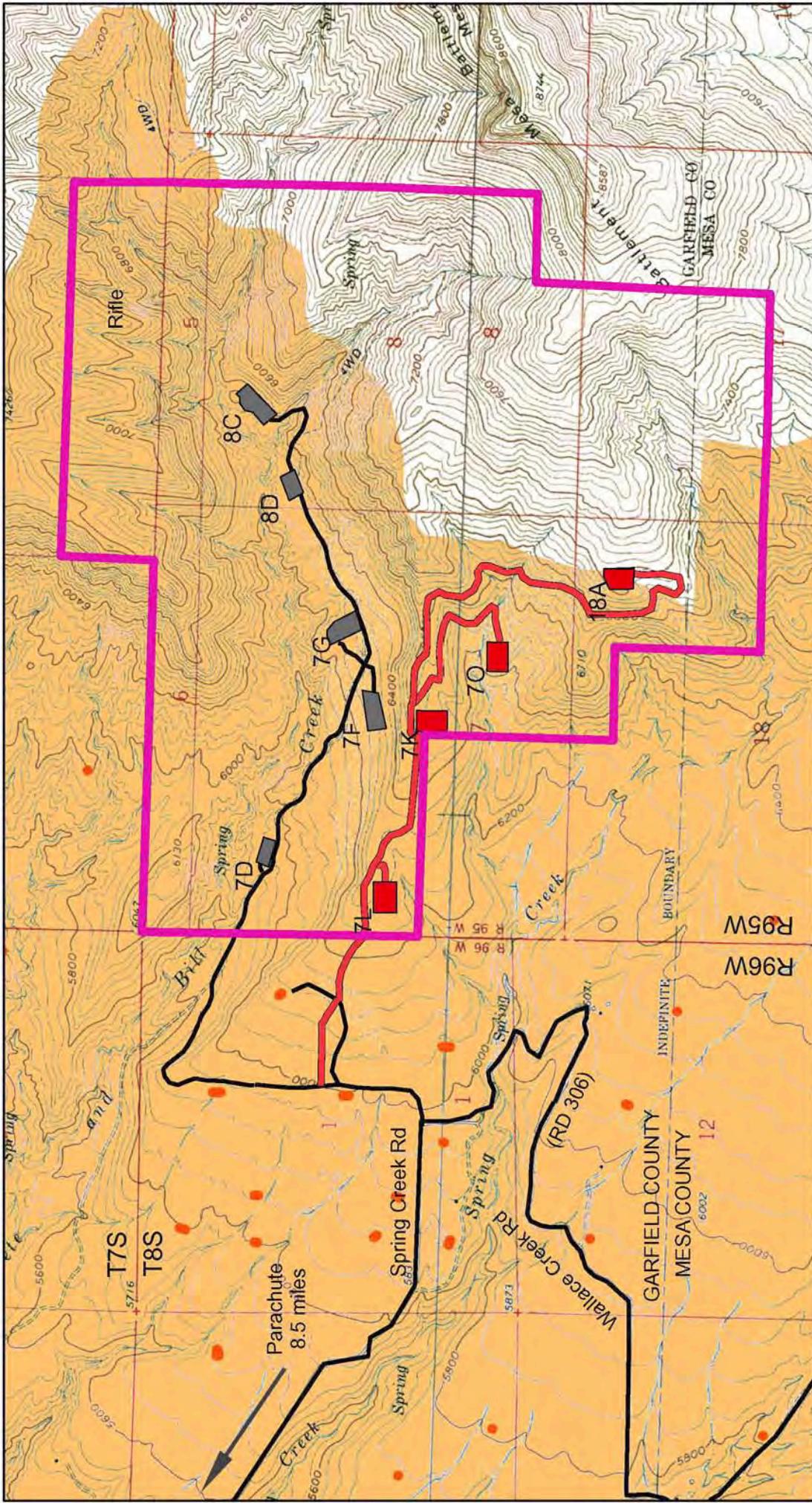


Figure 10. Deer Winter Range  
Pete and Bill Creek GAP



BASE: USGS 7.5 Minute  
Parachute and Housetop  
Mountain, Colorado Quadrangles

1 inch equals 2,000 feet  
Contour interval = 40'  
Date: July 2007

- Legend**
- GAP Boundary
  - Deer Winter Range
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - PBGAP Pads**
    - Existing
    - Proposed



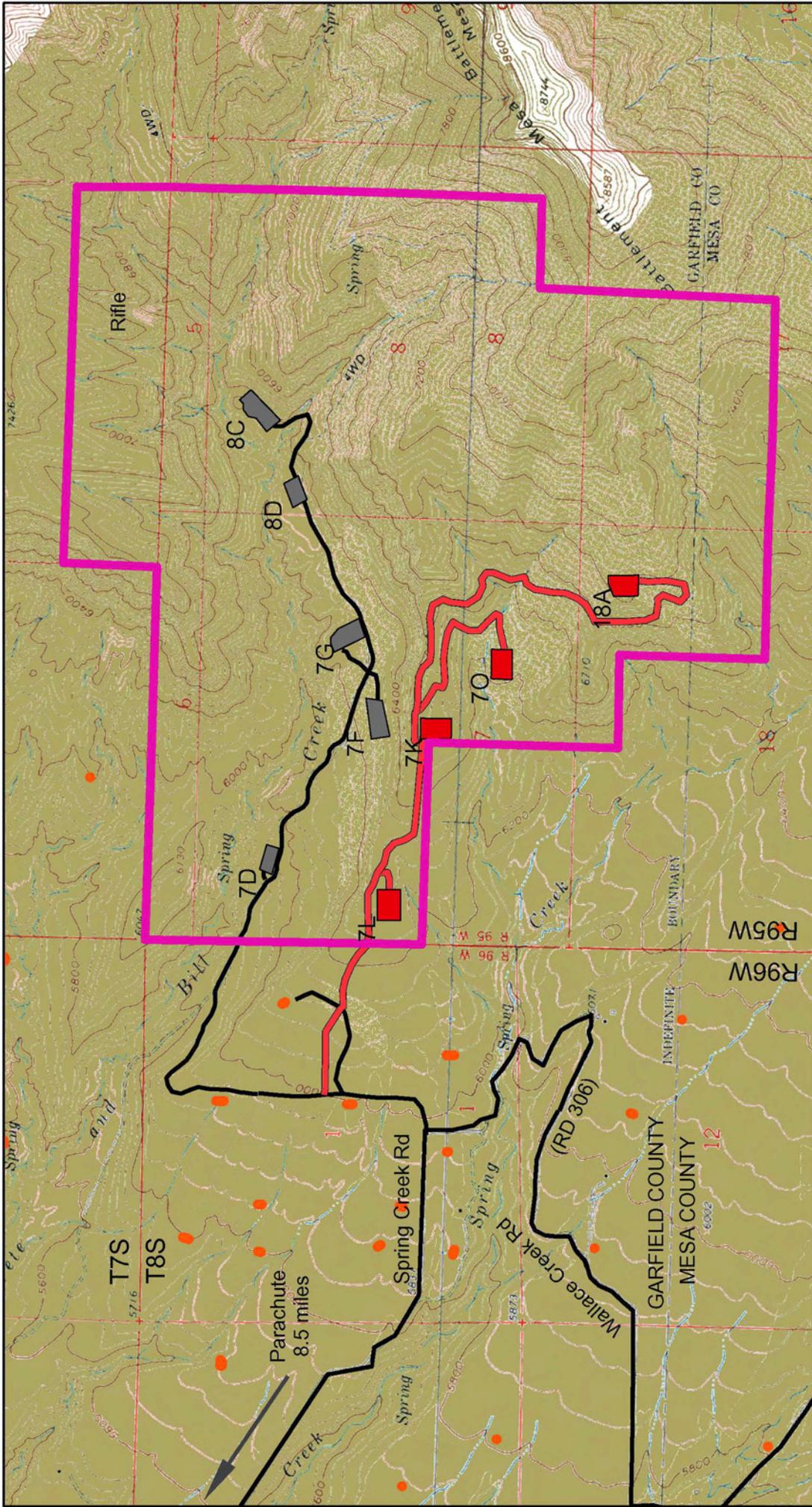


Figure 11. Elk Winter Range  
Pete and Bill Creek GAP



- Legend**
- GAP Boundary
  - Elk Winter Range
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - PBGAP Pads**
  - Existing
  - Proposed

1 inch equals 2,000 feet  
Contour interval = 40'  
Date: July 2007

BASE: USGS 7.5 Minute  
Parachute and Housetop  
Mountain, Colorado Quadrangles





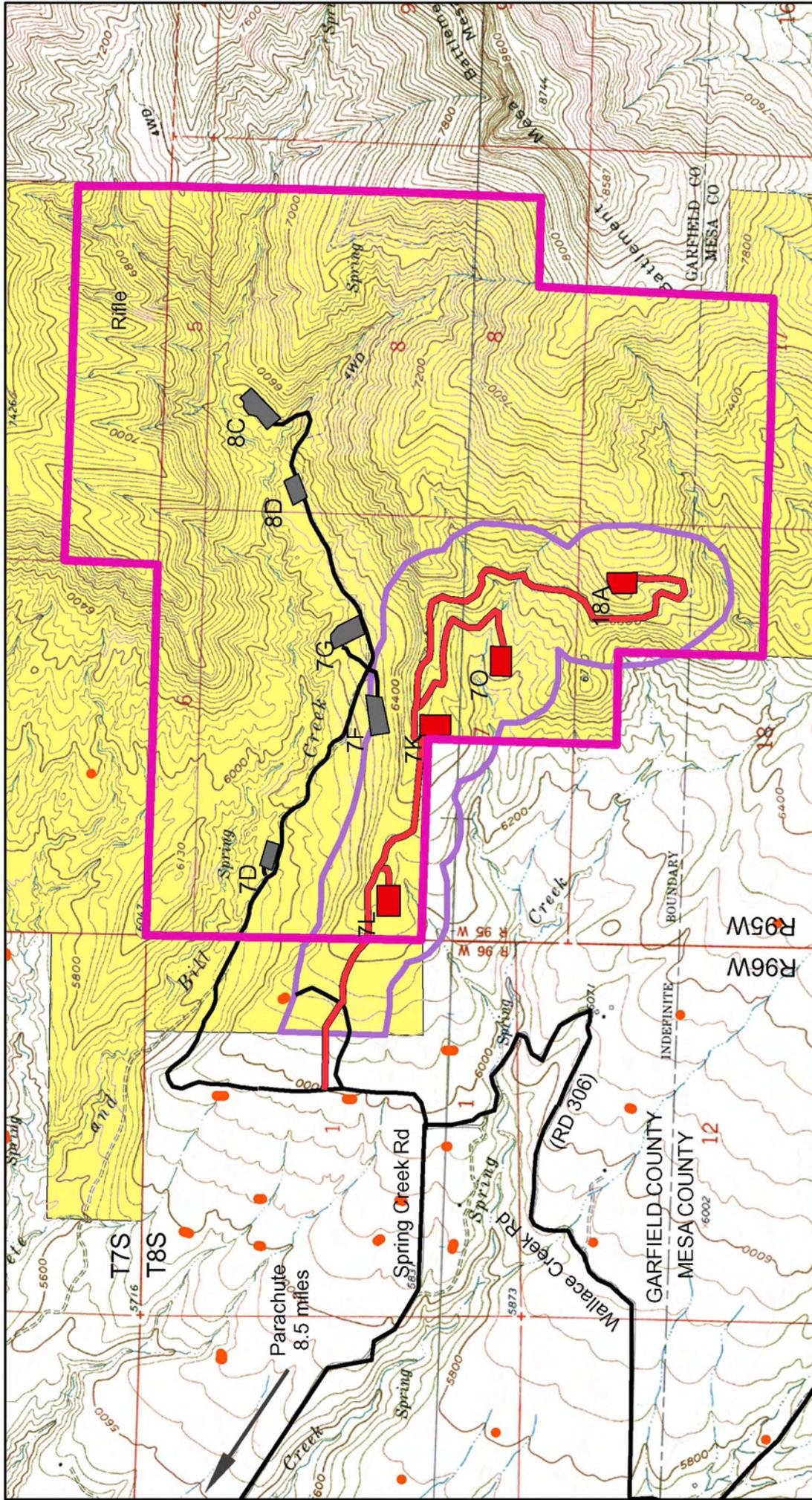


Figure 12. Effective Habitat Loss  
Pete and Bill Creek GAP



Project Location  
BASE: USGS 7.5 Minute  
Parachute and Housetop  
Mountain, Colorado Quadrangles

- Legend**
- GAP Boundary
  - Disturbance Buffer
  - Existing Wells (COGCC)
  - Proposed Roads & Pipelines
  - Existing Roads
  - BLM
  - Private
  - Existing PGAP Pads
  - Proposed PGAP Pads

1 inch equals 2,000 feet  
Contour interval = 40'  
Date: July 2007



## **Appendix B**

13-Point Surface Use Plan  
(Submitted by Noble Energy, Inc.)



# NOBLE ENERGY, INC.

7K Pad

7L Pad

7O Pad

18A Pad

Garfield County, Colorado

## MULTI-POINT SURFACE U.S.E AND OPERATIONS PLAN

1. **EXISTING ROADS** – Refer to Topo Maps “A” and “B”
  - A. Refer to directions in original APD.
  - B. Refer to existing roads in original APD
2. **PLANNED ACCESS ROADS**

Refer to plats and maps within individual APDs
3. **LOCATION OF EXISTING WELLS WITHIN A ONE (1) MILE RADIUS**
4. **LOCATION OF PRODUCTION FACILITIES**
  - A. Please reference the schematic attached to the APD for the location of proposed production facilities on the well pad.
  - B. Facilities on the pad will consist of tanks and production units. Reference APD for specific count. A single production unit consists of a separator, line heater and meter combination. Load lines will have a barrel under the end to catch drips.
  - C. A 10-3/4” steel gas line and a 4-1/2” fiberglass produced water line will be buried side by side in a common ditch constructed along the north side of the new access road out to existing Noble tie-ins, a distance of about 150 feet. The lines will be buried approximately 5 feet deep. The maximum disturbed width will be approximately 60 feet, all within the road corridor. The gas line will operate at 500 psi, be tested to 2160 psi with fresh water, and has a burst pressure of 2850 psi. The water line will operate at 400 psi, be tested to 750 psi with fresh water, and has a burst pressure of 2800 psi. Test water will be disposed of into Noble reserve pits. **Noble anticipates that these two lines will handle all the production from the eight wells proposed for this pad.**
  - D. Construction materials needed for installation of the production facilities will be obtained from the site; any additional materials required, such as gravel, will be purchased from a local supplier having a permitted source of materials in the area.
  - E. A berm or metal ring will be constructed completely around the tank battery. The berm will be constructed of compacted subsoil, be impervious, and hold 110% of the capacity of the largest vessel. If a metal ring is used, it, too, will be of sufficient size to hold 110% of the capacity of the largest vessel.

- F. All permanent (onsite for six (6) months or longer) above-the-ground structures constructed or installed on the well location, including, tank batteries, production units, etc., and excluding those subject to OSHA regulations, will be painted Shale Green (5Y 4/2). This also includes metal containment rings surrounding the tank batteries and any pipeline risers.
- G. During drilling and subsequent operations, all equipment and vehicles will be confined to the access road, pad and any additional areas which may be specified in the approved APD.
- H. Reclamation of disturbed areas no longer needed for operations will be accomplished by grading, leveling and seeding as recommended by the authorized officer, Glenwood Springs Field Office, Bureau of Land Management.

**5. LOCATION AND TYPE OF WATER SUPPLY**

Water for drilling operations will be obtained from the Colorado River at the Una Bridge by a water hauling company permitted for this activity. Existing improved roads, including Noble's BLM road right-of-way COC69031, will be utilized. No additional authorizations will be required.

**6. SOURCE OF CONSTRUCTION MATERIALS**

- A. Any construction materials (gravel) which may be required for surfacing of the drill pad will be obtained from a private contractor having a previously approved source of materials within the general area.
- B. No construction materials will be taken from Federal or Indian lands without prior approval from the appropriate Surface Management Agency.
- C. No new access roads will be required for the transportation of construction materials to the well location.

**7. METHOD OF HANDLING WASTE MATERIALS**

- A. Cuttings – the drilled cuttings will be deposited in the reserve pit. The reserve pit will be lined with 12 ml reinforced UV and hydrocarbon resistant synthetic liner with a permeability greater than or equal to  $1 \times 10^{-7}$  cm/sec. The top of the liner will be buried in the pit berms, extend under the mud tanks, and be installed so that it will not leak. If hard rocks are present in the pit, bedding material may be installed to protect the liner material.
- B. Drilling Fluids – including any salts and/or chemicals utilized in the mud system, will be contained in the reserve pit. The reserve pit was designed to prevent the collection of surface runoff and was constructed with a minimum of one-half the total depth below the original ground level at the lowest point within the pit.
- C. Produced fluids – liquid hydrocarbons produced during completion operations will be placed in test tanks on the location. Produced water will also be contained in tanks until the pipeline can be installed.
- D. Any spills of oil, gas, salt water or other potentially hazardous substances will be immediately cleaned up and removed to an approved disposal site.

- E. Sewage – portable, self-contained chemical toilets will be provided for human waste disposal. Upon completion of operations, or as required, the toilet holding tanks will be pumped and contents therein disposed of in an approved sewage disposal facility. Sewage disposal will be in strict accordance with Colorado State rules and regulations regarding sewage treatment and disposal.
- F. Garbage and other waste material – all garbage and non-flammable waste material will be contained in a self-contained, portable dumpster or trash cage. Upon completion of operations, or as needed, the accumulated trash will be hauled offsite to a State of Colorado approved sanitary landfill. **No trash will be placed in the reserve pit.**
- G. Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash cage will be cleaned up and removed from the well location. No potentially adverse materials or substances will be left on location.
- H. Any open pits will be fenced during the drilling operation and said fencing will be maintained until such a time as the pits have been backfilled.

8. **ANCILLARY FACILITIES** – None anticipated.

9. **WELLSITE LAYOUT**

- A. Exhibit 2A shows the drill pad as constructed, Exhibit 3 provides a cross-sectional view.
- B. All equipment and vehicles will be confined to the approved areas in this Application for Permit to Drill (i.e., access road, well pad).

10. **PLANS FOR RECLAMATION OF THE SURFACE**

- A. Rat and mouse holes will be backfilled and compacted from bottom to top immediately upon release of the completion rig from the location. The reserve pit will be solidified after completion operations.
- B. Producing Operations:
  - 1. Backfilling, leveling and re-contouring are planned as soon as possible after cessation of drilling and completion operations. Waste and spoil materials will be disposed of immediately upon cessation of drilling and completion operations.
  - 2. For production, the fill slopes will be reduced and the cut slopes will be reduced by pushing the fill material back up into the cut.
  - 3. Upon completion of backfilling, leveling and re-contouring, all disturbed surfaces (access road and well pad areas) will be scarified to a depth of 18 inches and the stockpiled topsoil will be evenly distributed to a depth of six (6) inches over the reclaimed area (s).
  - 4. Prior to commencement of seeding operations, the seedbed will be prepared by disking on the contour to a depth of four (4) to six (6) inches, leaving no depressions that would trap water or form ponds.

5. If conditions permit, the restored portions will be left rough and broadcast seeded. All disturbed surfaces (including the access road and the well pad areas) will be re-seeded using a seed mixture recommended by the Glenwood Springs Field Office, Bureau of Land Management.
6. If the drilling method of seeding is utilized, it will be drilled on the contour with a seed drill equipped with a depth regulator in order to ensure even depths of planting. Seed will be planted between one-quarter (1/4) to one-half (1/2) inches deep, with shrub seeds planted in rows separate from the grass seeds. In this case, utilize the bins on the outside rows of the drill for shrub seeds.
7. The broadcast method may be used instead of the drilling methods. If this is the case, the surface will be left in a rough condition and the seed mixtures will be doubled. The preferred method will be approved by the BLM at the time of restoration.
8. Fall seeding will be completed after September 1<sup>st</sup> and prior to ground frost. If applicable, spring seeding will be completed after the frost has left the ground and prior to May 15<sup>th</sup>.
9. The seeding will be repeated until a satisfactory stand, as determined by the Authorizing Officer, is achieved. The first evaluation of growth will be made following the completion of the first growing season.
10. Re-seeding activities are considered best in the fall, unless requested otherwise by the authorized officer Bureau of Land Management.
11. Mulching may be required on soils with low reclamation potential; where mulching is deemed necessary a certified weed free straw or hay mulch will be crimped into the soil at an application rate of 2 to 4 tons per acre. Mulches may be applied by blowers, spreaders or by hand. The mulch strand lengths should be long enough to be anchored by crimping. The mulch will be crimped to a depth of 2 to 3 inches. The mulch will be spread uniformly over the area so that 75% or more of the surface is covered.

C. Abandoned Well Location:

1. Upon final abandonment of the well location, gravel will be removed from the access road surface and well location (as directed by the authorized officer), water diversion installed as needed, and both the access road and well location will be restored to approximately the original ground contour(s) by pushing the fill material back into the cut and up over the backslope.
2. No depressions will be left that would trap water or form ponds. All disturbed surfaces (including the access road and well pad areas) will be re-seeded as directed by the BLM and re-vegetated sites will be monitored to ensure that desired species are thriving and invasive/noxious weeds are not present.

11. **SURFACE OWNERSHIP**

The well site and access road are located on lands administered by the Bureau of Land Management, Glenwood Springs Field Office.

12. **OTHER INFORMATION**

A. There are no known threatened or endangered species that would be affected by implementation of operations on this well location.

B. Noble Energy will be responsible for informing all persons associated with this project that they will be subject to prosecution for damaging, altering, excavating or removing any archaeological historical, or vertebrate fossil objects or sites.

C. If archaeological, historical or vertebrate fossil materials are discovered, Noble Energy will suspend all operations that further disturb such materials and immediately contact the authorized officer. Operations will not resume until authorization to proceed is issued by the authorized officer.

D. Construction activities, reclamation, and/or routine maintenance activities will not be conducted during periods when the soil is frozen or saturated, or when watershed damage is likely to occur as a result of these activities.

E. Noble Energy will be responsible for weed control on disturbed areas within the exterior limits of this permit and will consult with the authorized officer and/or local authorities for acceptable weed control measures.

F. Noble Energy will be responsible for applying dust abatement measures as needed or directed by the 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 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.

G. Hazardous Materials

1. The concentration of hazardous substances in the reserve pit at the time the pit is backfilled must not exceed the standards set forth in the **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**.
2. All gas and oil drilling related to CERCLA hazardous substances removed from the location and not reused at another drilling location must be disposed of at an EPA approved hazardous waste facility.
3. The permittee(s) and associated contractors shall comply with all applicable Federal, State and local laws and regulations, existing or hereafter enacted or promulgated, with regard to any hazardous material, as defined in this paragraph, that will be used, produced, transported or stored on the oil and gas lease, "Hazardous material" means any substance, pollutant or contaminant that is listed as hazardous under the CERCLA of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulation. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the RCRA of 1976, as amended, 42 U.S.C. 6901 et seq., and its regulations. The term hazardous materials also includes any nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended, 42 U.C.S. 2011 et seq. The term 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 U.S.C. 9601 (14) nor does the term include natural gas.

4. No hazardous substances or wastes will be stored on the location after completion of the well.
5. Chemicals brought to location must be on the Toxic Substance Control Act (TSCA) approved inventory list. For the list of chemicals and their quantities to be stored, produced, used, transported, or disposed.
6. All hazardous substances brought to the location will have a MSDS, and will be properly handled as to not cause harm to the environment or to people.
7. All Material Safety Data Sheets (MSDS) will be kept on location until the hazardous material is properly disposed of, all in accordance with Federal Law.

Noble Energy, Inc., maintains a file, per 29 CFR 1910.1200 (g) containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances which are used during the course of construction, drilling, completion, and production operations for this project. Hazardous materials (substances) which may be found at the site may include drilling mud and cementing products which are primarily inhalation hazards, fuels (flammable and/or combustible), materials that may be necessary for well completion/stimulation activities such as flammable or combustible substances and acids/gels (corrosives). The opportunity for Superfund Amendments and Reauthorization Act (SARA) listed Extremely Hazardous Substances (EHS) at the site is generally limited to proprietary treating chemicals. All hazardous and Extremely Hazardous Substances and commercial preparations will be handled in an appropriate manner to minimize the potential for leaks or spills to the environment.

All undesirable events (fires, accidents, blowouts, spills, discharges) as specified in Notice to Lessees (NTL) 3A will be reported to the BLM, Glenwood Springs Field Office. Major events will be reported verbally within 24 hours, followed by a written report within 15 days. "Other than Major Events" will be reported in writing within 15 days. "Minor Events" will be reported on the Monthly Report of Operations and Production (Form 3160-6).

13. **LESSEE'S OR OPERATOR'S REPRESENTATIVE AND CERTIFICATION**

DeAnne Spector  
Regulatory Specialist  
Noble Energy, Inc.  
1625 Broadway, Suite 2000  
Denver, CO 80202  
**Phone: 303-228-4064**

**Certification**

All lease and/or unit operations will be conducted in such a manner that full compliance is made with all applicable laws, regulations, *Onshore Oil and Gas Orders*, the approved plan of operations, and applicable *Notices to Lessees*.

Noble Energy will be fully responsible for the actions of their subcontractors. A copy of these conditions will be furnished to the field representatives to ensure compliance.

The dirt contractor will be provided a copy of the Surface Use Plan from the approved Application for Permit to Drill.

This drilling permit will be valid for a period of one (1) year from the date of approval. After permit termination, a new application will be filed for approval for any future operations.

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

Signed:

  
DeAnne Spector, Regulatory Specialist

Date:





## **Appendix C**

10-Point Drilling Plan  
(Submitted by Noble Energy, Inc.)



**Noble Energy, Inc.**

**7K Pad – 10 Wells**  
**7L Pad – 4 Wells**  
**7O Pad – 6 Wells**  
**18A Pad – 12 Wells**

**Garfield County, Colorado**

**DRILLING PROGNOSIS**

(Please see attached directional drilling plan.)

**1. ESTIMATED TOPS OF IMPORTANT GEOLOGIC MARKERS**  
(for KB elevation add 16 feet)

<b><u>FORMATION</u></b>	<b><u>Top (MD)</u></b>
Wasatch	Surface
Williams Fork	
Top of Gas	
Cameo Coal	
Rollins	
Cozzette	
Corcoran	
Mancos	
Total Depth	

**2. ESTIMATED DEPTHS OF ANTICIPATED WATER, OIL, GAS OR MINERAL BEARING FORMATIONS**

<b><u>FORMATION</u></b>	<b><u>DEPTH (MD)</u></b>	<b><u>SUBSTANCE</u></b>
Wasatch	Surface	Water
Williams Fork		Gas/Oil/Water
Top of Gas		
Cameo Coal		Gas/Oil/Coal/Water
Rollins		Gas/Oil/Water
Cozzette		Gas/Water
Corcoran		Gas/Water
Mancos		Gas/Water

Any usable water zones encountered will be adequately protected and reported. All usable water zones, potentially productive hydrocarbon zones, and valuable mineral zones will be isolated.

**3. PRESSURE CONTROL EQUIPMENT**-Schematic attached

- A. Type: 11.00” - 5,000 psi WP Annular BOP  
11.00” - 5,000 psi WP Double Ram BOPs  
Rotating Head

**The Blow Out Prevention Equipment will be set up as follows:**

- Rotating Head
- Annular Preventer
- Blind Rams (4.5")
- Pipe Rams
- Drilling Spool with 2-3" outlets
- Double Studded Adapter 11" 3000 psi x 11" 5000 psi
- Casing Head
- Kill line equipped with 2-2" x 5,000 psi valves and 1-2" x 5,000psi check valve as a minimum.
- Choke line equipped with 2-3" x 5,000 psi valves
- Choke manifold equipped with 2-3" x 5,000 psi valves, 4-3" x 5,000 psi wing outlet valves, a remote operated choke, a manual choke, 2-3" x 5000 psi valves downstream of the remote chokes, 2-3" x 5000 psi valves downstream of the manual choke and a pressure gauge. Bypass line from flare line to mud gas separator line.
- Upper kelly cock with handle available on floor
- Full opening internal blowout preventer or drill pipe safety valve to fit all connections

B. **Pressure rating:** 5,000 psi working pressure

C. **Testing Procedures:**

Annular Preventer

At a minimum, the Annular Preventer will be pressure tested to 50% of the rated working pressure for a period of ten (10) minutes or until provisions of the test are met, whichever is longer. The above pressure test will be performed as required.

- At initial installation
- Whenever any seal subject to test pressure is broken
- Following any related repairs

In addition, the annular preventer will be functionally operated at least weekly.

Ram Preventers

At a minimum, the Ram Preventers and the remaining BOPE (with the exception of the annular preventer) will be pressure tested to the approved working pressure of the BOP stack (if isolated from the surface or intermediate casing by a test plug). If the BOP stack is not isolated from the casing, then the equipment will be tested to 70% of the internal yield strength of the casing. Pressure will be maintained for a period of at least ten (10) minutes or until the requirements of the test are met, whichever is longer.

The above pressure test will be performed as required:

- At initial installation
- Whenever any seal subject to test pressure is broken
- Following any related repairs

In addition to the above, the pipe and blind rams will be activated each trip, but not more than once each day. All BOP drills and tests will be recorded in the IADC driller's log. The Glenwood Springs BLM Petroleum Engineer and the Colorado Oil and Gas Conservation Commission (COGCC) will be notified at least twenty-four (24) hours in advance of pressure tests.

**D. Choke Manifold Equipment:**

All choke lines will be straight unless turns utilize tee blocks or are targeted with running tees, and the lines will be anchored to prevent whip and vibration. A 5000 psi flex choke hose may be utilized from the BOP to the choke manifold.

**E. Accumulator:**

The accumulator will have sufficient capacity to open the hydraulically-controlled choke line valve (if so equipped), close all pipe rams plus the annular preventer, and retain a minimum of 200 psi above the precharge on the closing manifold without the use of the closing unit pumps. The fluid reservoir capacity will be double the usable fluid volume of the accumulator's system capacity and the fluid level of the reservoir will be maintained at the manufacturer's recommendations.

The BOP system will have two (2) independent power sources to close preventers. Nitrogen bottles (3 minimum) will be one (1) of these independent power sources and will maintain a charge equal to the manufacturer's specifications.

The accumulator precharge pressure test will be conducted prior to connecting the closing unit to the BOP stack and at least once every six (6) months thereafter. The accumulator pressure will be corrected if the measured precharge pressure is found to be above or below the maximum or minimum limits specified in *Onshore Oil a Gas Order Number 2*.

**F. Well Control Drills:**

Well control drills will be conducted by each crew after drilling out of the surface casing. The date and the time of the drills will be recorded in the IADC drilling book.

**G. Monitoring Equipment:**

When drilling below surface casing the following equipment will be utilized. Pit volume totalizer (PVT) equipment will be rigged up in the mud tanks to monitor mud volumes in the active mud system. A flow indicator will rigged up on the flow line to show when flow down the flow line is taking place. Stoke counters will be installed on both mud pumps to monitor pump strokes during all pumping activities. All of this equipment will be installed in a manner that will allow the driller to monitor this equipment from the rig floor when drilling.

**H. Miscellaneous Information:**

The Blow-Out Preventer and related pressure control equipment will be installed, tested and maintained in compliance with the specifications in and the requirements of *Onshore Oil and Gas Order Number 2*.

The choke manifold and BOP extension rods with hand wheels will be located outside the rig substructure. The hydraulic BOP closing unit will be located at least twenty-five (25) feet from the well head and will be readily accessible to the driller. Exact locations and configurations of the hydraulic BOP closing unit will depend upon the particular rig contracted to drill this hole.

Flare lines will be installed down stream from the choke manifold, extending a minimum of one hundred (100) feet from the center of the drill hole to a separate flare pit.

#### 4. PROPOSED CASING AND CEMENTING PROGRAM

Casing Program:

Hole Size	Casing Size	Wt./Ft.	Grade	Joint	Depth
20"	16"		Conductor Pipe		60'
12-1/4"	8-5/8"	24.0	J-55	STC	1500'
7-7/8"	4-1/2"	11.6	I-80	LTC	TD

Casing strings will be pressure tested to 0.22 psi/ft of casing string length or to 1,000 psi whichever is greater (not to exceed 70% of the internal yield strength of the casing), after cementing and prior to drilling out from under the casing shoe. Surface casing shoe will be set in a competent formation. Surface casing shall have centralizers on the bottom three joints, with a minimum of one centralizer per joint.

Cementing Program:

Surface Casing: Lead with 320 sx Rockies Lite plus additives mixed at 12.3 ppg with a yield of 2.37 ft<sup>3</sup>/sx. Tail with 180 sx Rockies Lite plus additives mixed at 12.8 ppg with a yield of 2.11 ft<sup>3</sup>/sx. Cement to surface. Top out with 1" pipe if necessary.

Production Casing: Cement with 650 sx 50/50 Poz plus additives mixed at 13.5 ppg with a yield of 1.45 ft<sup>3</sup>/sx. TOC ± 3500' (minimum of 200' above top of Mesa Verde (Williams Fork)).

Actual cement volumes to be determined after reviewing logs and shows. All potentially productive zones will be covered with cement. All waiting on cement times shall be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

#### 5. MUD PROGRAM

Interval	Type	Weight	Viscosity	Fluid Loss/Remarks
0-1500'	Gel/Lime	8.5-9.0 ppg	30-45	No Control
1500' – TD'	LSND	8.8-9.5 ppg	32-50	≤ 10 cc

The drilling fluids have been designed for optimal wellbore hydraulics and hole stability. Sufficient mud material(s) to maintain mud properties, control lost circulation and maintain well control will be available at the well during drilling operations.

**6. EVALUATION PROGRAM**

**Logs:**

Density Neutron/Induction                      Base surface csg to TD

- No cores or DST's are planned.
- No stimulation treatments have been formulated for this well at this time. The drill site as approved will be of sufficient size to accommodate all completion activities.

The evaluation program may change at the discretion of the wellsite geologist, with prior approval from the authorized officer, Glenwood Springs Field Office, Bureau of Land Management.

Whether the well is completed as a dry hole or as a producer, *Well Completion and Recompletions Report and Log* (Form 3160-4) will be submitted to the Glenwood Springs Field Office and State of Wyoming Oil and Gas Conservation Commission Office no later than thirty (30) days after the completion of the well or after completion of operations being performed.

Two copies of all logs, core descriptions, core analyses, well test data, geologic summaries, sample descriptions and all other surveys or data obtained and compiled during the drilling, workover, and/or completion operations will be filed with Form 3160-4. Samples (cuttings, fluids, and/or gases) will be submitted when requested by the authorized officer, Glenwood Springs Field Office, Bureau of Land Management.

**7. ABNORMAL CONDITIONNS**

No abnormal temperatures or pressures are anticipated. No hydrogen sulfide has been encountered or is known to exist from previous drilling in the area at this depth.

**8. ANTICIPATED STARTING DATES AND NOTIFICATION OF OPERATIONS**

A. Anticipated Starting Dates:

Operation Commencement date:	Upon APD approval
Drilling Days	Approximately 14 days
Completion Days	Approximately 14 days

B. Notification of Operations: COGCC and BLM must both be notified of spud date.

BLM Glenwood Springs Office:	970-947-5210
COGCC:	303-894-2100

**9. GENERAL CONDITIONS OF APPROVAL**

- A. All lease and/or unit operations are to be conducted in such a manner to ensure full compliance with the applicable laws, regulations (43 CFR, Part 3160), Onshore Orders, Notices to Lessees, and the approved plan of operations.

- B. The spud date will be reported orally to the Glenwood Springs Field Office **24 HOURS PRIOR TO SPUDDING**, unless otherwise required in the site specific conditions of approval.
- C. All wells, whether drilling, producing, suspended or abandoned shall be identified in accordance with 43 CFR 3162.6. There shall be a sign or marker with the name of the operator, the lease serial number, the well number and the surveyed description of the well.
- D. In accordance with *Onshore Oil & Gas Order Number 1*, this well will be reported on MMS form #3160-6, *Monthly Report of Operations and Production*, starting with the month in which operations commence and continuing each month until the well is physically plugged and abandoned. This report will be filed directly with the Royalty Management Program, Minerals Management Service, P.O. Box 17110, Denver, Colorado 80217.
- E. All undesirable events (fires, accidents, blowouts, spills, discharges) as specified in NTL-3A will be reported to the Glenwood Springs Field Office. Major events will be reported verbally within twenty-four (24) hours and will be followed with a written report within fifteen (15) days. Other than major events will be reported in writing within fifteen (15) days. Minor events will be reported on the *Monthly Report of Operations and Production* (form #3160-6).
- F. No well abandonment operations will be commenced without the 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 Field Office Petroleum Engineer.
- G. A *Notice of Intention to Abandon* (form #3160-5) will be filed with the authorized officer within fifteen (15) days following the granting of oral approval to plug and abandon.
- H. Upon completion of approved plugging, a regulation marker will be erected in accordance with 43 CFR 3162.6. The following information will be permanently placed on the marker with a plate, cap, or beaded-on with a welding torch: Company Name, Well Name and Number, Location by Quarter/Quarter, Section, Township, Range, and the Federal Lease Number.
- I. A *Subsequent Report of Abandonment* (form #3160-5) will be submitted within thirty (30) days following the actual plugging of the well bore. This report will indicate where plugs were placed and the current status of surface restoration operations. If surface restoration has not been completed at that time, a follow-up report on form 3160-5 will be filed when all surface restoration work has been completed and the location is considered ready for final inspection. If the location is on private surface, a *Landowner Acceptance of Reclamation* letter will be attached to this "Sundry Notice."
- J. Pursuant to NTL-4A, lessees and operators are authorized to vent/flare gas during initial well evaluation tests, not exceeding a period of 30 days or the production of fifty (50) MMCF of gas, whichever occurs first. An application must be filed with the authorized officer, and approval received, for any venting/flaring of gas beyond the initial 30 day or otherwise authorized test period.
- K. Not later than the 5<sup>th</sup> business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in the case of a

well which has been off production for more than ninety (90) days, the operator shall notify the authorized officer by letter or Sundry Notice of the date on which such production has begun or resumed. The notification shall provide at a minimum, the following informational items:

- a. Operator's name, address, and telephone number
  - b. Well name and number
  - c. Well location "¼, ¼, Section, Township, Range, P.M."
  - d. Date well was placed in a producing status
  - e. The nature of the wells production (i.e.: crude oil casing gas, or natural gas and entrained liquid hydrocarbons).
  - f. The OCS, Federal or Indian lease prefix and number on which the well is located. Otherwise, the non-Federal or non-Indian land category (i.e.: state or private).
  - g. As appropriate, the communitization agreement number, the unit agreement name, number and participating area name.
- L. Within sixty (60) days following construction of a new tank battery, a site facility diagram of the battery showing actual conditions and piping must be submitted to the authorized officer. Facility diagrams shall be filed within sixty (60) days after existing facilities are modified. For complete information as to what is required on these diagrams, please refer to 43 CFR 3162.7-4(d).
- M. Pursuant to Onshore Oil & Gas Order Number 1, lessees and operators have the responsibility to see that their exploration, development, production, and construction operations are conducted in such a manner which conforms with applicable Federal laws and regulations and with state and local laws and regulations to the extent that such state and local laws are applicable to operations on Federal and Indian lands.



## **Appendix D**

Standard and Site-Specific Conditions of Approval



## Surface Use Conditions of Approval (COAs)

### **I. Standard COAs Applicable to All PBGAP Components**

**Administrative Notification:** At least 48 hours prior to construction, the operator shall notify the BLM representative of construction startup plans.

**1. Road Design, Construction, and Maintenance:** All roads in the GAP shall be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity as per current BLM Gold Book standards.

As per BLM Gold Book Standards, gravel or other surfacing is required for steep grades, highly erosive soils, clay soils, and/or where all-weather access is needed.

Relief ditches or corrugated metal pipes shall be installed at regular intervals as per current BLM Gold Book standards (25 year 6 hour and 24 hour storm events) to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and sediment would settle out on the surface.

Ditches shall be allowed to vegetate and/or shall be armored with rocks or stones to slow the velocity of drainage and allow sediment to settle out.

Where drainage ditches are installed to direct runoff away from the road on steeper grades, water bars or hay bale dikes shall be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out particulates as per current BLM Gold Book standards.

The operator's road construction plans shall identify specific locations of drainage features and proposed BMPs for approval by the BLM prior to construction.

All road construction and maintenance activities shall adhere to standards identified in Gold Book.

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.

Speed control measures on all project-related unpaved roads shall be implemented to reduce vehicle fugitive dust.

In accordance with the operator's standard policy, erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, placement of surface rock on approaches to stream crossings, placement of surface rock, straw bales, and/or matting shall be used along proposed road reaches within 100-feet of stream channels.

Within areas less than 100 feet from intermittent drainages, an adequate vegetative buffer, artificial buffers (e.g., straw bales, matting, etc.), or filter strip shall be maintained between the road and the drainage to filter runoff from the road before it reaches the creek, wherever possible.

**2. Cultural Resource/Native American:** Class III cultural resource inventories will be required on any and all new wells, access roads, pipelines and other ground-disturbing activities not covered in this plan that require a Federal permit or authorization to conduct the action. Additional action specific mitigation

may be required – including but not limited to moving the location, archeological monitoring, testing, or data recovery

Strict adherence to the confidentiality of information concerning the nature and location of archaeological resources will be required of the operator and its contractors (Archaeological Resource Protection Act 16 U.S.C. 470hh).

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

Colorado State Statutes (CRS 24-80-401 and CRS 24-80-1301) for Historic, Prehistoric, and Archaeological Resources, and for Unmarked Human Graves shall be adhered to by the operator and its contractors on private lands. These State statutes require that the Federal authorizing officer be notified immediately of any historic or prehistoric finds or human grave. The find must be protected until the Authorizing Officer indicates that the action may proceed.

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

Pursuant to 43 CFR 10.4(g), the BLM authorized officer shall be notified by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4 (c) and (d), activities shall stop in the vicinity of the discovery, and the discovery 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 U.S.C 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.

Antiquities, historic, prehistoric ruins, or objects of scientific interest that are outside the authorization boundaries but directly associated with the impacted resource shall also be included in this evaluation and/or mitigation.

In situations where Federal action is required for wells directionally drilled into federal minerals from private surface overlying fee minerals, BLM's responsibilities under Section 106 of the National Historic Preservation Act [(NHPA) 16 U.S.C. 470] as amended and Section 36 CFR 800.4 shall be followed.

**4. Invasive Non-native Species (Weeds):** 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](mailto:beth_brenneman@blm.gov).

**5. Migratory Birds:** It shall be the responsibility of the operator to comply with the Migratory Bird Treaty Act with respect to "take" of migratory bird species. "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 take measures to 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 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.

**6. Nesting Raptors:** Raptor nest surveys for the PBGAP in 2007 did not result in location of raptor nest structures within 0.25 mile of a well pad or 0.125 mile of an access road, pipeline, or other surface facility. Although BLM considers surveys conducted for a NEPA Environmental Assessment to be valid for 5 years, new nests may be built and occupied between the initial surveys and project implementation. To ensure compliance with the Migratory Bird Treaty Act, the operator should schedule construction or drilling activities to begin outside the raptor nesting season (February 1 to August 15) if practicable. If initiation of construction or drilling during these dates cannot be avoided, the operator is responsible for complying with the Migratory Bird Treaty Act, which prohibits the "take" of birds or active nests (those containing eggs or young), including nest failure caused by noise and human activity. Contact Jeff Cook, Glenwood Springs Energy Office Wildlife Biologist, at 970-947-5231 or [jeffrey\\_cook@blm.gov](mailto:jeffrey_cook@blm.gov).

**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% 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](mailto: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 reseeding 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](mailto:beth_brenneman@blm.gov).

**Deadline for Interim Reclamation** -- The operator will be allowed to construct well pad to the maximum expected pad size necessary to drill and complete the number of wells proposed for this location. If one year has passed since the spudding of the initial well or subsequent wells on a given pad, the operator shall implement and complete standard interim reclamation practices as identified under Reclamation section in these surface use COAs or submit proposed BMPs to be approved by the authorized officer that would be implemented on the "open" pad to control stormwater drainage, weed control, wildlife protection measures, dust abatement plan and/or visual resource management.

**8. Surface Water and Waters of the U.S.:** All construction activities within a permanent, intermittent, or ephemeral drainage, including installation of culverts, trenching for a pipeline, or other disturbance of the channel, shall avoid high-flow conditions. During construction, flows in the channel shall be diverted around the construction area via a temporary pipeline.

Culverts at drainage crossings shall be designed and installed to pass a 25-year or greater storm event. Installation of culverts at drainage crossings shall avoid high-flow conditions. On perennial streams, culverts shall be designed to allow for passage of aquatic biota. The minimum culvert diameter 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](mailto: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.

All culverts that have currently failed or culverts not aligned in the natural drainage of the channel shall be replaced and aligned with the natural channel of the drainage with a gradient that maintains the natural drainage velocity to decrease sedimentation and erosion. Destroyed, damaged, or inoperable culverts shall be removed from the PBGAP area and disposed of by the operator.

Culverts shall be inspected annually to ensure they are functioning properly and promptly maintained (e.g. remove any debris causing blockage) and/or replaced when necessary.

The operator shall obtain 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. Discharging of fill includes placement of a culvert or construction of a temporary coffer dam for the diversion of flows around the construction area. 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.

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

In accordance with the operator's standard policy, all reserve pits shall utilize impermeable liners to contain drilling fluids. Following completion activities, pit liners shall be removed at the respective landowner's request. At the discretion of the operator and in cooperation with the respective landowner, closed-loop drilling systems may be used on well pads within 100 feet of intermittent drainages.

A minimum of 2 feet of freeboard shall be maintained in the reserve pit. Freeboard is measured from the highest level of drilling fluids and cuttings in the reserve pit to the lowest surface elevation of ground at the reserve pit perimeter. All vehicles shall be refueled at least 100 feet from stream channels.

**9. Wastes, Hazardous or Solid:** The operator and its contractors shall be required to collect and properly dispose any solid wastes generated by this project. Any release (leaks or spills) of hazardous substances in excess of the reportable quantity, as established by 40 CFR, Part 117, shall be reported as required by the CERCLA of 1980, as amended. If the release of a hazardous substance in a reportable quantity would occur, a copy of a report shall 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 shall be immediately reported verbally to the BLM and COGCC compliance officers and proof of cleanup provided for the project record. This mitigation shall be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

Protection of sensitive environments in the drilling area shall 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 are to be contained in the lined pit. Any hydrocarbons in the reserve pit shall be removed as soon as possible and processed or disposed of at a permitted offsite facility, and excess liquids in the reserve pit evaporated. The cuttings shall then be buried in place. Backfilling of the pit shall be performed in a manner to confine the mud in the pit and avoid incorporating the mud with surface soils.

No chromate additives shall be used in the mud system without prior BLM approval. No hazardous substances specifically listed by EPA as a hazardous waste or demonstrating a characteristic of hazardous waste shall be used in drilling, testing, or completion operations.

Tank batteries for the storage of produced water and condensate shall be placed in secondary containment to prevent migration offsite. These may consist of either corrugated steel surrounds, earthen berms, or both. In the event of an accidental release, produced water and condensate shall be confined for clean-up in the containment area and shall not migrate to surrounding soils and water.

Under the proposed drilling plan, fuel and lubricants shall be temporarily stored in transportable containment trailers or tanks on the proposed well pads. The operator shall implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize potential impacts from unintentional releases. The SPCC Plan shall include accidental discharge reporting procedures, spill response, and cleanup measures. All potentially hazardous materials and substances shall be handled in an appropriate manner that minimizes the risk of accidental contamination of soil and water resources.

**10. Groundwater/Geology:** Any shallow groundwater zones encountered during drilling of the proposed wells shall be properly protected and the presence of these zones reported to the BLM and COGCC. All usable water zones encountered (those with TDS less than 10,000 mg/L) must be isolated and protected, whether they are shallow or deep. Isolation of shallow zones shall be accomplished by setting and cementing surface casing from a depth of at least 50 feet below the deepest water zone to the ground surface. Deeper water-bearing zones shall be cemented off as required in the Master APD. For these zones, cementing shall be used from 50 feet above to 50 feet below each water-bearing zone.

Mitigation measures for protection of geologic resources are detailed in Appendix C. These measures include specific procedures for drilling, cementing, and completing the proposed wells to ensure that gas does not migrate into usable water-bearing zones or contaminate other geologic formations.

**11. Noise:** During drilling and completion, the operator shall angle the exhaust muffler stacks on the power units or generators away from private homes. The operator shall encourage commuting of construction and drilling crews to mitigate vehicle noise impacts. The operator shall use telemetry equipment at all gas well meters to reduce pumper-truck traffic within the GAP area.

**12. 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 shall be protected until notified by the BLM authorized officer to proceed.

As 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. Contact Karen Conrath, Glenwood Springs Energy Office Geologist at 970-947-5235 or karen\_conrath@blm.gov.

As feasible, the proponent 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 proponent shall work around or set the discovery aside in a safe place to be accessed by the BLM-permitted paleontologist.

If significant fossils resources are encountered, construction activities would be halted and the BLM notified of the occurrence immediately. A qualified paleontologist would then visit the site and make site-specific recommendations for impact avoidance. Operations in the area of the discovery would not resume until authorization to proceed has been received from the BLM authorized officer.

**13. Range Management:** Range improvements (fences, gates, reservoirs, pipelines, etc.) shall be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator shall 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.

**14. Recreation:** To promote safety for hunters and project workers alike during hunting season, warning signs should be posted along access roads serving active construction and drilling sites to warn hunters of the presence of workers and associated vehicle traffic in the area.

**15. Pinyon Pine *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.

**16. Visual Resources:** To help mitigate the contrast of bare, re-contoured slopes, reclamation shall include measures to feather cleared lines of vegetation, and to save and re-distribute cleared trees, debris, and rock over re-shaped cut and fill slopes.

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 the maximum reshaping of cut-and-fill slopes. Furthermore, all above ground facilities shall be painted Shale Green (Munsell 5Y 4/2) to blend with the existing landscape.

As a general rule, unless otherwise approved by BLM authorized officer, the production pack(s) and storage tanks(s) shall not be set more than 100 feet from the nearest wellhead to satisfy COGCC regulation.

Trees and vegetation would be left along the edges of the pads whenever feasible. Berms may need to be constructed on the fill portion on leading edges of pads with substantial cuts and fills.

**17. Wintering Big Game:** Remote monitoring shall be conducted to the extent practicable during winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife.

Routinely scheduled winter visits (those other than for emergency purposes), shall be scheduled between 10 a.m. and 3 p.m., to the extent practicable, to further minimize disturbance to wintering big game.

The operator shall not permit dogs or hunting, or target shooting within the PBGAP project area by its employees or contractors, except for hunting conducted legally under CDOW license and tag provisions.

Main access roads shall be signed to restrict vehicular use to oil and gas company personnel only.

## **II. Site-Specific COAs for Duncan Road Alignment**

**All Standard COAs outlined in Part A of Appendix C, above, shall be in addition to the following site-specific COAs.**

**1. Right-of-Way Application:** The operator shall apply for a BLM road and pipeline right-of-way on the Duncan Road alignment across portions of BLM lands in Section 1, T8S, R96W, that are not covered by existing BLM right-of-way COC71059. The operator shall adhere to all terms and conditions attached to the new and existing right-of-way grants.

**2. Timing Limitation for Big Game Winter Range:** To protect winter habitat use by big game, the operator shall not conduct construction activities along the Duncan Road alignment, and shall not use the Duncan Road alignment for activities related to construction, drilling, and completion of oil and gas wells and associated facilities, during the 5-month period from December 1 through April 30.

**3. Cultural Resources Monitor for Road and Pipeline Construction Activities:** The operator shall provide the services of a qualified archaeological firm to monitor construction of the road and pipeline across BLM lands in Section 1, T7S, R95W. The archaeological monitor shall be a firm that is permitted to do such archaeological work within the Glenwood Springs Field Office Area. The operator should be advised that this process can be time-consuming and should be started well in advance of anticipated development within the PBGAP for the 7L, 7K, 7O, and 18A locations.

No ground-disturbing construction activities (top soiling, grading, ditching, etc.) shall begin prior to the archaeologist's arrival. The operator is responsible for notifying the archaeological firm at least 72 hours in advance of any proposed ground disturbance in the specified area. The operator will be responsible for all construction delays and or damage to cultural manifestations due to insufficient notification of the Archaeological Contractor, and or noncompliance with the following procedures.

Archaeological monitoring shall involve on-the-ground visual inspection of all construction for the road/pipeline within the above specified area. The archaeologists shall follow all ground-disturbing equipment at a cautionary distance, allowing time for the construction dust to settle and for visible detection of buried cultural features to occur. If cultural resources are discovered, all ground-disturbing activities in the vicinity of identified feature(s) shall be halted and a buffer area at least 100 feet from the identified feature(s) shall be protected from any additional disturbance until which time as the feature(s) are mitigated via data recovery. Appropriate samples for analysis to determine cultural/temporal affiliation, and subsistence, shall be collected. At least one stratigraphic profile shall be made for each feature identified, and samples for pale-environmental reconstructions shall be taken as appropriate. If no cultural features are identified a stratigraphic profile shall be made and submitted with the report. Reporting to the BLM archaeologist of progress and findings shall be completed on a weekly or more frequent schedule as deemed necessary by the authorized officer.

After all ground-disturbing activities related to the Duncan Access Road are completed, including related mitigation, the archaeological contractor shall produce and submit a draft written report to the Glenwood Springs Field Office. Upon acceptance of the report, two final reports shall be submitted, one for the BLM and one for the SHPO. This report shall be in a contextual framework compatible with known archaeological knowledge of the area and the Northern Colorado River Basin Compact.

