



**U.S. Department of the Interior
Bureau of Land Management
Glenwood Springs Field Office
50629 Highway 6 & 24
Glenwood Springs, CO 81601**

ENVIRONMENTAL ASSESSMENT

NUMBER: CO140-2005-134 EA

CASEFILE NUMBER: Lease C-51156, C-52889, C-54738, C-55605, C-56258

PROJECT NAME: Gant Gulch Geographic Area Plan (GAP)

LEGAL DESCRIPTION: Township 7S, Range 92W, Sections 19 & 31
Township 7S, Range 93W, Sections 23-27, 34-36
Township 8S, Range 92W, Section 6
Township 8S, Range 93W, Sections 1 & 2, Sixth P.M.

APPLICANT: EnCana Oil & Gas (USA)

FONSI
CO-140-2005-134 EA

EnCana Oil & Gas (USA) Inc.
Gant Gulch Geographic Area Plan

The environmental assessment and analyzing the environmental effects of the proposed action have 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 proposed action (Gant Gulch Geographic Area Plan) as written (except for the following specific pad locations) in order to provide for the orderly, economical and environmentally sound exploration and development of oil and gas resources on valid oil and gas leases.

This decision does not modify any lease terms and stipulations attached to the specific leases involved. Updates and amendments to the Geographic Area Plan may be made over the course of the 2-3 year drilling program. Depending on the magnitude of the changes in the future, additional NEPA compliance documentation may be necessary if determined to be outside the scope of this analysis.

After reviewing the GAP and its various recommendations regarding the operator's development plan, any decisions regarding the M23W and N23W pads will be deferred until appropriate visual resource mitigation is developed to address the Class II Visual Resource Management (VRM) objectives. At present, such mitigation measures have not been thoroughly completed.

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 outlined in the body of the Environmental Assessment or relate appendices listed below.

MITIGATION MEASURES: Various mitigation measures are included in the body of the Environmental Assessment, described within the operator-submitted Surface Use Plan (Appendix A) and itemized as Standard (GAP-wide) Conditions of Approval (Appendix B) or Site-Specific Conditions of Approval (Appendix C).

Copies of the Geographic Area Plan are available for review at the BLM Glenwood Springs Field Office, 50629 Highway 6 & 24, Glenwood Springs, Colorado 81601.

The decisions made in this plan are appealable when the Applications for Permit to Drill (APDs) are approved by this office. The required 30 day posting period for APDs was completed at the beginning of the GAP process. For further information on APD approval dates related to the GAP, periodic consultation with the BLM, Glenwood Springs office is recommended via following methods: phone (970) 947-2804 or e-mail jim_byers@blm.gov.

In accordance with 43 CFR 3165.3, you may request a State Director Review upon approval of APD(s) outlined in this GAP. This request must be submitted in writing within 20 business days from date of APD approval. The request should be sent to: Colorado State Director, 2850 Youngfield Street, Lakewood, Colorado 80215-7076. The decision of the State Director may then be appealed to the Interior Board of Land Appeals in accordance with 43 CFR 3165.4.

NAME OF PREPARER: Jim Byers, Natural Resource Specialist

SIGNATURE OF AUTHORIZED OFFICIAL:


Authorized Officer

DATE SIGNED: OCT 17 2005

TABLE OF CONTENTS

PURPOSE AND NEED FOR PROPOSED ACTION 1

 PROPOSED ACTION 1

 Introduction..... 1

 GAP EA Process and Intent..... 2

 Development - Construction, Drilling and Completion..... 2

 Production..... 7

 Final Abandonment and Reclamation..... 10

 NO ACTION..... 11

ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD 11

PLAN CONFORMANCE REVIEW 12

 Standards for Public Land Health..... 13

 Lease Stipulations 13

AFFECTED ENVIRONMENT / ENVIRONMENTAL CONSEQUENCES / MITIGATION MEASURES 15

 CRITICAL ELEMENTS 15

 Air Quality 15

 Areas of Critical Environmental Concern..... 19

 Cultural Resources 20

 Environmental Justice..... 22

 Farmlands, Prime and Unique..... 22

 Floodplains, Wetlands & Riparian Zones..... 22

 Geology and Minerals..... 23

 Invasive, Non-Native Species..... 27

 Native American Religious Concerns..... 31

 Threatened, Endangered, and Sensitive Species..... 31

 Wastes, Hazardous or Solid..... 40

 Water Quality, Surface and Ground Water..... 41

 Wild and Scenic Rivers..... 46

 Wilderness..... 46

 NON-CRITICAL ELEMENTS 46

 SOCIO-ECONOMICS..... 46

 Hydrology and Water Rights 48

 Noise 48

 Paleontology 50

 Range Management 52

 Recreation 54

 Recreation 54

 Soils..... 56

 Travel/Access and Transportation 60

 Vegetation 61

 Visual Resources..... 69

 GAP-wide General Mitigation Measures: 74

 Site-Specific Mitigation Measures:..... 74

 Wildlife, Aquatic..... 75

 Wildlife, Terrestrial..... 75

OTHER NON-CRITICAL ELEMENTS:.....	81
ADDITIONAL ISSUES	82
CUMULATIVE IMPACTS SUMMARY	82
PUBLIC INVOLVEMENT	82
AGENCIES CONSULTED.....	85
LIST OF PREPARERS AND INTERDISCIPLINARY REVIEW.....	85
REFERENCES CITED.....	87
FIGURES.....	91

PURPOSE AND NEED FOR PROPOSED ACTION

The purpose and need of this EA is to authorize the Application for Permits to Drill (APDs) to provide for federal lease development that will in turn provide natural gas for commercial marketing to the public.

PROPOSED ACTION

Introduction

The Gant Gulch Geographic Area Plan (GGGAP) is a comprehensive and detailed plan that describes the EnCana Oil & Gas, (USA) Inc. (EnCana) proposed plan of development to drill and operate up to 97 natural gas wells in the Gant Gulch Geographic Area (GGGA), located approximately 15 miles south of Rifle, Colorado in Garfield County. The GGGAP encompasses portions or all of 13 sections of surface land (approximately 2,921 acres) in Townships 7 and 8 South, Ranges 92 and 93 West. **Figure 1** provides a project location map. The Gant Gulch GAP map is provided in **Appendix A**.

The majority of the surface in the Project Area is under the jurisdiction of the Bureau of Land Management (BLM), Glenwood Springs Field Office. However, the Project Area also includes 177 acres of private surface. Of the 97 proposed gas wells, 71 would be drilled into federal minerals, and 26 would be drilled into private minerals. Efforts have been taken to ensure acreage values cited are as accurate as possible in this EA, based on the available Geographic Information Systems (GIS) data. However, slight variances may exist throughout this EA.

EnCana proposes to use vertical and directional drilling technology to drill 97 natural gas wells from 17 new and 1 existing locations. As a result of using directional drilling technology for many of these wells, this plan would result in about 55 percent less surface disturbance than would be the case if all wells were vertically drilled from individual pads. EnCana proposes a 2- to 3-year phased drilling scenario that would:

- Expand 1 existing well pad on private land/surface by one acre;
- Develop 17 new well pads (3.86-9.53 acres of total disturbance each depending on topography and the total number of directional wells to be drilled at a given location);
- Construct approximately 8.27 miles of new access roads to well pads;
- Drill up to 24 wells in 2005 (one vertical well and up to 6 directional wells at each pad) using one or two drill rigs;
- Drill up to 73 wells in 2006 and 2007, and possibly later in the future (one vertical well and up to 6 directional wells at each pad) using up to three drill rigs;
- Install gas and water pipelines to each location, all within access road rights-of-way (8.27 miles co-located with access roads);
- Install production equipment (wellheads, separators/dehydration units, stock tanks, etc.) at each pad; and
- Operate and produce natural gas from up to 97 wells over the life of the project.
- The exact number of wells drilled in any given year would depend on technical results and market performance.

GAP EA Process and Intent

The GAP Environmental Assessment (EA) Process is intended to provide an assessment of the overall development scenario over a 2- to 3-year timeframe, instead of a case-by-case submittal of APDs. The intent of the GAP process is to address site-specific and cumulative environmental impacts associated with oil and gas development within a defined geographic area. In addition, the GAP process was created to propose mitigation for potential impacts to environmental resources, such as wildlife habitat and visual aesthetics that may occur within discrete areas.

The result of the GAP is a reasonable foreseeable development (RFD) scenario proposed by the operator given the current market conditions and demand for natural gas, other constraints of the company, and by environmental constraints imposed by the BLM. If fully developed, this proposal would result in up to 97 bottom-hole locations drilled at 18 surface locations (17 new locations and one existing pad that would be expanded). EnCana expects to drill up to 24 wells in 2005, and the remaining wells in 2006 and 2007. The proposed location of surface facilities is shown on **Figure 2**. The total number of wells drilled would depend largely on factors out of EnCana's control, such as geologic success, engineering technology, economic factors, availability of commodity markets, and lease and unit stipulations and restrictions.

The major elements of the GAP are described below under Development (Construction/Drilling/Completion), Production (Operation and Maintenance), and Abandonment and Reclamation. The proposed elements contain a standard Surface Use Plan (SUP) and 10 Point Drilling Plan for gas well development (**Appendix A**). With BLM's approval, all measures discussed in the SUP would be implemented as part of the BLM's Proposed Action. Any deviations from the standard practices below are identified in the standard and site-specific conditions of approval (**Appendices B and C**).

Development - Construction, Drilling and Completion

Construction

During the first two years of development in 2005 and 2006, numerous construction activities would be completed. All of these activities could occur simultaneously. The following is a description of construction methods to be utilized for well pads, access roads, and gas gathering and produced water pipelines.

Well Pads

Well pads would be constructed from the native soil and rock materials present and leveled by standard cut-and-fill techniques 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. Cut slopes required for pad construction would not be steeper than 1.5:1 (horizontal:vertical). The tops of the cut banks and pad corners may be rounded to improve the visual appearance.

Initially, the size of the newly-constructed pads would range from about 3.86 to 9.53 acres. The existing pad on private land would be expanded by approximately one acre to accommodate the additional wells proposed. At each pad, after all wells are drilled, completed, and production facilities are installed, interim reclamation activities would begin. Generally, cuts would be revegetated and fills would be recontoured to blend in with adjacent natural slopes and seeded to re-establish vegetative cover. These interim reclamation techniques would result in about an 80 percent reduction in surface disturbance that would remain over the long-term life of project (20 to 30 years). **Table 1** shows the size of the pads during drilling and completion activities (short-term disturbance) and after interim reclamation (long-term disturbance).

Table 1. Gant Gulch Well Pad Descriptions

Pad	Surface Location Sec-Township- Range	Surface Ownership	New Short-term Disturbance (acres)	Long-Term Disturbance (acres)
C36W	1-T8S-R93W	Fee	9.53	1.0
D2SW	2-T8S-R93W	Federal	7.20	1.0
D25W	25-T7S-R93W	Federal	5.90	1.0
F26W	26-T7S-R93W	Federal	5.47	1.0
G1SW (existing)	1-T8S-R93W	Fee	1.00	1.0
H2SW	2-T8S-R93W	Federal	4.70	1.0
I27W	27-T8S-R93W	Federal	4.09	1.0
I2SW	2-T8S-R93W	Federal	3.92	1.0
J6SE	6-T8S-R92W	Federal	5.07	1.0
K19E	19-T7S-R92W	Fee	5.83	1.0
K2SW	2-T8S-R93W	Federal	3.86	1.0
M23W	23-T7S-R93W	Federal	5.07	1.0
M24W	24-T7S-R93W	Federal	4.84	1.0
N23W	23-T7S-R93W	Federal	7.21	1.0
N26W	26-T7S-R93W	Federal	5.36	1.0
O31E	31-T8S-R92W	Fee	4.52	1.0
P26W	26-T7S-R93W	Fee	7.84	1.0
P27W	27-T7S-R93W	Federal	5.05	1.0
Total			96.5	18.0
Average			5.36	1.0

Reserve pits would be needed to contain drilling fluids. Given the variation in the size and dimensions of the well pads and the number of wells that may be drilled at any given location, the size of the reserve pits would vary. Generally, the 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 for the containment of cuttings and drilling fluids. Pits would be designed to prevent all storm water runoff from entering the pit. A fence would be constructed around the perimeter of the reserve pit to prevent wildlife from accessing the pit. 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.

Part of EnCana's storm water management policy may include additional engineering measures, which would be implemented to construct drainage systems and culverts in order to divert water flow away from the surface location, prevent erosion, and prevent sediment loading in waterways due to pad and/or road construction, as needed.

Access Road Construction

In general, access to the GGGGA would be from Interstate 70 at the Garfield County Airport exit (Exit 94). Vehicles would travel south on either Garfield County Road 315 (Mamm Creek Road) or Garfield County Road 319 (West Mamm Creek Road) to reach the private roads to access the Project Area (described in more detail in the Transportation section).

Within the Project Area, the access road network would be extended from existing ranch access roads, and other two-track roads that would be upgraded to provide access to the proposed well locations, as shown on **Figure 2**. The roads would be constructed to meet the standards of the anticipated traffic flow and all-weather requirements. Prior to construction/upgrading, the roadway would be cleared of any snow cover and allowed to dry completely. Road construction or upgrading would not be allowed during muddy conditions. Should mud holes develop, they would be filled in as soon as possible.

Construction would include ditching, draining, crowning and capping or sloping and dipping the roadbed as necessary to provide well-constructed and safe roads. Roads would be constructed using standard equipment and techniques approved by the BLM. Bulldozers and/or road graders would first clear vegetation and topsoil from the Right of Way (ROW). The access roads would be constructed within a 60-foot overall right-of-way, which would be reduced to 30 feet after rehabilitation. The running surface would be 18 feet, but could be wider at certain locations based on topography and side slopes. The average 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 100-foot curve radii, curve widening would be employed.

Roads would be constructed with appropriate drainage and erosion-control features. Road drainage crossings would be of the typical dry creek drainage crossing type. Crossings would be designed so they would not cause siltation or the accumulation of debris in the drainage crossing, nor block the drainages. Water diversions including cut-outs would be placed at frequent intervals along access roads to prevent erosion of the drainage ditches by runoff, as described in the BLM/USFS Surface Operating Standards for Oil and Gas Development, the "Gold Book" (BLM and USFS 1989).

Access road construction would include 8.27 miles of new roads, requiring 60.13 acres of short-term surface disturbance. Following interim reclamation of the portion of the road ROW not required for project operation, the long-term surface disturbance that would remain over the life of the project would amount to approximately 30.08 acres.

All trees on the well pad locations, access roads, and proposed pipeline routes would be cut to a maximum stump height of six inches (6"), and then cut to 4-foot lengths and stacked off location. Trees would not be dozed off the location or access road, except on private surface where trees

may be dozed. Trees may also be dozed on pipeline routes and then pulled back onto the right-of-way as part of final reclamation. Cut pinyon pine trees would either be mulched or disposed of to prevent the spread of the ips beetle. Rootballs would be buried or placed off the locations, access roads, or pipeline routes and scattered back over the disturbed area as part of the final reclamation. Other vegetation, such as sagebrush and other shrubs, may be scattered off-site or placed on well pad fills to help visually screen the pads.

Gas Gathering and Water Pipeline Construction

A gas gathering and produced water pipeline network would be needed to gather and deliver gas off-site to existing EnCana trunk pipelines and transport produced water to centralized tank batteries within and outside the Project Area.

In total, approximately 8.27 miles of pipelines would be installed as part of the Proposed Action. All of these pipelines would be co-located with access roads and would be buried in the same trench within the access road ROWs, resulting in no additional surface disturbance. All vehicles and trenching equipment would use the access roads as construction ROWs in that case. Generally, a mile of pipeline would be constructed in four to six days.

All buried pipelines would be buried to a 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. Then, 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 off-site and transported to the testing location by truck. After testing, the water would be disposed of at an existing off-site 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.

Total Surface Disturbance

Assuming all of the proposed facilities are constructed, approximately 156.63 acres of new surface disturbance would occur in the short-term (about 5.9% of the Project Area). Following interim reclamation of well pad, access road, and pipeline disturbance not required for operation, about 48.08 acres of surface disturbance would remain over the operational life of the project (about 1.6% of the Project Area). **Table 2** provides a summary of short- and long-term surface disturbance that would occur as a result of the Proposed Action.

Table 2. New Surface Disturbance Proposed under the Gant Gulch GAP

GAP Action	Short-Term Disturbance	Long-Term Disturbance
Well Pads	96.5 acres	18.0 acres
Access Roads	60.13 acres	30.08 acres
Total Acreage	156.63 acres	48.08 acres
Percent of Gant Gulch Geographic Area (2,921 acres)	5.4%	1.6%

Drilling and Completion

EnCana's drilling operations would be conducted in compliance with all Federal Oil and Gas Onshore Orders, and all applicable rules and regulations. New wells would be drilled to a depth of 7,200 to 10,000 feet. A natural gas well in this GAP would require about 12-15 days to drill and approximately 30-45 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. Multiple well bores from a single pad requires less surface disturbance than if single wells were drilled. Two or three wells are planned on eight pads for 2005. Production results from these wells will be used to plan the 2006 and 2007 drilling programs. When possible, all well bores planned on individual pads will be drilled and completed within one drilling season and the pad reclaimed. If, due to the exploratory nature of this GAP, all well bores are not drilled, EnCana may request approval to leave the pad and pits open until the following drilling season. All pits would be pumped dry, the liner removed, and the pit fenced. EnCana may drill fewer wells than those described in this GAP, because of geologic uncertainties and market uncertainties.

The drilling operation would be conducted in two phases. The first phase may use a small drilling rig to drill to a depth of approximately 630 – 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 630 – 1,500 feet up to ground level. This surface casing would serve the purposes of providing protection for any freshwater aquifers present and to contain 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, if so desired. 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 in order to witness these tests, if so desired. Following the use of the surface-hole rig, if used, a larger drilling rig would be used to drill to target depths of about 7,200 to 10,000 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 wellbore. In order to achieve borehole stability, minimize possible damage to the formations, provide adequate viscosity to carry the drill cuttings out of the wellbore, 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 bottom hole locations. In general, a target radius of 200 feet would be used. Specific directional plans for each well will 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 wellbore (mainly shale, sand, and miscellaneous rock minerals) and to contain drilling fluids carried over with the cuttings. No hazardous substances would be placed in this pit. Frac pits to contain water used in completion process would be planned for each new pad location in GAP. Frac pits would be lined. Compliance with Onshore Order No. 1 would determine the timing and closure

of frac pits. In instances where well drilling would occur in more than one drilling season on a pad, the frac pit will be drained dry prior to winter shutdown period or expiration of 90 day period, whichever occurs first.

After drilling the hole to the total depth, logging tools would be run in the well to evaluate the potential hydrocarbon resource. If the evaluation indicates adequate hydrocarbon resources are present and recoverable, steel production casing would be run and cemented in place in accordance with the well design, as approved by the BLM and any applicable Conditions of Approval (COAs). 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. The use of any isolating medium other than cement would receive approval prior to use.

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 the cement integrity and to correlate the cased hole logs to the open hole logs, perforating the casing across the hydrocarbon producing zones, and stimulating the formation to enhance the production of oil and gas. The typical method used for stimulation consists of hydraulic fracture treatment of the reservoir, in which sand with non-toxic fluids is pumped into the producing formation with sufficient hydraulic pressure to fracture the rock formation. The sand serves as a proppant to keep the created fracture open, thereby allowing reservoir fluids to move more efficiently into the wellbore.

Production

Surface Facilities

Well locations 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 berms, at each site. The production equipment would be fenced within a 45-foot by 25-foot area to prevent contact with wildlife/livestock at the surface owner's request. Telemetry equipment could be utilized to remotely monitor well conditions after a reasonable level of development. The use of telemetry would minimize traffic to and from the well locations. Automated tank gauging would also be employed to minimize the risk of spills.

Tank batteries would be placed within secondary containment to prevent the offsite migration of accidentally spilled condensate or produced water. Secondary containment would consist of corrugated steel containment 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 percent of the storage capacity of the largest tank within the berm. All loading lines would be placed inside the containment berm.

Centralized compression would take place when possible to minimize the area impacted by compressor noise. If production requirements make on-site 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. A permanent steel tank would be installed in the ground next to the production facilities to temporarily contain produced water for the duration of operation of the well. Produced water at well pads would be transported by truck or buried pipeline to EnCana's existing Hunter Mesa water treatment facility in the Mamm Creek Field, and/or trucked offsite to an approved disposal facility. Condensate would be transported to market by tanker trucks.

Interim Reclamation

After completion activities, EnCana 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. The cut and fill slopes would be reshaped to a maximum 2:1 slope. In brief, interim reclamation would be accomplished by grading, leveling and seeding, as recommended by the BLM. Interim reclamation would reduce the disturbed area at each pad to approximately one acre after well development.

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

1. 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.
2. All pits, cellars, rat holes and other bore holes at drilling locations unnecessary for further lease operations, excluding the reserve pit, would be back-filled immediately to conform to surrounding terrain after the drilling rig is released. Pits, cellars and/or boreholes that remain on location would be fenced as specified for the reserve pit.
3. Any hydrocarbons in the reserve pit would be removed in accordance with 43CFR 3162.7-1. 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 local landfill and the remaining buried part of liner would be backfilled in place with native soil/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. There would be a minimum of three feet of cover (overburden) over the pit. When work is complete, the pit area would support heavy equipment without sinking.
4. 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 re-seeded according to BLM recommendations.

Interim reclamation of the reserve pit and that portion of the location and access roads not needed for production facilities/operations would be reclaimed within ninety (90) days from the

date of well completion, weather permitting. Dry/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 on steeper slopes, fertilizing, seed-bed preparation, contour furrowing, watering, terracing, water barring, and the replacement of topsoil. All reclamation efforts would employ seed mixes as approved by the BLM. Pads would be fenced for the first two growing seasons or until the seeded species have established to prevent livestock/wildlife grazing pressure. Noxious weeds that may be introduced due to soil disturbance and reclamation would be treated by methods approved by the BLM.

Road Maintenance

The access roads would be inspected by the BLM and, if necessary, maintained on a quarterly basis (at a minimum) to include such items as:

- Road surface grading and graveling;
- Relief ditch, culvert and cattle guard cleaning;
- Erosion control measures for cut and fill slopes and other disturbed areas;
- Road closures in periods of excessive soil moisture to prevent rutting caused by vehicular traffic;
- Road and slope stabilization measures as required until final abandonment and rehabilitation;
- Weed control; and
- Dust abatement (as often as determined necessary by BLM and EnCana).

Noxious Weed Management

Noxious weeds which may be introduced due to soil disturbance during construction activities would be monitored and treated over the life of the project by methods approved by the BLM Authorized Officer. The Pesticide Use Permit would be placed on record with the BLM for treatment of noxious weeds.

Workovers / 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. The frequency of this type of work cannot be accurately projected because workovers vary well by well; however, an average may be one workover per well per year for a period of seven days. In the case of multi-well pads, space for equipment would usually be limited to the “in-use” (i.e., disturbed) area of the surface location, although it is possible that interim reclamation could be delayed by workover operations. In the case of a well recompletion, a reserve pit may have to be constructed.

Final Abandonment and Reclamation

Well and Pipeline Plugging and Abandonment

Upon abandonment, each borehole would be plugged, capped, and its related surface equipment would be removed. Subsurface pipelines would be plugged at specific intervals and site contouring would be accomplished using appropriate heavy equipment. All disturbed surface soil would be reseeded with native vegetation. The seed mix used would conform to the typical vegetation surrounding the specific well site and would be approved by the BLM.

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 & Gas Conservation Commission (COGCC) standards for plugging would be followed. A configuration diagram, a summary of plugging procedures, and a job summary with techniques used to plug the well bore (e.g., cementation) would be included in the Sundry Notice.

Final Reclamation

All surface disturbances would be recontoured and revegetated according to an approved reclamation plan. Final well site reclamation would be performed and monitored in accordance with the 1998 Glenwood Springs Resource Area (GSRA) Reclamation Policy, including control of noxious weeds. Further information on reclamation standards is available in Appendix I of the 1999 Oil and Gas Leasing and Development EIS. One of the basic goals of the policy is to “establish desirable (seeded and native) vegetation to set the stage for the natural process to restore the site”. Consequently, one of the goals of the Proposed Action is to accomplish as much reclamation on each well pad during the life of the well as possible, even on those pads with a large final reclamation or “in use” area. Unreclaimed areas or reclaimed areas that do not meet the objective of three-to-four years of sustained reclamation (known as “operator complete”) would undergo the reclamation re-treatment measures described in the Surface Use Plan (**Appendix A**). EnCana would also meet the BLM bonding requirements. Additional bonding would be provided for sites with extremely difficult reclamation conditions, if repeated reclamation attempts have been unsuccessful, or final reclamation cannot be completed with standard reclamation measures.

EnCana 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 up 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 would be re-seeded with a seed mixture to be recommended by the BLM. The seedbed would then be prepared by disking and then roller packing following the natural contours. Seed would be drilled on contours at a depth no greater than one-half inch (1/2”). In areas that cannot be drilled, seed would be broadcast at double the seeding rate and harrowed into the soil. Certified seed would be used, whenever available. All seeding would be conducted after September 1 and prior to ground frost. Spring

seeding would be conducted after the frost leaves the ground but no later than May 15th. If the seeding is unsuccessful, EnCana may be required to make subsequent seedings.

Reclamation would be considered successful when the objectives described in the GSRA Reclamation Policy are achieved. Re-vegetation would be considered successful if it meets the objectives set forth in the Conditions of Approval identified in Appendix E of the GSRA Oil & Gas Leasing & Development Draft Supplemental Environmental Impact Statement (DSEIS) (BLM 1998). To summarize the objectives in Appendix E of the DSEIS, re-vegetation would be considered successful when the following objectives are met:

- Immediate short term: Establishment of desirable perennial vegetation by end of the second growing season, capable of renewing itself.
- Acceptable establishment: Acceptable level of desirable vegetation by the end of the fifth growing season.
- Long-term establishment: Level of re-vegetation approximates the original pre-disturbed condition, in terms of canopy cover and species composition.

NO ACTION

The Proposed Action affects federal subsurface minerals that are encumbered with federal oil and gas leases granting the lessee a right to explore and develop the oil and gas leases in the GGGa. The No Action Alternative constitutes denial of the Proposed Action. Absent a non-discretionary statutory prohibition against drilling, BLM cannot deny the right to drill and develop the leasehold. Only Congress can completely prohibit development activities (Western Colorado Congress, 130 IBLA 244, 248, citing *Union Oil Co. of California v. Morton*, 512 F.2d 743, 750-51). Overall, the No Action Alternative has been considered, but eliminated from detailed analysis due to the existing lease rights involved.

ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

The Proposed Action map (**Figure 2**) has “proposed” access routes (shown in yellow) and “alternate” routes (shown in purple), which were reviewed during preparation of this EA. After completing these reviews and discussing these alternatives with the various affected landowners, a decision was made to proceed with the proposed routes, and delete the alternate routes that are depicted on the latest GAP Map (**Figure 2**). A slight change in **Figure 2** was made from the original GAP map (**Appendix F**) with the routes to pads I2SW, K2SW and H2SW originally shown as “proposed” (in yellow) up Middle Mamm Creek and “alternate” (in purple) along existing route over the ridgetop to the north.

D25W/M24W Access

This alternate route (shown in purple on **Figure 2**) is deleted from further consideration, because of potential impacts associated with the viewshed (Class II Visual Resource Management rating) and paleontological resources identified during the 2004 survey. The route would have created sizable cuts and fills visible from the valley floor.

D2SW Access

This alternate route (shown in purple on **Figure 2**) is deleted from further consideration, because of excessive road grade following the existing 2-track route along the same alignment. Furthermore, the proposed route “switchbacking” east from P27W toward N26W pad would provide more favorable road grades, less impact to the viewshed from County Road 319, and retain this new access route within the Pitman livestock allotment. The alternate route would bisect the Couey 2 allotment, thereby potentially creating issues with allotment management, gate security, and livestock trespass.

H2SW Access

This alternate route (shown in purple on **Figure 2**) is deleted from further consideration, because of potential impacts to riparian values in a tributary stream of East Mamm Creek, and the agreement from the landowner to allow the use of a vast portion of the existing road (proposed route shown as yellow on **Figure 2**). After landowner consultation, a further change from original GAP map evolved, with the proposed route beginning along the existing G1SW access road, crossing the existing road and tying in with the existing road along the ridgetop. This minor change in the new proposed road was implemented to avoid road use impacts to the landowner’s agricultural operations and irrigation.

P27W Access

This alternate route (shown in purple on **Figure 2**) is deleted from further consideration because of landowners’ decision to allow EnCana to use existing routes to access K27W and upgrade existing 2-track routes from K27W to P27W. The landowners did not want a new road constructed around their property, which would create additional surface disturbance. Furthermore, the alternate route would directly affect their ability to manage their livestock operations.

B2SW Pad

This pad was dropped from further consideration in the GAP because EnCana made the decision that the single bottomhole planned on the pad does not warrant cost of building a new road and pad. EnCana will consider reaching the bottomhole target from the D2SW pad.

PLAN CONFORMANCE REVIEW

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

- Glenwood Springs Resource Management Plan – approved January 1984;
 - Decision Number/Page: page 14 & Map 4
 - Decision Language: Continue to allow mineral exploration and development on lands not withdrawn for other uses or restricted to mineral activity.
- Oil and Gas Leasing and Development EIS – amended in November 1991;
- Colorado Standards and Guidelines - amended in November 1996;
- Oil and Gas Leasing and Development Final Environmental Impact Statement – amended in

March 1999; and

- Fire Management Plan for Wildland Fire Management and Prescriptive Vegetation Treatment Guidance – amended in September 2002.

Standards for Public Land Health

In February 1997, the *Colorado Standards for Public Land Health* became effective for all BLM lands in Colorado. The Standards describe the conditions needed to sustain public land health and apply them to all uses of public lands. The Glenwood Springs Field Office is in the process of completing Land Health Assessments. These assessments are done on a landscape basis. At this time, the landscape addressed in this EA has not had a formal Land Health Assessment completed. As such, no formal determination on conformance with the Standards would be made until a formal Land Health Assessment and Determination Document is completed. A Land Health Assessment for the Project Area will be assessed in 2010. Based on the findings of these assessments, the Authorized Officer may take appropriate action to achieve conformance with the Standards or implement further mitigating measures on future actions to maintain or prevent a further decline in land health.

These 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. Because a Standard exists for these five categories, the impact analysis must address whether the proposed action or any alternatives being analyzed would result in impacts that would maintain, improve, or deteriorate land health conditions for that specific parameter. These analyses are located within the narrative found in specific elements described in the Affected Environment.

Lease Stipulations

Each of EnCana's federal oil and gas leases includes stipulations intended to protect environmental resources present. **Table 3** provides a summary of lease stipulations that would apply to the Proposed Action.

Table 3. Lease Stipulations Applicable to the Gant Gulch Natural Gas Project

Lease Number	Description of Lands	Stipulations
C-54738	T7S-R93W 6 TH SEC. 24: S2SW SEC. 25: N2NW, SWNW SEC. 26: N2, NWSE SEC. 27: SENE	Timing Limitation: Big Game Winter Habitat (12/1/-4/30). Exception may be allowed last 60 days.
	T7S-R93W 6 TH SEC. 24: S2SW SEC. 25: N2NW, SWNW SEC. 26: E2NE, E2SW, W2SE	CSU: to protect Class II visual resource management areas.
	T7S-R93W 6 TH ALL LANDS	CSU: to protect fragile soils.
C-51156	T8S-R92W SEC. 6: LOTS 3-5, N2SE	TL: no surface use allowed between January 16 through April 29 to protect critical deer and elk winter range.
C-55605	T8S-R93W 6 TH SEC. 1: LOTS 8,9 SEC. 2: S2N3, LOTS 5, 6, 11, 12	NSO: Feb. 1 – Aug. 15 to protect raptors, golden eagles, all accipiters, falcons (except kestrels), all butteos and owls nesting and fledgling habitat during usage for ¼ mile around the nest site. Exceptions: granted during years when the nest site is unoccupied, when occupancy ends by or after May 15 or once the young have fledged and dispersed from the nest.
	T8S-R93W 6 TH SEC. 2: LOT 5	NSO: to protect raptor nests within a one-eighth mile radius from the site. An exception may be granted.
	T8S-R93W 6 TH SEC. 1: LOTS 16, 17 SEC. 2: LOTS 13-16	CSU: to protect perennial water impoundments and streams, and/or riparian/wetland vegetation by moving oil and gas exploration and development beyond the riparian vegetation zone. Exceptions may be granted if on-site analysis shows no degradation of the resource values.
	T8S-R93W 6 TH SEC. 1: LOTS 7-9, 17- 21, SWNW SEC. 2: LOTS 5,6	CSU: to protect Class II visual resource management areas.
C-56258	T7S-R92W 6 th SEC. 19: LOT S, E2SW	TL: no surface use allowed between January 16 through April 29 to protect critical deer and elk winter range.
C-52889	T7S-R93W 6 TH SEC. 23: E2SW, SWSW, W2SE SEC. 34: LOT 1, 2, 3, SEC. 35: LOT 1-4, N2N2 SEC. 36: LOTS 1-4	No stipulations on lease.

AFFECTED ENVIRONMENT / ENVIRONMENTAL CONSEQUENCES / MITIGATION MEASURES

Approving individual APDs is contemplated by the 1999 Oil and Gas Leasing and Development FSEIS (BLM 1999a), which addressed the environmental impacts of oil and gas development. Implementing the Proposed Action is consistent with the Preferred Alternative described in the FSEIS. The environmental impacts of the Preferred Alternative are described in the FSEIS and will not be repeated in this EA. Rather, discussion of the environmental impacts in this EA will be limited to site-specific information not included in the FSEIS. An analysis of adherence to the stipulations of the five leases C-54738, C-51156, C-55605, C-56258, and C-52889 is included in the environmental consequences section. In some cases, the conclusions of the FSEIS will be summarized if necessary to address issues raised in scoping or to provide information necessary to the decision maker. In addition, the discussion of environmental impacts will be limited to those remaining after reviewing the APDs, the application and conformance of mitigation from the FSEIS, and any changes or additions to the proposal resulting from the on-site investigations. The APDs and subsequent review and adjustments result in on-the-ground requirements and development of site-specific Standard Conditions of Approval to provide the best location of the proposal to minimize impacts and accomplish the objectives of the Glenwood Springs Field Office Reclamation Policy.

CRITICAL ELEMENTS

Air Quality

Affected Environment: National and Colorado Ambient Air Quality Standards (NAAQS and CAAQS) have been established for the purpose of protecting human health and welfare with an adequate margin of safety. For the pollutants associated with oil and gas operations [nitrogen dioxide (NO₂), carbon monoxide (CO), particulate matter less than 10 microns in effective diameter (PM₁₀), and particulate matter less than 2.5 microns in effective diameter (PM_{2.5})], the NAAQS and CAAQS are identical. If the ambient concentrations of pollutants are less than the CAAQS, then existing air quality in the region is acceptable based on standards set for the protection of human health. Garfield County is designated as an attainment area, meaning that the concentration of criteria pollutants in the ambient air is less than the CAAQS. Representative monitoring of air quality in the general area indicates that the existing air quality is well within acceptable standards. **Table 4** provides a summary of representative air quality data for the GGGAP and a comparison to the CAAQS.

Table 4. Existing Air Quality Summary for the GGGAP

Pollutant	Averaging Period	Ambient Concentration ($\mu\text{g}/\text{m}^3$)	CAAQS ($\mu\text{g}/\text{m}^3$)	Monitoring Station Location Description
PM ₁₀	24-hour	41	150	Garfield County. (2003-2004 data collected by American Soda) ^a
	Annual	15	50	
PM _{2.5}	24-hour	21	65	Garfield County. (2001 data collected by CDPHE) ^a
	Annual	8	15	
NO ₂	Annual	17	100	Garfield County. (2003 data from Southern Utes, near Ignacio) ^a
CO	1-hour	1,145	40,000	Garfield County. (2003-2004 data collected by American Soda) ^a
	8-hour	1,145	10,000	
Ozone	1-hour	173	235	Garfield County. (1 hr based on 2003 Mesa Verde and 8 hr based on CASTNET averages) ^a
	8-hour	145	157	

$\mu\text{g}/\text{m}^3$: micrograms of pollutant per cubic meter of ambient air

^a Background concentrations recommended by CDPHE

Environmental Consequences: The primary emission sources would include those resulting from well development and well production. This includes increased vehicle traffic and drilling activity during the development phase of the Proposed Action, followed by continuous well pad emissions from dehydrators, condensate storage tanks, and associated heaters. Air pollutant emissions from these sources would include oxides of nitrogen (NO_x), carbon monoxide (CO), particulate matter less than 10 and 2.5 microns in effective diameter (PM₁₀, PM_{2.5}) and volatile organic compounds (VOCs). Results indicate that benzene, toluene, ethylbenzene and xylenes (BTEX) compounds and n-hexane would be the primary hazardous air pollutants (HAP) emitted from the Proposed Action sources.

Total estimated emissions for the Proposed Action are summarized in **Table 5**. The development related emission calculations, which include well pad and resource road construction, well drilling, and well completion, represent the maximum activity within the 2 to 3 year development phase. At full development, it is estimated that a total of 97 gas wells would produce an average of 30 million standard cubic feet per day (MMscf/day) of natural gas and approximately 300 barrels of condensate per day over the life of the wells.

Emissions resulting from well development activities can be categorized into three distinct phases: well pad and access road construction, well drilling, and well completion. During well development, vehicle tailpipe and fugitive dust emissions would increase within the GGGAP. Emissions of NO_x and CO would result from vehicles transporting workers to and from the work site and from the transportation and operation of construction equipment. Fugitive dust concentrations would increase with vehicle traffic on unpaved roads and from wind erosion in areas of soil disturbance. Drill rig operations would result mainly in an increase of NO_x and CO emissions. Emission rates were calculated using applicable EPA emission factors and anticipated level of operational activities, such as estimated vehicle trips, load factors, and hours of operation.

After the construction phase is complete, the operation of the GAP wells would primarily produce NO_x, CO, PM₁₀, VOC, and HAP emissions from the following sources:

- Production unit heaters, condensate storage tanks, and glycol dehydrator still vents located at the well pads;
- Vehicle tailpipe sources; and
- Road dust from vehicles.

Table 5. Proposed Action Emission Summary

Pollutant	Construction and Well Development (tons/year)	Operations ¹ (tons/year)				Total Operations
		Production Heaters	Condensate Tank Flash	Well Pad Dehydration	Operations Vehicles	
NO _x	201.8	7.9	0.0	0.0	0.0	7.9
CO	71.3	6.6	0.0	0.0	0.4	7.1
VOC	12.3	0.1	531.1	41.3	0.0	572.5
SO ₂	3.4	0.0	0.0	0.0	0.0	0.0
PM ₁₀	183.4	0.6	0.0	0.0	25.4	26.0
PM _{2.5}	31.8	0.6	0.0	0.0	3.9	4.5
Benzene	0.0	0.0	2.5	5.6	0.0	8.2
Toluene	0.0	0.0	0.0	8.2	0.0	8.2
Ethylbenzene	0.0	0.0	0.0	0.6	0.0	0.6
Xylene	0.0	0.0	0.0	4.2	0.0	4.2
n-Hexane	0.0	0.1	7.4	1.8	0.0	9.4
Formaldehyde	0.1	0.0	0.0	0.0	0.0	0.0

¹ Emissions associated with full-field development

No substantial adverse impacts to air quality are predicted as a result of the Proposed Action. Ambient air concentrations were predicted using the Industrial Source Complex (ISC) computer dispersion model along with five years of representative meteorological data measured near Grand Junction, Colorado. Localized increases in NO₂, CO, and PM₁₀ concentrations would occur near the well pads during construction and operations. However, as summarized on **Table 6**, these predicted ambient air impacts, plus background concentrations, would be well below all applicable federal and State of Colorado ambient air quality standards.

Any comparisons with Prevention of Significant Deterioration (PSD) increments are intended only to evaluate potential significance, and do not represent a regulatory PSD increment consumption analysis. PSD increment consumption analyses are typically applied to large industrial sources during the permitting process, and are solely the responsibility of the State of Colorado and the Environmental Protection Agency.

Table 6. Predicted Gant Gulch GAP Criteria Pollutant Impacts

Pollutant	Avg. Period	Predicted Conc. (µg/m ³)	Predicted Conc. Plus Background (µg/m ³)	CAAQS (µg/m ³)	% of CAAQS ¹	PSD Allowable Increment (µg/m ³)	% of PSD Increment ²
NO ₂	Annual	5	22	100	22%	25	19%
CO	1-hour	215	1360	40,000	3%	None	NA
CO	8-hour	99	1244	10,000	12%	None	NA
PM ₁₀	24-hour	5	46	150	31%	30	18%
PM ₁₀	Annual	1	16	50	32%	17	8%

¹ Concentrations as % of CAAQS include background plus predicted concentrations for each pollutant.

² Concentrations as % of PSD increment include predicted concentrations, excluding background, for each pollutant.

Hazardous air pollutant sources would be the well pad dehydrator vents and condensate storage tanks. Since there are no applicable federal or State of Colorado ambient air quality standards for assessing potential HAP impacts to human health, reference concentrations (RfC) for chronic inhalation exposure, and Reference Exposure Levels (REL) for acute inhalation exposures, are applied as significance criteria. The RfC represents an estimate of the continuous (i.e. annual average) inhalation exposure rate to the human population (including sensitive subgroups such as children and the elderly) without an appreciable risk of harmful effects. The REL is the acute (i.e. one-hour average) concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects. Predicted acute and chronic HAP impacts from the GGGAP project sources are summarized in **Tables 7 and 8**.

For carcinogenic impacts, the range of acceptable cancer risks when evaluating the health effects of an action varies from 1 in a million to 1 in 10,000 (EPA 1998). Maximum impacts from the GGGAP project sources are observed at facility property lines and decrease sharply with distance. Therefore, results indicate that no substantial adverse effects are expected to result from the Proposed Action GAP emission sources. Predicted carcinogenic HAP risks for the GGGAP project is summarized in **Table 9**.

Table 7. Predicted GGGAP Acute HAP Impacts

Hazardous Air Pollutant	Maximum Predicted One-Hour Concentration ($\mu\text{g}/\text{m}^3$)	Acute Reference Exposure Level (REL) ($\mu\text{g}/\text{m}^3$) ¹	Percentage of REL
Benzene	685	1,300	53%
Toluene	919	37,000	3%
Ethylbenzene	92	350,000	<1%
Xylenes	459	22,000	2%
n-Hexane	1821	390,000	1%

¹ Source: EPA Air Toxics Database, Table 2 (EPA 2002). Immediately Dangerous to Life or Health (IDLH)/10 for ethylbenzene and n-hexane, since no available REL.

Table 8. Predicted GGGAP Chronic HAP Impacts

Hazardous Air Pollutant	Maximum Predicted Annual Concentration ($\mu\text{g}/\text{m}^3$)	Reference Concentration (RfC) ($\mu\text{g}/\text{m}^3$) ¹	Percentage of RfC
Benzene	9	30	30%
Toluene	12	400	3%
Ethylbenzene	1	1,000	<1%
Xylenes	6	100	6%
n-Hexane	25	200	13%

¹ Source: EPA Air Toxics Database, Table 1 (EPA 2002).

Table 9. Predicted Gant Gulch GAP Carcinogenic HAP Risk

Hazardous Air Pollutant	Unit Risk Factor (1/μg/m ³)	Exposure Adjustment Factor	Modeled Annual Concentration ¹ (μg/m ³)	Cancer Risk ¹
Benzene	7.8 x 10 ⁻⁶	0.286	8.9	19.8 in a million

¹ Cancer risk = (unit risk factor) x (annual concentration) x (exposure adjustment factor) / 1E-06
 Exposure adjustment factor = 20 Year Expected Exposure Period/70 Year Life Span.

Two Class I airsheds, the Flat Tops Wilderness Area to the northeast and the Maroon Bells Wilderness Area to the southeast, are within approximately 25 miles of the GGGAP. The potential effect on Air Quality Related Values (visibility and acid deposition) in Class I areas are considered in a comprehensive NEPA analysis. The BLM recently published the Roan Plateau draft Environmental Impact Statement. The DEIS focused on oil and gas development in the Glenwood Springs Resource Area and predicted the cumulative effects from approximately 3,500 future wells. The analysis concluded that this level of development, along with other reasonably foreseeable pollutant sources, would have no adverse effect on Air Quality Related Values at either Flat Tops or Maroon Bells. Therefore, it can be concluded that the much smaller level of development from the GGGAP is not likely to have a measurable effect on these Class I areas.

Mitigation: Mitigation of air quality impacts would be accomplished through the permitting of all regulated air pollution sources through the Colorado Department of Public Health and Environment, Air Pollution Control Division (CDPHE-APCD). The construction and operating permitting processes, where applicable (large glycol dehydration units), typically require the use of emission controls to reduce air pollutant impacts. For smaller, minor sources of air pollution (small heaters, condensate tanks), impacts are generally insignificant and mitigation is not typically warranted.

Air quality impacts would be minor during the construction, drilling, completion, testing, and operation of the proposed project. However, the following additional mitigation would be implemented to further reduce impacts:

- Speed control measures on all project-related unpaved roads would be implemented to reduce vehicle fugitive dust.
- Roads and well locations constructed on soils susceptible to wind erosion would be appropriately surfaced to reduce the amount of fugitive dust generated by vehicle traffic.

Areas of Critical Environmental Concern

Lease Stipulations: None.

Affected Environment: There are no ACECs within the GGGA.

Environmental Consequences: N/A.

Mitigation: N/A.

Cultural Resources

Lease Stipulation Adherence: Cultural resource inventories have been completed for all proposed surface disturbing activities within the GGGA. Further inventories and approval will be required from the AO, if surface disturbance activities would occur outside of the inventoried areas.

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

Fifteen cultural resource inventories (GSFO# 768, 875, 887, 1092, 1049, 1166, 1175, 5402-2, 5404-8, 5404-21, 5402-26, 5404-11, 5405-1, 5405-19, 14604-2) have been conducted within the GAP area. Most of these projects were associated with resource extraction or energy transmission for seismic lines, transmission lines, and access roads.

Two previous projects overlap portions of the current project's APE. Portions of those two projects coincide with EnCana's proposed access/pipeline corridors. One of these inventories was for the proposed Oryx Energy Company's #1 Mazatlan Federal Unit Road Reroute (GSFO #1166), covering portions of the proposed access/pipeline rights-of-way for the C2SW, N26W, I27W, and P27W locations. The second project was conducted for EnCana's Hunter Mesa Unit 2-11(GSFO #5402-26). It covered approximately 2.2 miles of proposed access to the currently proposed K2SW well location. It should be noted that the linear portions of these two previous inventories only covered corridors 100 feet wide, so that the current level of inventory will probably only accommodate an access road or pipeline right-of-way, but not both, along these segments of the proposed APE.

No historic properties were identified during the surveys. In accordance with Colorado BLM/SHPO Protocol (1998) and National Protocol (1997) a determination of "No Effect" was made for this action and formal consultation with the Colorado State Historic Preservation Office (SHPO) is not required to comply with Section 106 of the National Historic Preservation Act (16 U.S.C. 470f), as amended.

Environmental Consequences: Direct physical impacts are the greatest single source of potential adverse impacts to the majority of historic properties. For archaeological sites (sites manifested by artifacts and features found on or below the ground surface), these impacts come primarily from disturbance of surface and subsurface sediments through topsoil stripping, excavation, and pipeline trenching. Many of these historic properties are considered eligible under National Register Criterion "d". Criterion "d" recognizes the information potential inherent in the materials on these sites. A site's potential is dependent on the integrity of materials, location, and association, all which are damaged by disturbance to the matrix of the site. This loss of integrity negates the significance of the site. Such impacts are generally concentrated during the development phase of a proposed project, although they can result any time undisturbed ground is subject to alteration.

Direct physical impacts are considered to have an “adverse effect” when they damage or destroy protohistoric structures that contribute to a site’s eligibility under National Register criterion “c.” Such sites are considered eligible because they preserve rarely found examples of historic and protohistoric Native American structures. These sites also usually have an archaeological component associated with the structures and this component may also cause the site to be eligible under criterion “d.”

An “adverse effect” would result if the Gant Gulch Proposed Action has the potential to adversely affect historic properties. “Adverse affect” to an historic property occurs when a Proposed Action “may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.” (36 CFR §800.5[a][1]).

Generally, activities that do not directly physically damage or destroy historic properties are not considered to have an “adverse effect”. However, there are certain Native American sites that can be adversely affected by impacts that alter their surroundings. These culturally sensitive sites are usually ones that convey a significant association to the surrounding terrain or vegetation or specific topographic features. Assessing this effect is often one of consideration of the magnitude of the effect, the degree to which the significant qualities of the surrounding landscape are already affected, and how much weight these surroundings carry in the overall significance of the historic property. Evaluating this effect also relies on consultation with interested Native American tribes because sites may be significant within the context of their surroundings for reasons that are of religious or cultural importance to tribes.

Additionally, indirect long-term cumulative impacts 1) could occur from increased public access and personnel involved in the GAP development; 2) could result in a range of impacts to known and undiscovered cultural resources from illegal collection and excavation to vandalism; or 3) if environmental degradation is allowed to occur, which could potentially expose cultural material which was once buried.

Mitigation: Additional inventory will be required if the pipeline/access roads to the C2SW, N26W, I27W, P27W, and K2SW are construction to a width that exceeds 75 feet. As stated earlier these routes were inventoried to cover corridors 100 feet wide, so that the current level of inventory will probably only accommodate an access road or pipeline right-of-way, but not both, along these segments of the proposed APE.

“The National Historic Preservation Act (NHPA) requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)). Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act.” EnCana will

notify its staff and contractors of the requirement under the NHPA, that work must cease if cultural resources are found during project operations.

Environmental Justice

Lease Stipulation: None.

Affected Environment: Review of 2001 data from US Census Bureau indicates the median annual income of Garfield County averages \$43,560, and is neither an impoverished nor a wealthy county. U.S. Census Bureau data from July 2002 shows the minority population of Garfield County comprises less than 3 % of the total population (U.S. Census Bureau 2003).

Environmental Consequences/Mitigation: The Project Area is in a remote location with no residential communities or concentrations of minority or low income residents. As a result, the Proposed Action is not expected to create a disproportionately high and adverse human health impact or environmental effect on minority or low-income populations within the area.

Farmlands, Prime and Unique

Lease Stipulation: None.

Affected Environment: The Project Area does not contain any prime or unique farmlands.

Environmental Consequences/Mitigation: N/A

Floodplains, Wetlands & Riparian Zones

Lease Stipulation: None

Controlled Surface Use: “Activities within 500 feet of riparian or wetland vegetation, including roads, pipelines, and well pads, may require special design, construction and implementation measures, including relocation beyond 200 meters, in order to protect the uses and functions of riparian and wetland zones. Such measures will be based on the nature, extent, and value of riparian vegetation that are most important to the riparian zone and will be avoided.”

No Surface Occupancy: “To maintain the proper function of riparian zones, activities associated with oil and gas exploration and development, including roads, transmission lines and storage facilities, are restricted to an area beyond the outer edge of the riparian zone. Within the riparian vegetation, an exception is permitted for stream crossings, if an area analysis indicates that no suitable alternative is available.”

Affected Environment: Floodplain habitat occurs along Middle Mamm Creek and East Mamm Creek, which are perennial streams within the Gant Gulch Project Area. Approximately 0.25 miles of Dry Hollow Creek is also within the Project Area. Riparian habitat is found along the banks of these streams. The riparian vegetation along Middle Mamm creek extends up to 100 feet on either side of the creek. Vegetation along the creek includes cottonwood (*Populus* sp.),

maple (*Acer* sp.), dogwood (*Cornus* sp.), an understory of rushes (*Juncus* sp.), and other herbaceous vegetation.

The riparian habitat along Middle Mamm Creek in Sections 1 and 2 (Township 8S, Range 93W) has been classified as “functioning at risk with an upward trend” (M. Kinser, BLM, personal communication, August 2005). East Mamm Creek in Section 6, Township 8, Range 92 has been classified as “not functioning,” and not meeting land health standards due to 1) undercut banks; 2) sediment deposition; 3) poor species diversity; and 4) poor condition (M. Kinser, BLM, personal communication, August 2005). A 1994 PFC assessment of the segment of Dry Hollow Creek in the Project Area determined that this reach was “non-functional” (M. Kinser, BLM, personal communication, September 2005). Problems included 1) sinuosity, width/depth ratio and gradient not in balance with the landscape setting; 2) poor composition/cover/vigor of riparian vegetation; 3) system is not vertically stable; and 4) excessive erosion or deposition.

Environmental Consequences: The Proposed Action would not result in direct impacts, since no riparian vegetation will be removed upon implementation of the Proposed Action (M. Kinser, BLM, personal communication, September 2005). Indirect impacts would include sedimentation from soil disturbance from road and pipeline construction, which would temporarily alter the flow of the streams, and potential invasion of noxious weeds. Effects on water quality from the proposed action could also affect the riparian vegetation (see water quality section).

Mitigation: Mitigation measures for access roads in would include the following:

- Erosion control measures.
- Road closures in periods of excessive soil moisture.
- Weed control.
- Road surface grading

Analysis on the Public Land Health Standard for Riparian Systems: The lands affected by the actions addressed in this EA have not had a formal Land Health Assessment completed. However, the riparian habitats associated with Middle Mamm, East Mamm and Dry Hollow Creeks, have been determined to be “non-functional” or “functioning at risk” (M. Kinser, BLM, personal communication, September 2005). The implementation of the mitigation measures identified above could potentially result in an upward trend towards achieving Standard 2.

Geology and Minerals

Lease Stipulation: None

Affected Environment: There are three major topographic divisions in the State of Colorado, which loosely correspond to three major geologic zones. The topographic divisions include the eastern plains, Rocky Mountains, and the Colorado Plateau. The Colorado Plateau region falls within the western part of the state and consists of a succession of plateaus and mesas that decline gradually toward the west away from the mountains or step down in a series of horizontal plateaus. The Colorado Plateau is classified as a sedimentary zone. Igneous and metamorphic areas occur within the plateau, but these areas are small in comparison to the extent of sedimentary rock.

The project area is located south of the Colorado River, within the southern portion of the Piceance Basin. The Piceance Basin is a broad, asymmetric, southeast-northwest trending structural basin that contains sedimentary rocks up to 20,000 feet thick and lies between the White River uplift to the northeast, the Gunnison uplift to the south, and the Uncompahgre swell to the west (George 1927; Weiner and Haun 1960). The Piceance Basin contains stratified sediments ranging in age from Cambrian through middle Tertiary. The northern half of the basin is deepest and has the thickest stratigraphic sequence. **Figure 3** provides the geologic map for the project area. Most of the project area is underlain by the Eocene and Paleocene Wasatch Formation. The Wasatch Formation consists of variegated siltstone, claystone, and sandstone, and locally, conglomerate. The Wasatch Formation ranges from 1,000 feet to over 5,000 feet thick in this area (CGS 1999). The Wasatch Formation is a source of many varieties of fossils, including early horses, primates, birds, rodents, fish, turtles, clams, snails, and plants (BLM 1999a). However, there are no areas of critical environmental concern for the Wasatch Formation within the project area.

The Wasatch Formation is underlain unconformably by the Mesaverde Group. The Mesaverde Group includes various rock formations that have sometimes been given individual formation names, including the Iles Formation and Williams Fork Formation. The Mesaverde Group has also sometimes been referred to as the Mesaverde Formation on some maps, with the various rock units considered to be members of the formation. In general, the Mesaverde Group is composed of mudstones, shales, conglomerates, limestones, and sandstones with interlayered coal beds and ranges in thickness from about 3,000 to over 7,000 feet. The Iles and Williams Fork Formations are significant producers of natural gas in the Piceance Basin. In addition, there are several known hydrocarbon-producing marine sandstones (commonly referred to as “sands” by the oil industry) at or near the base of the Mesaverde Group, including the Cameo, Cozette, Corcoran, and Rollins Sandstones. Above these units lies the “barren member”, named because of the lack of coal in this interval, which consists of numerous unconnected sandstones, shales, and mudstones with low permeability (Glover et al 1998).

The proposed natural gas drilling project would target sandstone layers within the Williams Fork Formation between 7,200 feet and 10,000 feet below ground surface (bgs). The Williams Fork Formation consists of interbedded marine and non-marine lenticular sandstones, fresh-water limestones, coal seams, and conglomerates. The Williams Fork Formation sandstones are considered to be “tight sands”. These lenticular (lensed-shaped in cross-section) sandstones occur in a series of packages, each about 400-500 feet thick, across a total depth interval of about 3,000 feet. Studies conducted by current operators within the Rulison Gas Field, located just west of the project area, show that these sandstone packages have limited horizontal extent, based on the lack of communication between existing wells spaced less than 1,000 feet apart (USDOE 2004). Natural gas wells drilled in the Rulison Gas Field penetrate four to six of these sandstone packages (USDOE 2004). These “tight” sandstone gas reservoirs typically require hydraulic fracturing to produce economical quantities of gas.

A small portion of the southern part of the project area is underlain by the Anvil Points Member of the Eocene Green River Formation. The Green River Formation consists of marlstone, siltstone, mudstone, and oil shale, and is an important source of fossils. No project facilities would be located on exposures of the Green River Formation.

Alluvial deposits of Quaternary age are present on the tops of the mesas within the project area and along the tributaries to Middle Mamm Creek (**Figure 3**). These alluvial units have been subdivided into a number of units by detailed geologic mapping of the area conducted by the Colorado Geological Survey in 1999 (CGS 1999). The alluvial units include Holocene alluvial stream deposits, glacial gravel and sheetwash deposits, terrace deposits, and landslide and debris-flow deposits. These deposits generally consist of unconsolidated sand, gravel, and clay and may locally produce groundwater to wells.

Portions of the project area underlain by the Wasatch Formation on steep slopes may be susceptible to landslides. Landslide deposits (map unit Qls) are extensive on some north-facing slopes in the project area and range between 3 and 50 feet thick (CGS 1999). These landslides were produced by three mechanisms: transitional earth slides, complex rotational earth slides – debris flows, and complex rotational earth slides – earth flows (Cruden and Varnes 1996). The transitional landslides are shallow features with failure surfaces originating between 3 and 15 feet below ground surface (bgs). These landslides originate on steep slopes and involve sliding of regolith, colluvium, and decomposed bedrock along the interface between the regolith and underlying competent bedrock. Rotational slope failures in the area are typically large and their failure surfaces deeper than for transitional landslides. These rotational landslides involve unconsolidated surface materials, decomposed bedrock, and weakly cemented beds of the Wasatch Formation. Debris-flow deposits (map unit Qdf) are also present within the project area and were derived from the Green River Formation. These deposits are estimated to be as much as 20-25 feet thick.

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 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. Most of the gas reservoirs also produce varying amounts of oil/gas condensate. The project area is contained within the Mamm Creek field. The Mamm Creek field was discovered in 1959 and currently produces gas and a little oil from over 270 existing wells (RMAG 2003).

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 great depth to coal (more than 7,000 feet) beneath the area. These coal beds may contain some natural gas. Therefore, there is some potential for future gas production from these coal beds.

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 alluvial deposits located along the stream valleys and in terrace deposits on mesa tops. According to the CGS (1999), these deposits are of little commercial value because the gravels contain much silt and clay matrix and secondary calcium carbonate cements, and are often mantled by windblown deposits. The deposits are occasionally exploited locally for use as road materials.

Environmental Consequences: The construction of well pads for the Proposed Action would result in changes to the local topography, including cuts made into bedrock surfaces of the Wasatch Formation at some well pad locations. These changes to the visual topographic

character of the area would be minor, but long-term. In addition to the visual aspects of the cuts, cuts into the Wasatch Formation on steep slopes could result in slope instability, possibly including landslides. Portions or all of five proposed well pads (P-26W, P-27W, I-27W, M-23W, and N-23W) are located on landslide deposits. At these locations, the potential for increased landslide activity is considered to be moderate. The increased activity would likely be in the form of minor slumping of material from cuts. Some small slumps may also occur in the cuts created for the new access roads, where these roads cross exposures of the Wasatch Formation on steep slopes. However, these mass movements would be localized in extent and would not affect any existing structures or roads. The potential for increased landslide activity for the remainder of the project area from the Proposed Action is considered to be minor.

If the proposed Gant Gulch unit wells were to become productive, implementation of the Proposed Action would result in natural gas and associated water being produced from the hydrocarbon-producing sands within the Mesaverde Group. The amount of natural gas that may be potentially produced from the proposed wells cannot be estimated accurately. 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.

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. 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.

Injection of drilling fluids and hydraulic fracturing of the wells would have the potential to induce earthquakes in nearby faults. Injection of waste liquids has historically caused earthquakes at some locations in the United States, notably near Denver, Colorado. Earthquake-induced ground shaking could result in damage to above-ground structures within the project area. However, the likelihood of fluid-induced earthquakes is considered to be very low, as indicated by the absence of recorded historic earthquake epicenters in the region. Accordingly, the Proposed Action would have a negligible impact on the risk of fault-generated earthquakes.

Mitigation: Mitigation measures for protection of geologic resources are detailed in the Gant Gulch GAP and would be included in the Master Application for Permit to Drill (APD). 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. The GAP also describes methods for minimizing the potential for slope instability and erosion, and for interim and final reclamation of disturbed surfaces.

Invasive, Non-Native Species

Lease Stipulation: None

Affected Environment: Based on a plant survey conducted in June 2005, the Gant Gulch Project Area is, to some extent, affected by cheatgrass (downy brome) (*Bromus tectorum*), an invasive noxious weed species. In certain areas of sagebrush flats and pinyon/juniper woodlands, cheatgrass is a major component of the understory. Noxious weeds are defined as plants that grow out of place and are competitive, persistent, and pernicious (James et al 1991). Cheatgrass is on the State of Colorado noxious weed list (and is addressed in BLM's 1999 Oil and Gas Reclamation Policy). Other weed species observed in the Gant Gulch Project Area, especially along existing roads and trails are listed in **Table 10**.

Table 10. Weeds reported from the Gant Gulch Project Area¹.

Common Name	Scientific Name
Tumble mustard	<i>Sisymbrium altissimum</i>
Yellow sweet clover	<i>Melilotus officinalis</i>
Shepherd's purse	<i>Capsella bursa-pastoris</i>
False flax	<i>Camelina microcarpa</i>
Cheatgrass	<i>Anisantha tectorum</i>
Field pepperweed	<i>Neolepia campestris</i>
Blue mustard	<i>Chorispora tenella</i>
Bulbous bluegrass	<i>Poa bulbosa</i>

¹Western Ecological Resource 2005

Environmental Consequences: The spread of weeds is of concern to the BLM Glenwood Springs Field Office in the areas proposed for oil and gas development activities in the Gant Gulch Project Area. Specific negative effects of noxious and invasive weeds can include:

- Reduction in the overall visual character of an area;
- Competition with, or complete over-running of, native plants resulting in the loss of species diversity and ecosystem functions;
- Reduction or fragmentation of wildlife habitats; and
- Increased soil erosion.

Construction activities, increased soil disturbance, and higher traffic volumes could potentially introduce and spread undesirable weed species within the Gant Gulch Project Area. However, implementation of the mitigation measures identified below would minimize the potential for invasion or expansion of invasive or noxious weeds.

Mitigation:

- EnCana would implement an intensive reclamation and weed control program beginning the first growing season after well completion. All disturbed areas not needed for immediate operation of the wells will be seeded with a mixture of native grasses and shrubs. Site specific seed mixes designed to reclaim the sites and deter establishment of noxious weeds are presented in the vegetation section. The seed shall be certified free of primary or secondary noxious weeds. The operator shall adhere to the specified seed mix and will

continue with reclamation activities, including additional reseeding if necessary, until BLM's interim reclamation objectives are achieved.

- The operator shall be required to monitor for the presence of noxious weeds, which are included on the State or County noxious weed lists at least once each year during the growing season.
- The operator shall be responsible for promptly controlling any noxious weed infestations, which have resulted from the operator's construction, operation, or maintenance activities within the Project Area. A Pesticide Use Proposal must be approved by the Authorized Officer prior to the use of any herbicides.
- Given that cheatgrass is common in portions of the Project Area, it may not be possible to totally eliminate this noxious weed from the reclaimed area. In the case of cheatgrass, interim reclamation will be considered acceptable if cheatgrass and other undesirable vegetation are less than five percent cover, if the adjacent vegetation consists of less than 50 percent undesirables. Cheatgrass will be less than 50 percent cover, if the adjacent vegetation is more than 50 percent undesirables (1999 GSRA Oil and Gas FSEIS).

Migratory Birds

Lease Notice – “A biological survey will be required for raptor nests prior to approval of operations. Mitigation measures such as relocation and fencing of habitat may be required.”

Timing Limitation applicable to H2SW and I2SW pads - No surface use is allowed on specified lands on Lease COC-55605 from February 1 to August 15 within a ¼ mile buffer zone around nest sites for golden eagles and all accipiters: falcons (except kestrels); all buteos; and owls. During years when a nest site is unoccupied by May 15, the seasonal limitation may be suspended. It may also be suspended once the young have fledged and dispersed from the nest.

Affected Environment: The Migratory Bird Treaty Act of 1918 (MBTA) as amended, was implemented for the protection of migratory birds. Unless permitted by specific regulations, the MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

The Gant Gulch Project Area provides habitat and/or potential habitat for numerous migratory birds, including species identified as “birds of conservation concern” by the USFWS, Region 6 (USFWS 2002). **Table 11** provides a list of birds of conservation concern that may occur in the Gant Gulch Project Area at various times of the year, and the habitat in which each of these species may be found.

Table 11. Birds of Conservation Concern for the Southern Rockies/Colorado Plateau Potentially Present in the Gant Gulch Project Area (USFWS 2002).

Common Name	Scientific Name	Habitat	Potential Presence
Northern Harrier	<i>Circus cyaneus</i>	Wetlands with dense vegetation; also grasslands, agricultural lands, mountain sagebrush, and marshes.	Y
Ferruginous Hawk	<i>Buteo regalis</i>	Grasslands and semi-desert shrubs; rock outcrops, buttes.	Y
Golden Eagle	<i>Aquila chrysaetos</i>	Open habitats including grasslands, sagebrush, farmlands, and pinyon-juniper woodlands.	Y
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Open pine forest, riparian, and pinyon-juniper woodlands	Y
Gray Vireo	<i>Vireo vicinior</i>	Pinyon-juniper woodlands; understory of sagebrush and other desert scrub.	Y
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	Pinyon-juniper woodlands.	Y
Virginia's Warbler	<i>Vermivora virginiae</i>	Dense shrublands and scrub forest associated with mesa slopes, foothills, open ravines, and valleys.	Y
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	Pinyon-juniper woodlands.	Y
Sage Sparrow	<i>Amphispiza belli</i>	Large, low-elevation stands of big sagebrush or mixed big sagebrush and greasewood.	Y

A raptor survey was conducted at all proposed access roads and well pads by Wildlife Specialties, LLC on June 8, 9, 20, and 21 2005. A hand-held Global Positioning System (GPS) unit was used to identify the approximate center of each proposed well pad based on the Universal Transverse Mercator (UTM) coordinate for that location. A pedestrian survey was used to access all areas within 0.4 km of the proposed well pads. Structure (i.e., cliffs and snags) characteristic of Buteo nest sites were examined using binoculars for evidence of use. The surveyor also listened for characteristic raptor calls.

A pair of red-tailed hawks (*Buteo jamaicensis*) was observed flying and vocalizing near pads H2SW, I2SW, and K2SW. These two adults actively defended the area, however, the density of the vegetation did not allow for location of the nest. Nests are often in trees that are taller than surrounding trees, and a common characteristic of nest sites is an unobstructed access to the nests and a commanding view of surrounding hunting areas. Birds that are non-migratory typically remain in or near the breeding territory throughout the year (Peterson 1979). Red-tails are limited by nest sites and food supply. Populations may be limited by a scarcity of appropriate nest sites in some regions despite high prey availability (Preston and Beane 1993). Eggs are typically laid in mid to late March (Kingery 1998). In Colorado red-tails have been found on nests from 1 April to 1 August (Kingery 1998).

An active Cooper's hawk (*Accipiter cooperii*) nest was identified within the P26W well pad site. Cooper's nests are placed under dense canopy cover on cooler north and east slopes. Breeding

phenology is variable; nests with eggs have been recorded between 16 May and 5 July and nests with young vary between 29 May and 31 July (Kingery 1998).

Environmental Consequences: The Gant Gulch Project Area consists mostly of sagebrush shrublands. However, there are areas where pinyon-juniper or Gambel oak are dominant. The Proposed Action could result in loss of foraging, hunting, and nesting habitat of the migratory bird species. Reclamation activities resulting in the growth of herbaceous vegetation species would increase the habitat of small rodents and other prey species for raptors. While habitat loss may affect individual birds, it is not expected to adversely affect the species as a whole. If vegetation clearing for well pads, roads, and pipelines is conducted during the spring nesting season, it is possible that nests and/or eggs will be destroyed. Construction activity will likely result in the displacement of birds to adjacent habitats due to noise, commotion, and human presence. The proposed action will also result in increased habitat fragmentation, and a reduction in habitat connectivity and habitat patch size. This can be detrimental to migratory birds that require large intact habitat blocks

Mitigation:

In order to protect nesting raptors, an annual raptor survey would be conducted prior to any new construction, drilling, or completion activities scheduled between February 1 and August 15. If an active raptor nest is documented within ¼ mile of proposed construction, drilling or completion, the activity could be delayed until the young have fledged or the nest is no longer active, as determined by a qualified wildlife biologist. If lease stipulation does not exist to protect nesting raptors, a 60 day timing limitation or relocation of the well pad/road up to 200 meters would be applied to a ¼ mile buffer around the nest site to minimize disturbance during a portion of the critical nesting period.

Since an active Cooper's hawk nest is located adjacent (within 1/8 mile) to the proposed P26W pad, a survey will be conducted by May 15 to determine the status and use of the nest. Unless this nest is not active next breeding/nesting season by May 15, or unless evidence is presented that shows how the geographical relationship to the nest site of topographic barriers and vegetative screening sufficiently hides/protects the nest, this pad will have to be moved 200 meters and/or the implementation of a 60 day timing limitation (if pad lies within ¼ mile of nest) to mitigate the proximity of proposed pad to the nest.

- On the H2SW and I2SW well pads, the Timing Limitation listed on Lease #COC-55605 will apply to protect an active red-tailed hawk nest identified during the raptor survey. The TL will apply until young have been documented, by a qualified biologist, as having fledged and dispersed from the nest, or August 15th – whichever occurs first.
- On the K2SW pad, a 60-day timing limitation will be enforced (between February 1 and August 15) to protect the above-mentioned active red-tailed hawk nest identified during the raptor survey.

Analysis on Public Land Health Standard for Animal Communities: The lands affected by the actions addressed in the Gant Gulch Proposed Action have not had a formal Land Health Assessment completed. However, with the implementation of mitigation measures addressed in this EA, Standard 3 may be achieved.

Native American Religious Concerns

Lease Stipulation: None.

Affected Environment: At present no Native American concerns are presently known by the GSFO within The Gant Gulch Unit GAP, however the GAP is within a larger area identified by the Ute Tribes as part of their ancestral homeland, particularly the Uintah and Ouray Bands of the Ute Tribe. The Southern Ute, Ute Mountain Ute, and the Uintah and Ouray Bands of the Ute Tribe, were notified by letter on July 25, 2004 about the GAP, the results of the cultural resource inventories, and asked to respond if they had any concerns. No response was received by September 6, 2005.

Environmental Consequences/Mitigation: Environmental consequences and mitigation would be the same as the Cultural Resources section. The importance of the Education/Discovery Stipulation needs to be stressed to EnCana and all of their subcontractors. A standard Education/Discovery Condition of Approval for Cultural Resource protection will be attached to the decision document for this project. If new data is disclosed, new terms and conditions may have to be negotiated to accommodate Native American concerns during the implementation phase.

Threatened, Endangered, and Sensitive Species

Lease Stipulation: Endangered Species Act Section 7 Consultation – *“The lease area may contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened and endangered species or result in the destruction or adverse modification of a designed or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.”*

Affected Environment: Based on information from the U. S. Fish and Wildlife Service, the federally listed and candidate plant and animal species provided in **Table 12** may reside or be impacted by actions occurring in the Project Area. They include the bald eagle, Canada lynx, DeBeque phacelia, Gunnison sage grouse, Mexican spotted owl, Uinta Basin hookless cactus, yellow-billed cuckoo, Colorado pikeminnow, humpback chub, razorback sucker, and bonytail. Designated critical habitat has been identified for the Colorado pikeminnow and razorback sucker on the Colorado River from Rifle, Colorado to Lake Powell, Utah.

Plant species listed as sensitive by the BLM that may occur within the Project Area include DeBeque milkvetch (*Astragalus debequaeus*) and Harrington’s penstemon (*Penstemon harringtonii*).

Table 12. Threatened, Endangered, and Candidate Species Potentially Present in the Gant Gulch Project Area.

Common Name	Scientific Name	Habitat	Status
Bald eagle	<i>Haliaeetus leucocephalus</i>	River, reservoir, and stream habitat.	Threatened
Boreal toad	<i>Bufo boreas boreas</i>	Spruce/fir forests between 8,500 and 11,500ft.	Removed from satatus as “candidate” on September 28, 2005
Canada lynx	<i>Lynx canadensis</i>	High elevation aspen and spruce-fir forests	Threatened
De Beque phacelia	<i>Phacelia submutica</i>	Clay and sandstone of the Wasatch Formation	Candidate
Gunnison sage grouse	<i>Centrocercus minimus</i>	Sagebrush, grasslands	Candidate
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Forested canyon bottoms	Threatened
Uinta Basin hookless cactus	<i>Sclerocactus glaucus</i>	Gravelly, rocky surfaces, mesa slopes	Threatened
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Riparian; gallery cottonwoods	Candidate
Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Colorado River System	Endangered
Humpback chub	<i>Gila cypha</i>	Colorado River System	Endangered
Razorback sucker	<i>Xyrauchen texanus</i>	Colorado River System	Endangered
Bonytail	<i>Gila elegans</i>	Colorado River System	Endangered

Fish species identified as species of special concern by the Colorado Division of Wildlife (CDOW) include the Colorado River cutthroat trout (*Oncorhynchus clarkia pleuriticus*), flathead chub (*Platygobio gracilis*), Iowa darter (*Etheostoma exile*), mountain sucker (*Catostomus platyrhynchus*), orangethroat darter (*Etheostoma spectabile*), Rio Grande cutthroat trout (*Onchorhynchus clarkii virginialis*), and stonecat (*Noturus flavus*). Colorado River cutthroat trout are found in Garfield County. Bluehead sucker, flannelmouth sucker, and roundtail chub, which are designated as BLM sensitive species, may be found in the Colorado River near the Project Area (http://ndis.nrel.colostate.edu/asppresponse/statusbycnty_res.asp).

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is listed as threatened under the federal Endangered Species Act. Historically, the species ranged throughout North America, but its numbers declined drastically in the middle of the 20th Century, due to eggshell damage caused by the pesticide DDT, as well as loss of habitat. The bald eagle typically is found in areas with tall trees near large rivers, lakes, and seacoasts. The eagle feeds on fish, waterfowl, muskrats, squirrels, rabbits, prairie dogs, and road-killed animals. Bald eagles construct nests up to eight feet in size in tall trees. The female lays one to three eggs, which are incubated approximately 35 days. Both the male and female incubate the eggs. (http://wildlife.state.co.us/species_profiles/baldeagle.asp, accessed 7/7/05). Although there are

no recorded nesting or roosting sites in the vicinity of the Gant Gulch Project Area, the bald eagle is occasionally observed in the area.

Boreal Toad

The boreal toad (*Bufo boreas boreas*), was a candidate for listing under the Endangered Species Act. However, it was removed from consideration as a threatened and endangered species on September 28, 2005. The boreal toad is considered a sensitive species in Colorado. It typically lives in damp conditions within the vicinity of marshes, wet meadows, streams, beaver ponds, glacial kettle ponds, and lakes (Hammerson 1999), and is restricted to areas with suitable breeding habitat in spruce-fir forests and alpine meadows. The boreal toad is generally found in the southern part of the Rocky Mountains, at an elevation between 8,500 and 11,500 feet, which is higher than the elevation of the Project Area.

Canada lynx

The Canada lynx (*Lynx canadensis*) is listed as threatened by the USFWS under the ESA of 1973, as amended. The Canada lynx's presence in the State of Colorado is currently distributed throughout higher elevations of Colorado, primarily in the San Juan Mountain region and along the continental divide, and into southern Wyoming.

Canada lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare (Ruggiero et al, 2000). In the western United States, the species is associated with lodgepole pine (*Pinus flexilis*), subalpine fir, Engelmann spruce, and aspen cover types. Snowshoe hares are the primary prey of lynx (Koehler and Aubrey, 1994), but red squirrels are an important alternative prey species (Koehler, 1990; Ruediger et al, 2000). In the Southern Rocky Mountain region, primary lynx habitat is found in the subalpine and upper montane forest zone, roughly between 8,000 and 12,000 feet elevation (Ruediger et al, 2000).

Gunnison Sage Grouse

The Gunnison sage-grouse (*Centrocercus minimus*) is found south of the Colorado River. This species is about one-third smaller than the typical sage-grouse, and males have more distinct, white tail feathers and filoplume. Approximately 3,500 breeding Gunnison sage-grouse occur among seven separate populations throughout southwest Colorado and southeast Utah. The largest population, about 2,500 birds, inhabits the Gunnison Basin. Residential development, livestock grazing, water diversion projects and increased deer and elk populations have all contributed to the loss of habitat for the Gunnison sage-grouse. The Gunnison Sage-grouse requires a variety of habitats such as large expanses of sagebrush with a diversity of grasses and forbs and healthy riparian ecosystems. The Gunnison sage-grouse is designated a species of special concern in Colorado and is a candidate for listing under the federal Endangered Species Act. (http://wildlife.state.co.us/species_profiles/gunnisonsagegrouse.asp, Accessed 9/28/05).

Mexican Spotted Owl

The Mexican spotted owl (*Strix occidentalis lucida*) is listed as threatened under the federal Endangered Species Act. It is one of three subspecies of spotted owls occurring in the United States and one of 12 species of owls that regularly occur in Colorado. The range of the Mexican

spotted owl extends from southwestern United States into Mexico. In Colorado the Mexican spotted owl occurs in the lower elevation forests mostly in deeply incised rocky canyons, preferring complex forest structures or rocky canyons that contain uneven-aged, multi-level and old thick forests. The prey includes rodents, such as mice, voles, and woodrats, but the species also feeds on bats, birds, snakes and lizards. Alteration of the habitat of the Mexican spotted owl due to logging has resulted in a decline in the population of the species. (http://wildlife.state.co.us/species_cons/wildlifeindanger/MexicanSpottedOwl.pdf, accessed 7/7/05).

Yellow-billed cuckoo

The western yellow-billed cuckoo (*Coccyzus americanus*), a Federal candidate for listing under the ESA, is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Nest sites have been correlated with large and relatively large willow-cottonwood patches, dense understory, high local humidity, low local temperature, and in proximity to slow or standing water. In Colorado, yellow-billed cuckoos are rare spring and fall migrants and summer residents on the eastern plains west to Morgan and Otero counties, and rarely west to the foothills. It is an uncommon local summer resident in western valleys, primarily from Mesa County southward. It occurs in mountain parks (four records) and in foothills and lower mountains (four records). Numbers of this species fluctuate widely from year to year. (<http://ndisweb.nrel.colostate.edu/wildlifespdx.asp?SpCode=040277>, Accessed 9/28/05).

Endangered Colorado River Fish

Four species of fish in the Colorado River System are classified as endangered under the federal Endangered Species Act. They include the Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*). The Colorado pikeminnow thrive in swift flowing muddy rivers with quiet, warm backwaters. The humpback chub prefer deep, canyon-bound portions of the Upper Colorado River system, such as Black Rocks and Westwater Canyon on the Colorado River, and Yampa Canyon within Dinosaur National Monument. The razorback sucker is most often found in quiet, muddy backwaters along the Colorado, Green, and San Juan rivers. The bonytail is extremely rare in Colorado and no self-sustaining populations exist throughout the Colorado River Basin. The construction and operation of large dams is one of the major factors that contributed to the decline of these species. Other factors that contributed to their decline include water diversions, introduction of non-native species, and stocking of predatory game fish species, such as largemouth bass, northern pike, and catfishes. A recovery program managed by the USFWS, using hatchery-reared fish has been underway for several years. (http://wildlife.state.co.us/species_cons/wildlifeindanger/). Designated critical habitat for the Colorado pikeminnow and razorback sucker is located on the Colorado River and its 100-year floodplain from Rifle, Colorado to Lake Powell. Although the Colorado River is more than 10 miles north of the Project Area, the Mamm Creek watershed drains into the Colorado River.

Cutthroat Trout

The cutthroat trout (*Salmo clarki pleuriticus*) is found in the Colorado River drainage and is designated a BLM sensitive species. Current distribution is limited to a few, small headwater streams and lakes in northwest Colorado. Like all native cutthroat, the Colorado River variety

spawns from April to June in running water. Fertilized eggs are buried in a gravel nest by females and develop in the summer. The cutthroat feeds mainly on terrestrial insects and aquatic invertebrates, but food of adults may include small fish, frogs, and mice (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=010575>, Accessed 9/28/05).

Mountain Sucker

The mountain sucker (*Catostomus platyrhynchus*), a BLM sensitive species, is found throughout western North America, ranging from South Dakota to the Pacific coast states and British Columbia, Alberta, and Saskatchewan. This species can be found in cool rivers and streams with moderate currents and rocky substrates. These fish rarely occur in larger rivers and lakes. Mountain sucker feed primarily on diatoms and other types of algae. Spawning occurs in late spring or early summer, primarily in riffles near pools in fast flowing streams.

Bluehead sucker

The bluehead sucker (*Catostomus discobolus*), a BLM sensitive species, is found in a wide variety of areas from headwater streams to large rivers. It is absent in areas of standing water, requiring water of moderate-to-fast velocity. Adults vary in color according to habitat, ranging from grey-blue to tan to yellowish and are darker dorsally. The head, especially of adults, often has a blue cast. Bluehead suckers are found throughout the middle and upper Colorado River Drainage in Colorado, New Mexico, Arizona, Utah and Wyoming. In Colorado, the bluehead sucker is restricted to western slope waters. In some waters, such as the Gunnison River above Blue Mesa Reservoir, this species and the flannelmouth sucker have been replaced by white and longnose suckers. The white and longnose suckers, native to the eastern slope waters of Colorado, were introduced to the western slope. Cold water releases from reservoirs may also have been involved in the disappearance of the bluehead sucker from some western slope waters (Wiltzius 1978). (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=010634>, Accessed 9/28/05)

Roundtail Chub

The roundtail chub (*Gila robusta*), a BLM sensitive species, occupies slow moving waters adjacent to areas of faster moving water. Groups of adult roundtail concentrate in quiet swirling water adjacent to fast moving water, swimming in small groups into the faster water "presumably to feed" (Minckley 1973). Young prefer shallow river runs while juvenile chubs concentrate in river eddies (Valdez, et. al. 1982) and irrigation ditches (Wiltzius 1978). The roundtail has historically been the most common member of the genus *Gila* in the Colorado River Basin extending up to the mountain foothills (Holden and Stalnaker 1975). In Colorado, the roundtail chub is found in the Colorado River mainstem and larger tributaries (e.g., White, Yampa, Dolores, San Juan, and Gunnison rivers). (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=010629>, Accessed 9/28/05)

Flannelmouth sucker

The flannelmouth sucker (*Catostomus latipinnis*), a BLM sensitive species, inhabits larger streams and rivers in all habitat types including riffles, runs, eddies, and backwaters. The flannelmouth is restricted to larger streams and rivers in the middle and upper Colorado River

Drainage, including parts of Wyoming, Colorado, New Mexico, Utah, Arizona and Nevada. In Colorado, the flannelmouth is found only in large rivers on the western slope. This species and the bluehead sucker have disappeared from some waters, such as the Gunnison River above Blue Mesa Reservoir. The white and longnose suckers, introduced from eastern slope waters, have replaced the flannelmouth and bluehead in the upper Gunnison River. Competition with the introduced species and/or cold water temperatures from reservoir releases probably led to the disappearance of the flannelmouth from the upper Gunnison River.

Uinta Basin Hookless Cactus

Uinta Basin hookless cactus (*Sclerocactus glaucus*) is a federally listed threatened plant that occurs in Western Colorado. It produces pink flowers from late April to late May. The Uinta Basin hookless cactus is typically found on river benches, valley slopes, and rolling hills in xeric, fine textured soils overlain with cobbles and pebbles. It grows in salt desert shrub and pinyon-juniper communities at elevations ranging from approximately 4,500 to 6,600 feet. The species and habitat are vulnerable to disturbance from domestic livestock grazing, oil and gas exploration and development, and off-road vehicle use (Heil and Porter 1993). There is no habitat for the Uinta Basin hookless cactus within the Gant Gulch Project Area (Western Ecological Resource 2005).

DeBeque Phacelia

DeBeque phacelia (*Phacelia submutica*) is considered a candidate for listing under the Endangered Species Act. The species is a low-growing annual plant with light yellow or cream colored flowers, often with a purple tinge. It occurs on moderately steep exposures and on small benches, as well as on ridge tops. It is limited to soils with high clay content and relatively light vegetative cover. DeBeque phacelia is a narrow endemic with small populations known only from Garfield and Mesa counties. Livestock grazing, OHVs, reservoir development and oil and gas development are potential threats to the species. (www.sw-center.org/swcbd/Programs/bdes/cp/co.html, accessed 7/21/05).

Harrington Penstemon

Harrington penstemon (*Penstemon harringtonii*), a BLM sensitive plant, is a perennial herbaceous plant that primarily occurs in open stands of big sagebrush shrublands, or rarely, pinyon-juniper woodlands between 6,800 -9,200 ft. The soils are typically rocky loams and rocky clay loams derived from coarse calcareous parent materials or basalt. Harrington penstemon is only found in Colorado in Grand, Eagle, Routt, Summit, Garfield, and Pitkin Counties (Spackman et al., 1997). This showy species grows to about 18 inches in height and has light blue flowers in interrupted spikes. An easily recognizable feature of the flowers is the two lower stamens that stick out of the floral tube (Western Ecological Resource 2005).

DeBeque Milkvetch

The DeBeque milkvetch (*Astragalus debequaeus*), a BLM sensitive plant, is a member of the pea family. It is a small plant with white or yellowish-white flowers. The habitat consists of varicolored, fine textured, seleniferous, saline soils of the Wasatch Formation-Atwell Gulch Member, containing barren outcrops of dark clay interspersed with lenses of sandstone. of the

DeBeque milkvetch is found at an elevations ranging from 5,100 to 6,400 feet (www.cnhp.colostate.edu/rareplants.html, accessed 7/21/05).

Environmental Consequences:

Bald Eagle

Although bald eagles have been observed in the area, there are no known bald eagle nest or roost sites in the vicinity of the Gant Gulch Project Area. The closest bald eagle nest to the project area is located in northern Garfield County (<http://ndis.nrel.colostate.edu/maps/>). The Project Area is near the southern boundary of the county. Although potential roosting exists along the Colorado River north of the Project Area, the Gant Gulch area, itself, lacks the preferred bald eagle habitat. Therefore the Proposed Action would have “no effect” on the bald eagle.

Endangered Colorado River Fish

In May 1994, the BLM prepared a Programmatic Biological Assessment (PBA) that addresses water depleting activities in the Colorado River Basin that would impact the endangered Colorado River fish. In response to BLM’s PBA the USFWS issued a Biological Opinion (#ES/GJ-6-CO-94-F-017) on June 13, 1994, which determined that water depletions from the Colorado River Basin are likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker, and result in the destruction or adverse modification of their critical habitat.

The Biological Opinion includes reasonable and prudent alternatives developed by the USFWS, which allow the BLM to authorize projects that result in water depletion (less than 100 acre-feet), while avoiding the likelihood of jeopardy to the endangered fishes and avoiding destruction or adverse modification of their critical habitat. As a reasonable and prudent alternative, the USFWS authorized the BLM to make a one-time contribution to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) in the amount equal to the average annual acre-feet depleted by each project. Payment was to be made to the National Fish and Wildlife Foundation to cover all BLM authorized actions that result in water depletions.

Oil and gas development in the upper Colorado River basin was determined to produce more water that is used in construction and development activities. The USFWS concurred with this determination in the Biological Opinion. Therefore, oil and gas development activity is not currently considered a water depletion activity (T. Fresques, BLM, personal communication, July 21, 2005).

Canada lynx

The Canada lynx, listed as threatened under the ESA, inhabits mesic spruce-fir forests that have cold winters with heavy snowfall. The primary prey of the lynx is the snowshoe hare. Since the primary prey species and habitat does not occur within the project area, the Canada lynx is not likely to be present. Therefore, the Proposed Action would have “no effect” on the Canada lynx.

Gunnison Sage Grouse

The Gunnison sage grouse, a candidate for listing under the ESA, inhabits sagebrush habitat containing grasses and forbs. Since sagebrush is the dominant vegetation in the Project Area, this species could occur there. Impacts to the Gunnison sage grouse from the Proposed Action could include fragmentation and loss of breeding, nesting, and winter habitat, in addition to loss of forage.

Mexican Spotted Owl

The Mexican spotted owl, listed as threatened under the ESA, inhabits low elevation forests with steep, incised, rocky canyons. Since this habitat is not present within the Gant Gulch Project Area, the Proposed Action would have “no effect” on the Mexican spotted owl.

Yellow-billed cuckoo

The yellow billed cuckoo is found in riparian habitats with large willow-cottonwood patches, dense understory, and proximity to slow-flowing water. The species is a rare spring and fall migrant and resident on the eastern plains. Therefore, suitable habitat does not exist within the Project Area, resulting in a “no effect” determination.

Uinta Basin Hookless Cactus

The Uinta Basin hookless cactus, listed as threatened under the ESA, is found in salt desert shrub and pinyon-juniper communities at elevations of 4,500-6,600 feet. Since there is no habitat for this species in the Project Area (Western Ecological Resource 2005), the Proposed Action would have “no effect” on the Uinta Basin hookless cactus.

DeBeque Phacelia

The DeBeque phacelia, a candidate species under the ESA, occurs on sparsely vegetated steep slopes in clay 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., 1989), appropriate habitat is unlikely to be present (C. Scheck, BLM, personal communication, June 2005). In addition, the project site lies at a higher elevation than the known range for the species (4,700 – 6,200 feet).

BLM Sensitive Fish Species

The cutthroat trout, mountain sucker, are reported to occur in Garfield County; and the bluehead sucker, roundtail chub, and flannelmouth sucker are reported from the Colorado River in the vicinity of the Mamm Creek confluence (T. Fresques, BLM, personal communication, September 2005). Erosion and sedimentation from the Proposed Action could impact these fish. However, erosion control would minimize the potential impact from this project on these species.

BLM Sensitive Plant Species

No habitat is present for the Uinta Basin hookless cactus (threatened), the Ute ladies'-tresses (threatened), or the Parachute penstemon (candidate). Therefore, the Proposed Action would have “no effect” on these species. Of the six sensitive species that are known to occur in Garfield County, only the Harrington penstemon has appropriate habitat in the Project Area. However, no Harrington penstemon plants were found in the Gant Gulch Project Area during a survey conducted in June 2005 (Western Ecological Associates 2005).

Harrington Penstemon. According to Western Ecological Resource (2005), the “Harrington penstemon has appropriate habitat on the project site.” Each well pad and access road site was surveyed for this and BLM sensitive species. Some of the sites surveyed did not provide appropriate habitat for Harrington penstemon, whereas suitable habitat was present at other locations as shown in **Table 13**. In suitable habitat, direct impacts could result from construction of roads, pads and pipeline. Indirect impacts could result from noxious weed invasion following surface disturbing activities. Mitigation to address potential indirect impacts is presented in the Mitigation section below. Indirect impacts to the habitat of the Harrington penstemon also may result from increased public access to the area following construction of new roads and improvement of existing roads. Damage to its habitat may occur if OHVs diverge from the roads and travel cross-country through open hillsides and benches. Since this area is currently designate “open” for cross-country travel in the GSRA RMP (BLM 1984) this activity may result in negative impacts to the Harrington penstemon habitat.

Table 13. Survey Results for Harrington Penstemon (Western Ecological Resource 2005).

Survey Site	Habitat	Comments
C36W and access road	Open sagebrush shrublands	No Harrington penstemon found
P26W and access road	Predominantly oak shrubland	Habitat not appropriate
D25W, M24W and access road	Predominantly sagebrush shrubland	No Harrington penstemon found
J6SE and access road	Predominantly pinyon-juniper woodland, some open sagebrush shrublands	No Harrington penstemon found in open sagebrush shrubland. Most habitat not appropriate.
K19E and access road	Disturbed sagebrush shrublands with dense agricultural seeding	Habitat not appropriate, except above proposed well pad
D2SW and access road	Wyoming sagebrush and mountain big sagebrush shrublands	Open sagebrush shrublands surveyed and no Harrington penstemon found. Other habitats not appropriate.
N26W and access road	Open stand of Wyoming sagebrush	No Harrington penstemon found
F26W and access road	Wyoming sagebrush shrublands and pinyon-juniper woodlands	No Harrington penstemon found
M23W and N23W and access road	Dominated by sagebrush shrublands	No Harrington penstemon found
I27W and P27W and access road	Gambel oak shrublands	Habitat not appropriate for Harrington penstemon
I2SW and access road	Dense mountain and big basin sagebrush	Habitat not appropriate for Harrington penstemon
H2SW, K2SW and access road	Open sagebrush shrubland	No Harrington penstemon found

DeBeque Milkvetch. The DeBeque milkvetch occurs on the fine textured, seleniferous, saline soils of the Atwell Gulch Member of the Wasatch Formation at elevations of 5,100-6,400 feet. According to Western Ecological Resource (2005), the Gant Gulch Project Area does not have appropriate habitat for this species. Therefore, the Proposed Action would not impact this species.

Since no other federal or state listed species or federal proposed or candidate species or BLM sensitive species or their habitats are found in the vicinity of the Project Area, the proposed action would have “*No Effect*” to any other special status species.

Mitigation: Mitigation measures suggested by the BLM for threatened, endangered, or sensitive species would include the following measures.

- Any discoveries of previously unknown bald eagle nesting or roosting sites would be addressed by application of the appropriate stipulations and consultation with the USFWS prior to commencement of development activities.
- Biological inventories (surveys) for sensitive plant species, in which appropriate habitat was present, will be conducted in areas of potential new disturbance not covered in the Gant Gulch GAP EA (e.g., new routes for access roads).
- Mitigation of impacts to special status plants would include 1) relocating gas activities and facilities to minimize direct impacts; 2) requiring EnCana to seed the well pads with native species, including species that provide direct competition with cheatgrass, such as bottlebrush, squirreltail, and/or Sandberg bluegrass; 3) ensuring that seeding occurs at the appropriate time of year to optimize the potential for seeding success; and 4) requiring EnCana to control all noxious weeds within the disturbed areas.

Analysis on the Public Land Health Standard for Special Status Species and their Habitats:

The lands affected by the actions addressed in the Gant Gulch Proposed Action have not had a formal Land Health Assessment completed. With the implementation of mitigation measures addressed in this EA, it is anticipated that Standard 4 would be achieved.

Wastes, Hazardous or Solid

Lease Stipulation: None.

Affected Environment: N/A

Environmental Consequences: Hazardous materials and solid waste, which are defined in various ways under a number of regulatory programs, can represent potential risks to both human health and the environment when not managed properly. The Proposed Action would generate various solid and liquid wastes, including trash, produced water, and drill cuttings. In addition, the project would use other potentially hazardous materials during construction and production operations, including fuels and lubricants for vehicles and heavy equipment.

The USEPA has specifically exempted certain waste materials generated in oil and natural gas exploration and production (E&P) from regulation as hazardous wastes (USEPA 1988). To classify as exempt E&P waste, these materials must be intrinsic or uniquely associated with the production of oil and natural gas. Examples of these exempt wastes are 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 are protective of human health and the environment. All natural gas condensate and produced water generated during operation of the project would be stored in tanks within secondary containment and transported offsite to market or a permitted offsite disposal facility. Drill cuttings would be placed in the reserve pit on the drilling location. 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. The potential for impacts to soil and water resources from burial of drill cuttings is considered to be negligible.

Potential impacts from hazardous materials that would be used for the Gant Gulch project would be mainly from spills and leaks of motor fuels and lubricants, which would be used in modest quantities. Fuel and lubricant spills, if not remediated quickly, have the potential to adversely impact soil and water resources. Under the Proposed Action, fuel and lubricants would be temporarily stored in transportable containment trailers or tanks on the proposed well pads. In order to minimize potential impacts from fuel and lubricant spills, the EnCana would implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan. The SPCC Plan would include accidental discharge reporting procedures, spill response, and cleanup measures. All potentially hazardous materials and substances would be handled in an appropriate manner that minimizes the risk of accidental contamination of soil and water resources. EnCana and its contractors would also comply with all applicable federal laws and regulations regarding the transportation, handling, and storage of hazardous materials. No other hazardous or potentially hazardous materials would be brought into the GGGA.

It is important to note that, because of the relatively small amounts of potentially hazardous materials that would be transported and used for the Proposed Action, the potential for impacts to soil and water resources from accidental spills is considered to be minor.

Mitigation: Any release (leaks or spills) of hazardous substances in excess of the reportable quantity, as established by 40 CFR, Part 117, would 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 would be furnished to the BLM and all other appropriate federal and state agencies. In addition, all releases to soil or water of 10 gallons or more of any substance would be immediately reported verbally to the BLM and COGCC compliance officers and proof of cleanup provided for the project record. This mitigation would be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

Water Quality, Surface and Ground Water

Lease Stipulation: For lease C-54738, Controlled Surface Use applies to areas near perennial water impoundments and streams, and riparian vegetation corridors associated with these features. Oil and gas development is to be moved outside of the riparian vegetation zone. Exceptions may be granted.

Affected Environment:

Surface Water

The Gant Gulch geographic area is located within the Colorado Headwaters - Plateau watershed (Hydrologic Unit Code 14010005). **Figure 2** shows the streams present within the project area and vicinity. All streams in the Gant Gulch geographic area are tributary to the Colorado River. The project area is located in the Mamm Creek watershed, and drained by Gant Gulch, Middle Mamm Creek, and an unnamed tributary to Middle Mamm Creek. Gant Gulch is tributary to West Mamm Creek. These drainages flow to the northeast into the mainstem portion of Mamm Creek, approximately 3 miles north-northwest of the project area boundary. Mamm Creek is a perennial tributary to the Colorado River.

There are no USGS gauging stations (current or historic) within the project area. The closest station is located on Mamm Creek, northeast of the project area. This station records flow for the entire Mamm Creek watershed, including watersheds not within the project area. Limited stream flow data (peak flow only) are available for the period 1980-1995 for this station. Peak stream flow ranged from 105 cubic feet per second (cfs) in 1983 to 595 cfs in 1995 (USGS 2005).

Stream flows in the drainages within the Gant Gulch geographic area are generally ephemeral and dependent on seasonal storm and snowmelt runoff. The majority of the runoff is during the spring and early summer and is generated by melting of the winter snow pack. Flood flows are also generated from summer thunderstorms.

Water Quality and Beneficial Uses

The Colorado Department of Public Health and Environment (CDPHE) uses specific criteria to classify surface waters for the purpose of assigning water quality standards in compliance with the national water quality improvement objectives of the Clean Water Act (CDPHE 2004). The classification system addresses beneficial use categories together with narrative standards, an anti-degradation rule, and numeric standards that define conditions necessary to maintain or attain the beneficial uses. All surface waters in the Gant Gulch geographic area are assigned the following beneficial uses (CDPHE 2005):

- **Aquatic Life Cold Water Class 2:** These waters are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.
- **Recreation Class 2:** These surface waters are not suitable or intended to become suitable for primary contact recreation uses, but are suitable for or intended to become suitable for recreational uses on or about the water which are not included in the primary contact subcategory, including but not limited to wading, fishing, and other streamside or lakeside recreation.
- **Water Supply:** These surface waters are suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent) these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements thereto.

- **Agriculture:** These surface waters are suitable or intended to become suitable for irrigation of crops which are usually grown in Colorado and which are not hazardous as drinking water for livestock.

Water quality data are not available for the streams within the Gant Gulch geographical area (USGS 2005). The stream segments within and downstream of the Gant Gulch geographical area are contained on the State of Colorado 303(d) list of water-quality-limited segments requiring total maximum daily loads for selenium (5 CCR 1002-93), with a moderate priority rating.

Groundwater

Groundwater resources in the Gant Gulch geographic area include shallow groundwater within alluvium located along the stream channels and in perched zones within the Wasatch Formation. Although the Mesaverde Group has some water-bearing intervals within it (Glover et al 1998), the depth to the top of the Mesaverde Group beneath the Gant Gulch geographic area is more than 5,000 feet below ground surface (bgs). Therefore, these water-bearing zones are too deep to be considered aquifers in this area.

Three permitted water wells are located within the Gant Gulch geographical area (CDWR 2005). These wells are developed within the alluvium of Gant Gulch in Section 23, T7S, R93W, in the far northern portion of the project area. Although water quality is not available, the primary use of these wells is domestic. Therefore, it can be assumed that water quality in these wells is very good as it is fit for human consumption.

Environmental Consequences:

Surface Water

Potential direct or indirect impacts to surface water resources that could occur as a result of the Proposed Action include increased sedimentation and turbidity of surface water as a result of ground disturbance and erosion into surface waters via runoff; changes in stream flow regimes of surface waters in the Gant Gulch geographical area, depletion of water flow in the Upper Colorado River System due to project-related water consumption, and potential contamination of surface water resources with drilling fluids, fuels, or other wastes generated by natural gas drilling and production activities.

Minor increased sedimentation of the streams within and downstream of the project area is possible, especially during the construction of the project facilities. Increased sedimentation to these intermittent drainages could result from increased erosion of areas disturbed for project construction. Increased sedimentation could include a short-term increase in turbidity and an increase in the deposition of fine sediment within the channels. Both of these effects could have negative impacts on aquatic habitat within affected streams. However, the disturbed areas would generally be well-buffered from the streams by vegetation, thus minimizing the amount of eroded sediment reaching streams. In addition, the use of Best Management Practices (BMPs) during construction would further reduce the amount of additional sediment the reaches the creeks.

For long-term access road disturbance located within the water influence zones (WIZ) of the tributaries to Gant Gulch and Middle Mamm Creek, BMPs would be employed to reduce the amount of sediment that reaches the drainages. Detailed construction plans for the proposed access roads would be prepared and submitted for review and approval prior to construction. The road design would include specific drainage components and BMPs that would be utilized to address control of sedimentation of surface waters in the Gant Gulch geographic area. Furthermore, as required, EnCana would submit 404 permit applications to the U.S. Corp of Engineers for any proposed construction within designated Waters of the U.S. In general, the access roads would be designed to maintain vegetative buffers between the roads and intermittent drainages, where possible, and feature relief ditches that would be installed at frequent intervals to channel water to undisturbed vegetated surfaces. These practices would help slow the velocity of runoff and filter out sediment prior to entering the intermittent drainages within the project area and downstream.

Since water would be obtained from an offsite source and hauled to the project area for drilling and well completion activities, there would be no diversions or alterations of the flow regime of any creeks in the project area. Therefore, adverse effects to stream health from changes in stream flow regime would not occur from the Proposed Action.

Contamination of surface water by spills of fuels, produced water, or petroleum products could potentially occur. The contamination could occur from two mechanisms: direct spills of materials into a creek, and indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water courses. The potential for contamination of surface water from these events is considered to be minor.

Groundwater

Potential impacts to groundwater resources from 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 conducted 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 COGCC.

After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD. This would isolate all water-bearing formations in the borehole and would effectively eliminate communication between hydrocarbon-bearing zones and the shallow groundwater aquifers. Only three permitted water wells are located within the project area. These wells are located on Gant Gulch in the northern portion of the project area. The closest proposed well pads are nearly one-half mile away from these wells, therefore, the potential for contamination of the groundwater used by these wells is negligible.

With respect to deeper groundwater resources, the thick impermeable layers of rock in the top section of the Williams Fork Formation make it highly unlikely for hydrocarbons or water produced from drilling operations to migrate into potable water zones. In addition, these deeper zones, while representing a possible groundwater resource, are located more than 5,000 feet

below the ground surface and are therefore too deep to be usable as aquifers. The gas-producing zones that would be targeted are also several thousand feet below these deeper groundwater zones.

Mitigation: EnCana would implement aggressive reclamation and re-vegetation of disturbed areas not needed for operational activities. These measures would help prevent erosion and sedimentation to drainages. In addition EnCana would implement multiple BMPs including, but not limited to, the following:

- New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.
- Relief ditches or corrugated metal pipes would be installed at regular intervals 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 would be allowed to vegetate and/or would include large 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 would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.
- EnCana's road construction plans would identify specific locations of drainage features and proposed BMPs for approval by the BLM prior to construction.
- 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 COGCC. All usable water zones encountered (those with TDS less than 10,000 mg/L) would be isolated and protected, whether they are shallow or deep. Isolation of shallow water-bearing zones would be accomplished by setting surface casing from the ground surface to at least 50 feet below the water-bearing zone. Deeper water-bearing zones would be cemented off as required in the Master APD. For these zones, cementing would be used from 50 feet above to 50 feet below each water-bearing zone.
- After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.
- EnCana would consult with the Army Corps of Engineers (for Section 404 permits) and with the State of Colorado Water Quality Control Division (for stormwater permits) prior to commencing construction activities within the Gant Gulch geographical area. Written documentation to the BLM would be required to indicate that appropriate permits have been obtained or are not required by the authorizing agency.

In addition, the following site-specific mitigation measures will be implemented:

- In accordance with EnCana's standard policy, all reserve pits would utilize impermeable liners to contain drilling fluids. Following completion activities, reserve pit liners would be removed at the respective landowner's request. At the discretion of EnCana and in cooperation with the respective landowner, closed-loop drilling systems may be used on well pads within 100 feet of intermittent drainages.
- In accordance with EnCana's standard policy, erosion protection and silt retention techniques including construction of silt catchment dams, installation of culverts or drainage dips, and

- placement of surface rock, straw bales, and/or matting on approaches to stream crossings.
- Within areas less than 100 feet from intermittent drainages, an adequate vegetative buffer, artificial buffers (e.g., straw bales, matting, etc.), or filter strip would be maintained between the road and the drainage to filter runoff from the road before it reaches the creek.
 - **Analysis on the Public Land Health Standard for Water Quality:** The lands affected by the actions addressed in Proposed Action have not had a formal Land Health Assessment completed. However, with the implementation of mitigation measures specified above, it is anticipated that the Standard 5 would be met.

Wild and Scenic Rivers

Lease Stipulation: None.

Affected Environment: There are no un-studied rivers, or rivers found to be eligible or designated as Wild and Scenic Rivers within the GGGA.

Environmental Consequences/Mitigation: N/A

Wilderness

Affected Environment: There are no designated Wilderness Areas, Wilderness Study Areas, or citizen's wilderness proposal areas within the GGGA.

Environmental Consequences/Mitigation: N/A.

NON-CRITICAL ELEMENTS

SOCIO-ECONOMICS

Lease Stipulation: None.

Affected Environment: A basic socio-economic description of Garfield County, Colorado is available at the County's website (<http://www.garfield-county.com/home/index.asp?page=2>). Tourism, gas and coal mining, sheep and cattle ranching, and fruit and vegetable growing are the major industries. Unemployment is low. Public lands account for about 60% of the total land base of the County.

Property Tax Revenue

Oil and Gas Assessed Valuation in Garfield County amounted to \$259,832,000, or about 25% of total assessed valuation in the county of \$1,019,831,820 in 2003. Based on this assessed value, \$12,515,617 in property tax revenue was collected in Garfield County from oil and gas operations. These revenues were used to fund a variety of county facilities and services, including local school districts, fire districts and other special service districts, Colorado Mountain College, local city governments, and the Garfield County government in general.

Mineral Lease Royalty Payments

Federal mineral royalties are levied on oil and gas production from federal mineral leases. For oil and gas production that took place in Garfield County in 2003, total royalties collected amounted to \$125,683,568, paid to the U.S. Treasury. Half of those royalties or \$62,841,784 was then paid to the State of Colorado. The state's share of the revenue was then distributed using a complex formula to a variety of state and local agencies, including the State School Fund (49%), Department of Local Affairs (23%), the Colorado Water Control Board (10%), counties where oil and gas were produced (8%), local towns in those counties (5%), and local school districts (5%). In 2003, the Garfield County share of Federal mineral lease royalties was \$1,332,000.

In total, oil and gas-related revenues paid to Garfield County, local communities in the county, and various school and special service districts in the county totaled about \$13.8 million in 2003 (Martin, 2004).

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 supporting trades and services. In addition, local governments in Garfield County would experience an increase in tax and royalty revenues collected, assuming economic production from the proposed natural gas wells in the Gant Gulch GA.

The Proposed Action could also have negative economic impacts. According to the Mamm Peak Outfitters (Mead 2005), the Proposed Action would significantly impact their business by causing a loss of clientele and revenue. The Gant Gulch Project also could result in a minor economic loss to ranchers from vegetation loss (see range management section).

The Proposed Action could result in substantial negative social impacts, that may include the following: 1) changing the rural character of the area (see recreation section), 2) reducing the scenic quality (see visual resources section), 3) resulting in increased dust levels, which would reduce the air quality (see air quality section), 4) and increasing traffic from EnCana's operations (see transportation section). The potential social impacts of development activities are becoming increasingly complex as operations expand and grow in rural communities. Protecting the safety, health and welfare of the public are major concerns of the adjacent landowners and community.

Table 14 provides a brief summary of the types of social/economic impacts that would be experienced as a result of the Proposed Action.

Table 14. Social / Economic Impact Summary

Social / Economic Summary Table	Proposed Action
1. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	No, with the mitigation proposed
2. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	May add limited number of industrial opportunities
3. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	No
4. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	Yes, increase in both state and county tax income
5. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc) be needed?	Some additional traffic will be added
6. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans negatively affected?	No
7. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing?	No
8. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	Yes, mainly an increase in traffic
9. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	No

Hydrology and Water Rights

Affected Environment: See Water Quality, Surface and Groundwater section.

Environmental Consequences: Since water would be obtained from an offsite source and hauled to the new well pad locations for drilling and completion, there would be no diversions or alterations of the flow regimes of the streams in the Gant Gulch geographic area. No effects to stream health from changes in stream flow regime would occur in the Gant Gulch geographic area as a result of the Proposed Action.

Development of additional gas wells would result in the use of approximately 0.25 acre-feet of water to drill each well, for a total of approximately 25 acre-feet. Based on the average annual flow rate of 2,757,000 acre-feet per year for the Colorado River downstream from the Gant Gulch geographical area (based on flow data from USGS gauging station 09093700 at De Beque, Colorado), this project-related water use would be insignificant from a hydrologic standpoint.

Noise

Lease Stipulation: None.

Affected Environment: The BLM has not established noise standards. A 55-dBA threshold for noise established (EPA 1974) is not a regulatory requirement. Rather, the 55-dBA threshold for noise should be recognized as a level below which there is no reason to suspect that the public

health and welfare of the general population would be at risk from any of the identified effects of noise.

The Colorado Oil and Gas Conservation Commission (COGCC 2004) has established regulatory noise limits for oil and gas facilities on state and private lands as follows:

“Oil and gas operations, including gas facility operations, shall comply with the following maximum permissible noise levels for the predominant land use existing in the zone in which the operation occurs. Any operation involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones. In the hours between 7:00 a.m. and the next 7:00 p.m. the noise levels permitted below may be increased ten (10) db(A) for a period not to exceed fifteen (15) minutes in any one (1) hour period”.

Industrial zone thresholds, under which oil and gas construction activities are classified, are 80 dBA between 7:00 a.m. and 7:00 p.m. and 75 dBA between 7:00 p.m. and 7:00 a.m. the next day. The 80 dBA threshold may be increased by 10 dBA under the circumstances described above.

Current noise in and near the GGGAP is typical of a rural area with occasional traffic noise from oil and gas and ranching activities in the area. Therefore, estimated background noise levels are about 35 dBA.

Noise has been measured at typical compressor units (USGS 1981). A noise level of 90 dBA from one large compressor engine can be expected at 10 feet from the source. A compressor building enclosing compressor engines would afford further noise attenuation of about 15 dBA.

Environmental Consequences: Noise above existing levels would occur during construction, drilling, completion, and operation of natural gas facilities as a result of the Proposed Action. Elevated noise from construction of well pads and roads, drilling, and completion activities would occur for about 12 to 45 days at any given location. After construction activities, noise increases from natural gas extraction activities would occur for the life of the project near production facilities such as gas processing stations, well pads, and along access roads.

Noise from an individual source is the greatest in the immediate vicinity. Noise decreases with increasing distance from a source. Noise levels at a given distance from a source can be estimated using the Inverse Square Law of Noise Propagation (Harris 1991). Essentially, this law states that noise decreases by 6 dBA with every doubling of distance from a source. For example, if the noise at 50 feet from an industrial engine is 70 dBA, the noise at 100 feet will be 64 dBA, and 58 dBA at 200 feet.

Construction noise levels would be moderate but short-term at any given location. Based on an average construction site noise level of 85 dBA at 50 feet from the site, the construction noise could be above 55 dBA within 1,500 feet of the site. Additionally, elevated noise levels would occur along access roads as vehicles and heavy equipment travel to each site. Elevated noise levels would occur for a short duration at any given location and would occur only during daytime because construction would generally cease between sunset and sunrise.

Noise impacts from drilling and completion activities would be moderate and would last approximately 60 days at any one location. Based on a measured noise level of 50 dBA at ¼ mile (1,320 feet) from a drill rig, the noise would be above 55 dBA within 800 feet of a drill rig. Drilling noise would occur continuously for 24 hours per day during the approximate 12 to 15-day drilling period for each well. Completion flaring activities would also contribute to elevated noise levels for a short duration at any one site.

Additionally, traffic noise levels would be elevated along access roads during the drilling and completion sequences. However, the majority of traffic would occur during the morning and evening hours as workers arrive at and leave from the drilling sites. Vehicle traffic would be negligible during evening hours provided suggested mitigation is implemented.

Operational Noise Impacts: Noise impacts related to increased traffic during operations would be minor along access roads, provided suggested mitigation is implemented. Additional minor noise impacts would result from periodic maintenance and workovers at well sites. Since no additional compression is planned for the Proposed Action, compression noise would remain unchanged from existing compression facility levels in the area.

Since noise impacts during both the short-term and long-term timeframes would result at locations only within close proximity to the noise source, cumulative noise impacts (i.e., cumulative increases in noise throughout the GGGAP) are not expected. Ongoing projects in the region are expected to only affect site-specific locations.

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

Paleontology

Lease Stipulation: Lease Notice – Within Class I and II Paleontological Areas, an inventory shall be conducted by an accredited paleontologist approved by the AO prior to surface-disturbing activities in these areas (BLM 1999b).

Affected Environment: The Wasatch Formation within the Piceance Basin is known to contain numerous fossils, including a wide variety of vertebrates such as fish, turtles, crocodiles, birds, and mammals, and invertebrates such as fresh-water clams, gastropods, and high-spired snails (Uinta Paleontological Associates 2004, and references cited within). Along Mamm Creek, fluvial mudstone and sandstone strata of the Wasatch Formation are known to contain local accumulations of fossil vertebrates and invertebrates, traces and tracks of these organisms, and plant fossils. In 1999 and 2000, the University of New Mexico conducted Vertebrate Paleontology Field Schools in the area. Many new fossil localities were discovered by students of these schools (Uinta Paleontological Associates 2004, and references cited within).

There are three known vertebrate fossil occurrences at one locality in Section 2, T T8S, R93W, within the project area, and three other mapped localities in adjacent sections (Uinta Paleontological Associates 2005a).

Field surveying of four proposed well pads (I2SW, D25W, K2SW, and D2SW) and the associated access roads was conducted by Uinta Paleontological Associates (2004, 2005a, b, c). The surveys encountered fossil-bearing material along three of the four the access roads to these well pads, including fragments of turtles, fish scales, mammal bones, teeth, and crocodile. A badlands area along the proposed access road to well site D2SW was not investigated but also likely contains fossils (Uinta Paleontological Associates, 2005c). All four proposed well pad locations were found to be underlain by Wasatch strata that may also contain fossils. None of the localities examined are considered to be richly fossiliferous when compared with other localities in the Wasatch Formation. However, the material documents the presence of scientifically significant vertebrate fossils within the project area and the need for consideration of mitigation. Some fossils were collected during the field surveys and were sent to the University of Colorado Geology Museum for curation.

Environmental Consequences: Potential impacts to paleontological resources include the loss of scientifically important fossils due to ground-disturbing activities such as well pad, access road, and pipeline excavation and grading. Alternatively, construction of well pads, access roads, and pipeline corridors may uncover scientifically important fossils, which would be considered to be a positive (beneficial) impact.

The BLM established a classification system for ranking paleontological areas as to their potential for noteworthy fossil occurrences (BLM 1999). Condition 1 areas are those areas which are known to contain vertebrate fossils or noteworthy occurrences of invertebrate fossils. Condition 2 areas contain geological units with a high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate fossils, and Condition 3 areas are unlikely to contain either vertebrate fossils or noteworthy occurrences of invertebrate fossils. Under this ranking system, all vertebrate fossils are considered to be scientifically significant. Because of the known occurrence of vertebrate fossils, all exposures of the Wasatch Formation within the project area are considered to be Condition 1.

Mitigation: Based on consultation with BLM paleontologist, Harley Armstrong, monitoring of road and pad construction work as recommended in Uinta Paleontological Associates, Inc. field survey reports for D2SW, D25W, I2SW and K2SW well pads would be conducted only if such construction activities will occur within 200 feet of a known locality or if fossils are present on the ground surface. Given this direction, monitoring by qualified paleontologist will be required within 200 feet of the known fossil localities (5GF3715 and 5GF3716) which fall generally within vicinity of the H2SW well pad and access road and and the access road to the K2SW pad. This supports recommendations by Uinta Paleontological Associates, Inc. outlined in Field Survey Reports for I2SW and K2SW pads. If significant fossil resources are found during the monitoring, they will be collected and curated at the University of Colorado Museum.

If significant fossils resources are encountered during work on other proposed well pads and access roads, 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.

Range Management

Lease Stipulations: None

Affected Environment: The BLM permits livestock grazing on public land on five allotments in the Gant Gulch Project Area (**Figure 4**). These allotments are permitted for cattle grazing. **Table 15** identifies these allotments, permittees, the type and number of livestock permitted, their seasons of use and capacity in terms of Animal Unit Months (AUMs). An AUM is the amount of forage needed by an "animal unit" (AU) grazing for one month. An AU is defined as one mature 1,000 pound cow and her calf.

Table 15. Permitted Grazing Use on Allotments in the Gant Gulch Gap Area.

Allotment Name and Number	Permittee	Livestock Type and Number	Season Of Use	% PL	AUMs
Couey 1 #08115	Marvelle Couey	Cattle 2	05/01-05/31	100	2
		Cattle 2	10/16-11/15	100	2
Shideler Ind. # 08116	Barry Shideler	Cattle 4	05/16-06/15	100	4
	Ben Shideler	Cattle 4	05/16-06/15	100	4
Pitman # 08117	Nancy S. & Barbara Pitman	Cattle 50	05/01-06/15	80	60
		Cattle 20	06/16-10/31	80	73
		Cattle 10	11/01-11/30	80	8
Couey 2 # 08118	Marvelle Couey	Cattle 87	08/20-10/19	5	17
Middle Mamm # 08128	Marvelle Couey	Cattle 112	06/03-06/30	100	103
	Barry Shideler	Cattle 29	06/01-06/30	100	29
	Ben Shideler	Cattle 28	06/01-06/30	100	28
Dry Hollow Reservoir Gulch # 08127 ¹	Kelly Couey	Cattle 73	06/01-06/15	100	36
	Marvelle Couey	Cattle 195	06/01-06/15	100	96
		Cattle 57	06/16-10/15	100	229
	Barry Shideler	Cattle 315	06/01-06/15	90	140
	Ben Shideler	Cattle 285	06/01-06/15	100	141
	Record Ranch, Don Fulton	Cattle 140	06/01-06/15	100	69
	Frank Starbuck	Cattle 10	06/01-06/30	100	10
	Robert T. Wheeler	Cattle 90	06/01-06/15	100	44

¹The Dry Hollow allotment is a common allotment; 170 acres are within the Gant Gulch Project Area.

Environmental Consequences: The Proposed Action would have negative and positive impacts on livestock grazing. The Couey 1 Allotment would have two new well pads, about 1,214.4 feet (0.23 miles) of new or upgraded road segments or loss of 3.0 acres of forage. Six new well pads and 17,424 feet (3.3 miles) of access roads would be constructed within the Pitman Allotment. Four new well pads and 13,781 feet (2.61 miles) of new or upgraded access roads would be constructed on the Middle Mamm Common Allotment. One new well pad and 0.29 miles of roads would be constructed on the Dry Hollow Res. Gulch Allotment. There would be no loss of forage on the Shideler Ind. Allotment resulting from the Proposed Action.

Surface disturbing activities such as construction and use of roads, pipelines, and well pads would initially remove forage. On areas that are disturbed and rehabilitated, herbaceous vegetation and herbaceous forage production typically recovers to the level before disturbance in 3 years. Rehabilitated sites often produce more livestock forage than native rangeland. There would be some loss of vegetation on well pads and roads that remain in use for the life of the project. This long-term projected loss of vegetation and forage on each allotment is expected to be relatively minor with a projected loss of about 59.5 acres. This would result in a loss of forage on the allotments. **Table 16** identifies the allotments, their acreage in the Project Area, and the short term and long term loss of forage. Development and maintenance of oil and gas facilities would increase human activity, which would disturb grazing livestock. However, construction of roads and pipelines may improve access into remote areas of allotments.

Table 16. Loss of Forage on Allotments Within the Gant Gulch Project Area.

Allotment	Allotment Acreage in Project Area	Short Term Loss (acres)	Long Term Loss (acres)	Long-term Loss of Forage (%)
Couey 1 Allotment	105	12.4	3.8	3.6
Couey 2 Allotment	81	0.4	0.1	0.1
Pitman Allotment	820	75.8	30.4	3.7
Middle Mamm Com Allotment	1,207	56.3	21.9	1.8
Dry Hollow Res Allotment	170	9.1	2.9	1.7
Shideler Ind. Allotment	159	1.5	0.4	0.3
TOTAL		155.5	59.5	

Mitigation: It is not anticipated that the level of impacts from implementation of the Proposed Action would require adjustment of stocking rates. The level of forage utilization will be monitored on affected allotments and if necessary, adjustments in livestock use would be made to protect land health. EnCana would fence newly reclaimed well pads to exclude livestock and big game grazing pressure on seeded sites.

Range improvements (fences, gates, reservoirs, pipelines, etc.) will be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, EnCana will be responsible for repairing or replacing the damage.

To mitigate potential livestock trespass problems between livestock allotments, EnCana will install and test a solar powered gate along the D25W/M24W access road near the boundaries of Pitman, Couey 1 and Shideler Ind allotments. A gatekeeper will also be positioned at this gate location during any drilling work on the D25W or M24W pads to ensure gate security.

EnCana will construct and maintain livestock fence (final location to be determined by field review with livestock permittees, EnCana and BLM personnel) that would separate Pitman and Middle Mamm Common allotments.

Recreation

Lease Stipulation: None.

Recreation

Lease Stipulation: None.

Affected Environment: The Project Area is located on a combination of private property and public lands administered by the BLM. Because the area is mostly bounded by private lands that restrict public access, recreational use of the Project Area by the public is low.

There are no developed recreational facilities, such as campgrounds or picnic areas within the Project Area. Recreation in the Project Area primarily consists of big game hunters that have been granted access through the private properties or are guided by the sole permitted outfitter. The recreation resource setting character of the BLM-administered portion of the Project Area remains generally natural and primitive. Modifications have not been done to either enhance visitor activities and experiences or protect resources.

BLM Recreation Planning and Management for the GGGGA

Lands managed by the GSFO were inventoried in terms of their recreational character for the 1984 (Revised 1988) RMP (BLM 1984, Appendix C, Map 9). The BLM used the Recreation Opportunity Spectrum (ROS) classification system for the inventory. The ROS system defines six recreation opportunity classes that provide settings for different styles of recreational use: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban areas.

The GGGGA is located within the Semi-Primitive Motorized (SPM) recreation opportunity class. Settings in this category are characterized as predominantly unmodified natural environments of moderate to large size that provide: 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. The BLM's use of the ROS is descriptive and not prescriptive for management purposes.

Identification of a Special Recreation Management Area (SRMA) is considered where management "for recreation" is the primary land use objective. The GGGGA is not in an SRMA. Instead it is in the Glenwood Springs Extensive Recreation Management Area (ERMA), where recreation is a significant activity but not the principal management focus. In the Glenwood Springs ERMA, management is "custodial" and geared to the provision of dispersed recreation. The BLM addresses visitor health and safety, user conflict, and protection of the resource from damage due to recreation over-use or abuse. Management direction for the ERMA in the 1984 RMP is "to provide visitor information, minimal sanitation facilities and access... [and to] manage ERMAs to resolve management issues and for off-road [vehicle] (ORV) use".

Existing Recreational Use in the GGGA

The primary recreational use of the Project Area is seasonal big game hunting for elk and mule deer. Hunting is managed and licensed by the Colorado Division of Wildlife (CDOW 2005) from the end of August through the early part of November. Archery hunting is permitted from the end of August through the end of September. Muzzleloader rifle season occurs in September. Rifle seasons occur from October through November.

Environmental Consequences: The Proposed Action would generate vehicle traffic, dust, noise, and increased human activity in the Project Area during the approximately three-year development and drilling phases of the project. Since hunting relies on the presence of game species it is likely that construction and well drilling activities would disrupt hunting in localized areas within about one mile of those activities. Both game species and hunters would likely avoid active construction areas and well drilling activities and would be displaced to other locations within and outside of the Project Area.

Over the long-term—the 20 to 30 year operational life of the project—the presence of natural gas wells, production equipment, and other facilities would alter the recreation setting character of the Project Area from generally natural to relatively developed. Based on this change, the recreation setting in the Project Area would become Roded-Natural (RN), in terms of the ROS, instead of SPM.

The RN designation is applied to settings where there are: 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 may be important, and 4) opportunities for both non-motorized and motorized recreation. Experiences related to challenge and risk are not very important. In a RN setting, the area is characterized by a moderate evidence of the sights and sounds of humans. Resource modifications and uses are evident, but should harmonize with the natural environment.

In the GGGA, the change from an SPM setting to an RN setting would be consistent with the GSFO RMP because, as part of the ERMA, the Project Area does not have resource setting prescriptions or specific recreation activities, experiences or benefits. Over time, natural gas development under the Proposed Action would modify the landscape and the sights and sounds of development would be more evident in the GGGA. The changes in the physical and social recreation setting would impact the recreational experience of traditional users, especially big game hunters, if big game animals are also displaced. Users seeking different activity opportunities and experiences not affected by the proposed resource modifications may replace the traditional recreational visitor.

No place are the changes in recreation resource setting conditions more apparent than to the existing special use permit holder, Mamm Peak Outfitters. Mamm Peak Outfitters operates in the Project Area and on the White River National Forest, with 247 service days for big game hunting and 50 days of summer use. The business has four hunting camps on National Forest lands and one within the Project Area in T.8 S., R.93 W., Section 2. The business is already reporting a loss of big game hunting clientele and revenue from the existing gas development

and the changes in the physical and social recreation setting conditions. The Proposed Action would further these losses.

The Proposed Action would change the character of the recreation setting, but is unlikely to generate an increase in public recreational use of the area even with the increased motorized access to and through the Project Area. This is because use is limited by private lands and almost all access roads created or used by the proponent would be gated at private property boundaries. The impacts to the primary recreational activity of big game hunting would likely lower recreational use.

From the proponent's standpoint, a general conflict that could occur is that the careless discharge of firearms in close proximity to active project locations would potentially pose a risk for project personnel.

Mitigation:

- The implementation of measures to mitigate impacts to visual resources (see Visual Resources section below) also would help to mitigate impacts to the character of the Project Area as a setting for recreation.
- Signage, gates, and gate attendants or gates with automatic closure devices would be provided under the Proposed Action to discourage unauthorized public access to the Project Area.
- Warning signs would be posted on roads that access active construction and drilling sites to alert hunters to project personnel and vehicles in the Project Area.

Soils

Affected Environment. Elevations within the Project Area range from approximately 6,400 feet along Gant Gulch to over 8,000 feet near the southwestern corner of the area. Annual precipitation within the Project Area is approximately 21.6 inches. Soils surrounding the Project Area are distributed according to the major soil forming factors including climate (effective moisture and temperature), parent material, topographic position, and slope.

Twenty-two soil associations are found within the Project Area, as shown on **Figure 5** (SCS 1985). **Table 17** provides a summary of the soil types found within the Project Area. Of these soils, the Badland, Bucklon-Inchau loams, Dollard-Rock outcrop-shale complex, Torriorthents-Camborthids-Rock outcrop complex, and Torriorthents- Rock outcrop complex are considered to be fragile soils with a severe erosion hazard on cut slopes.

Table 17. Soil Associations in the Gant Gulch Project Area.

Map Unit Number	Soil Association Name	Soil Description	Slope
5	Ascalon fine sandy loam	Deep, well drained soils formed in alluvium derived from sandstone and shale. Found on mesas, alluvial fans, and terraces. Surface runoff is rated as slow and erosion is moderate.	1-6%
6	Ascalon fine sandy loam	Deep, well drained soils formed in alluvium derived from sandstone and shale. Found on mesas, alluvial fans, sides of valleys and terraces. Surface runoff is rated as medium and erosion is moderate.	6-12%
7	Ascalon-Pena complex	Deep, well drained soils formed in alluvium derived from sandstone and shale. Found on alluvial fans and sides of valleys. Surface runoff is rated as medium and erosion is moderate.	6-25%
9	Badland	Vary shallow, poorly-drained areas showing no soil characteristics; formed from residuum derived from highly calcareous and gypsiferous shale and bentonite. Surface runoff is rated as very rapid and erosion potential is very severe.	10-65%
12	Bucklon-Inchau Loams	Shallow well drained soils formed in sandstone and shale residuum. Found on ridges and mountainsides. Surface runoff is rated as medium and erosion is severe.	25-50%
16	Cimarron loam	Deep, well drained soils formed in alluvium derived from basalt. Found on narrow mountain valleys and drainageways. Surface runoff is rated as medium and erosion is moderate.	2-12%
24	Dollard-Rock outcrop, shale, complex	Moderately deep and well drained soils formed in shale residuum. Found on hills and mountainsides. Surface runoff is rated as rapid and erosion is severe.	25-65%
30	Heldt clay loam	Deep, well drained soils formed in fine textured alluvium derived from sandstone and shale. Found on alluvial fans and sides of valleys. Surface runoff is rated as medium and erosion is moderate.	6-12%
31	Heldt clay loam	Deep, well drained soils formed in fine textured alluvium derived from sandstone and shale. Found on alluvial fans and sides of valleys. Surface runoff is rated as medium and erosion is moderate.	12-25%
39	Jerry loam	Deep, well-drained soils formed in alluvium derived from sandstone, shale, and basalt. Found on mountainsides. Surface runoff is rated as slow and erosion is moderate.	12-50%
42	Lamphier loam	Deep, well drained soils formed in residuum derived from sandstone and shale. Found on alluvial fans and mountainsides. Surface runoff is rated as slow and erosion is slight.	15-50%
45	Morval-Tridell complex	Deep, well drained soils formed in reworked alluvium derived from basalt and sandstone. Found on alluvial fans and sides of mesas. Surface runoff is rated as medium and erosion is moderate.	6-25%
46	Nihill channery loam	Deep, well drained soils formed in alluvium derived from Green River sandstone and shale. Found on alluvial fans and sides of valleys. Surface runoff is rated as slow and erosion is moderate.	1-6%
55	Potts loam	Moderately-sloping, deep, well-drained loam and clay	3-6%

Map Unit Number	Soil Association Name	Soil Description	Slope
		loam formed from in alluvium derived from sandstone, shale, and basalt. Found on mesas, benches, and the sides of valleys. Surface runoff is slow and erosion potential is moderate.	
50	Olney loam	Deep, well drained soils formed in fine textured alluvium derived from sandstone and shale. Found on alluvial fans and sides of valleys. Surface runoff is rated as slow and erosion is moderate.	3-6%
51	Olney loam	Deep, well drained soils formed in fine textured alluvium derived from sandstone and shale. Found on alluvial fans and sides of valleys. Surface runoff is rated as medium and erosion is moderate.	6-12%
65	Torrifluents	Deep, well drained to somewhat poorly well drained soils formed in alluvium. Found on floodplains. Surface runoff is rated as medium and erosion is moderate.	Nearly level
66	Torriorthents-Camborthids-Rock outcrop complex, steep	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 and erosion potential is very severe.	15-70%
67	Torriorthents-Rock outcrop complex, steep	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 and erosion potential is very severe.	15-70%
68	Vale silt loam	Deep, well drained soils formed in calcareous eolian material. Found on alluvial fans, mesas, and terraces. Surface runoff is rated as medium and erosion is moderate.	3-6%
69	Vale silt loam	Deep, well drained soils formed in calcareous eolian material. Found on alluvial fans, mesas, and benches. Surface runoff is rated as medium and erosion is moderate.	6-12%
71	Villa Grove-Zoltay loams	Deep, well drained soils formed in mixed alluvium. Found on alluvial fans and mountainsides. Surface runoff is rated as slow and erosion is slight.	15-30%

Environmental Consequences: The applicant has committed to using directional drilling techniques to minimize the amount of surface disturbance associates with the construction of the new gas wells. Multiple wells would be drilled from several of the proposed well pads. Each of the 17 new well pads is anticipated to initially cover between 3.86 and 9.53 acres, depending on the local topography and the number of wells to be drilled from each pad. As part of the interim reclamation conducted after construction of the Proposed Action, each well pad would be reduced in area to approximately one acre, and cut-and-fill slopes would be reshaped to a maximum 2:1 slope (horizontal:vertical).

As summarized in **Table 2**, implementation of the Proposed Action would initially disturb up to 156.63 acres of surface soils, or about 5.4% of the total project area of about 2,921 acres. These areas consist of vegetation disturbed during the construction of the well pads (96.5 acres) and co-located access roads and gas gathering pipelines (60.13 acres). Of the total of 156.63 acres of disturbance, most of the disturbed area would be reclaimed and re-vegetated upon the completion

of construction. The remaining 48.08 acres (about 1.6% of the total project area) would remain disturbed for the long-term 20 to 30 year life of the project.

The primary effect of long-term surface disturbances on soil resources is increased erosion and the resulting increase in sediment yield to nearby drainages and streams. In order to estimate potential erosion and sediment yield increases from long-term surface disturbance, the Water Erosion Prediction Project model (WEPP) developed by the U.S. Forest Service was used.

Baseline WEPP modeling of the grassland areas in the proposed Project Area shows that the existing erosion rate from these surfaces is about 0.03 tons per acre. For the Proposed Action, an average erosion rate of 0.27 tons per acre per year was calculated for the well pads. For the short term, this could result in an additional 23.2 tons per year of erosion from the well pad surfaces. In addition to the area disturbed for the well pads, approximately 8.27 miles of new access roads covering about 60.13 acres with co-located pipelines are anticipated to be constructed for the Proposed Action. WEPP modeling of the road surfaces shows that approximately 32.1 tons per year can be expected to be eroded from these surfaces during the short term, assuming a width of 60 feet, average road gradient of 4%, a native outsloped running surface with 20% rock content, and the modeled annual precipitation of about 21.6 inches.

Following interim reclamation, the disturbed area for the well pads would be reduced to 18 acres and the access roads would be reduced in width to 30 feet and cover to about 30 acres. Applying the modeled erosion rates to the 48.08 acres that would be disturbed over the long-term life of the project, an additional 15 tons per year of sediment could be generated annually from the Proposed Action. However, because these areas would generally be well buffered (at least 100 feet) from Gant Gulch and other project area drainages, little or no eroded material is expected to reach the creeks in the short- or long-term from the disturbed surfaces. The modeling also shows that following re-vegetation and two growing seasons, the erosion rate and potential sediment yield would drop to near baseline conditions.

In order to minimize soil erosion, as well as the potential for landslides, the Proposed Action has been designed to avoid areas with slopes greater than 30%. **Figure 6** shows fragile soils within the all Proposed Action project facilities to be located on soils with slopes less than 30%.

Mitigation: Sensitive areas within the Gant Gulch Project Area would be site-specifically engineered (e.g., silt fences and/or other BMPs) to protect against sedimentation. Additionally, all depositional areas created by eroded material would be re-vegetated to reduce the potential for noxious weed encroachment along the drainages. The mitigation proposed in the water quality section of this document is mandatory to protect soil resources in the proposed project area. Refer to the water quality section of this document for details.

In addition to the measures and stipulations required by the leases, the following measures would be implemented to help prevent erosion and subsequent sedimentation:

- 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, and placement of straw bales and/or matting would be used at the proposed creek crossings.

- New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.
- Relief ditches or corrugated metal pipes would be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.
- Ditches would be allowed to vegetate and/or would include large 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 would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.
- Straw cover would be placed on excess material piles to help limit heavy dust emissions into the air during weather-created wind events.
- Road construction plans would identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

Analysis on the Public Land Health Standard for Upland Soils: The lands affected by the actions addressed in Proposed Action have not had a formal Land Health Assessment completed. However, with the implementation of the mitigation measures identified in this EA, it is anticipated that Standard 1 would be achieved.

Travel/Access and Transportation

Lease Stipulation: None.

Affected Environment: Access to the GGGA would be from Interstate 70 at the Garfield County Airport exit (Exit 94). Vehicles would then use Garfield County Road (CR) 315, (Mamm Creek Road) to reach existing, private roads on the east side of the Project Area and CR 319, (Dry Creek Road) to reach existing, private roads on the west side of the Project Area. Vehicles would use either CR 346 (Airport Road) or CR 322 (Schaefer Road) to access CR 319 from CR 315. All existing county roads are improved, open for public use, and considered suitable by the County for use by drilling, construction and operations traffic (**Figure 7**).

Environmental Consequences: Under the Proposed Action, EnCana would upgrade existing ranch access roads and other two-track roads and extend them into the GGGA to access the proposed well locations (**Figure 2**). In all, EnCana would construct 8.27 miles of new access roads.

Short-term increases in the volume of both heavy and light traffic would occur during the construction, well drilling, and completion phases of the project, proposed for 2005 through 2007. To construct, drill, and complete each well, an average of approximately 16 light truck trips and 8 heavy truck trips per day would be expected on local area roads.

During the 20-to-30-year operations phase of the project, project-related traffic would be as follows. An EnCana employee would visit the well pads approximately twice per week to inspect the facilities, read meters, and do routine maintenance. Tanker trucks would remove condensate from the storage tanks on the well pads at varying rates from 1-2 trips per day to about once per week. On average, there would be one workover or recompletion per well per

year. Increased traffic associated with a workover or recompletion would consist of three to five truck trips per day for a period of seven days.

Potential impacts to travel and access of other land users during the construction/drilling phase and recompletion/workover activities would include temporary conflicts with existing traffic (including a potential for delays and increased vehicle collision rates) and degradation of County roads due to heavy equipment use, fugitive dust, and traffic-related noise. The impacts would be lower after all wells are in operation because traffic levels generated by the Proposed Action would be lower.

Mitigation: The operator would encourage car pooling for commuting construction and drilling crews to reduce the number of vehicle trips generated on County roads and to reduce the associated wear and tear.

Vegetation

Lease Stipulation: None

Affected Environment: The primary vegetation types in the Gant Gulch Project Area are sagebrush shrublands (*Artemisia tridentata*), pinyon-juniper woodlands (*Pinus edulis-Juniperus osteosperma*), and Gambel oak shrublands (*Quercus gambelii*). A small amount of aspen is present at the southern and eastern edge of the Project Area. Riparian habitat occurs mainly at the Middle Mamm Creek crossing, which is approximately eight feet wide. The riparian vegetation includes narrowleaf cottonwood (*Populus angustifolia*), mountain maple (*Acer glabrum*), river birch (*Betula occidentalis*), alder (*Alnus incana spp. tenuifolia*), dogwood (*Cornus sericea*), and Woods' rose (*Rosa woodsii*). Snowberry occurs in the shrublayer, and orange sneezeweed (*Dugaldia hoopesii*), tailcup lupine (*Lupinus caudatus*), field horsetail (*Equisetum arvense*), American vetch (*Vicia americana*), orchardgrass (*Dactylis glomerata*), northern bedstraw, geranium (*Geranium caespitosum*), and yarrow (*Achillea lanulosa*) occur in the understory. Further to the southwest, numerous blue spruce (*Picea pungens*) occur along the creek. (Figure 8)

The vegetation at each proposed well pad and access road location was identified by Western Ecological Resources, Inc. (2005) and is provided below.

Well Pad C36W. The C36W well pad site lies in sagebrush (*Artemisia tridentata*) shrubland. The sagebrush is 2½ to 3 ft tall and fairly open, with occasional shrubs of snowberry (*Symphoricarpos rotundifolius*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and isolated pinyon pine (*Pinus edulis*) and Utah juniper trees (*Juniperus osteosperma*). The herbaceous layer is represented by graminoids, such as junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), needle-and-thread grass (*Hesperostipa comata*), and occasional crested wheatgrass (*Agropyron cristatum*). Common forbs include tapertip onion (*Allium acuminatum*), running fleabane (*Erigeron flagellaris*), lobe-leaf groundsel (*Packera multilobata*), wild buckwheat (*Eriogonum umbellatum*), mariposa lily (*Calochortus gunnisonii*), wholeleaf Indian paintbrush (*Castilleja integra*), tailcup lupine (*Lupinus caudatus*), and balsamorhiza (*Balsamorhiza sagittata*). Brittle prickly pear (*Opuntia fragilis*) is present as well.

To the northeast of the pad site is Gambel oak (*Quercus gambelii*) shrubland in a small swale. The oak is thick and the understory consists of snowberry, elk sedge (*Carex geyeri*), lobe-leaf groundsel, and tailcup lupine. The ridge to the south and east is dominated by a Utah juniper woodland with an understory composed of squirrel tail (*Elymus elymoides*), running fleabane, junegrass, and mat penstemon (*Penstemon caespitosus*), as well as a few scattered shrubs of sagebrush and serviceberry (*Amelanchier alnifolia*).

Access Road. The proposed access road traverses over disturbed roadside vegetation, disturbed sagebrush shrublands, and through a small amount of rabbitbrush shrubland. The disturbed roadside vegetation consists of a sporadic agricultural planting of smooth brome (*Bromus inermis*) and crested wheatgrass, with numerous weeds, including tumble mustard (*Sisymbrium altissimum*), yellow sweet clover (*Melilotus officinalis*), shepherd's purse (*Capsella bursa-pastoris*), false flax (*Camelina microcarpa*), cheatgrass (*Anisantha tectorum*), field pepperweed (*Neolepia campestris*), blue mustard (*Chorispora tenella*), bulbous bluegrass (*Poa bulbosa*), as well as a few native forbs, including tapertip onion and coppermallow (*Sphaeralcea coccinea*).

The disturbed sagebrush shrubland consists of scattered sagebrush 2 to 3 ft high with an agricultural planting of smooth brome and crested wheatgrass. Numerous native forbs also occur, including mariposa lily, tapertip onion, Indian paintbrush, running fleabane, coppermallow, tailcup lupine, salsify (*Tragopogon dubius*), sticky gumweed (*Grindelia squarrosa*), white sage (*Artemisia ludoviciana*), and a few native graminoids such as needle-and-thread grass, junegrass, and western wheatgrass. The disturbed sagebrush shrubland gradually intergrades into undisturbed shrubland closer to the proposed pad location. The proposed access road also crosses an upland vegetated swale just below a stock pond. This broad swale contains scattered rubber rabbitbrush (*Chrysothamnus nauseosus*) with tailcup lupine, running fleabane, Kentucky bluegrass (*Poa pratensis*), western wheatgrass, and smooth brome.

Well Pad P26W. The vegetation surrounding the proposed P26W is predominantly oak shrubland with some sagebrush shrubland openings. The oak shrubland contains a thick overstory 8 to 10 ft high with an understory consisting of sticky false starwort (*Pseudostellaria jamesii*), Long's phlox (*Phlox longifolia*), tailcup lupine, lambstongue groundsel (*Senecio integerrimus*), ternate desert parsley (*Lomatium triternatum*), Kentucky bluegrass, and snowberry. The sagebrush openings generally consist of a continuous cover of sagebrush and herbaceous plants including tapertip onion, tailcup lupine, Indian paintbrush, balsamroot, mariposa lily, Kentucky bluegrass, junegrass, and western wheatgrass. Several small stands of serviceberry (*Amelanchier alnifolia*) 7 to 8 ft tall are present as well.

Access Road. The proposed access route follows an existing jeep trail and traverses through disturbed roadside vegetation, disturbed sagebrush shrubland, some undisturbed sagebrush shrublands, and oak shrubland.

Well Pads D25W and M24W. The vegetation in the vicinity of these two well pads consists of sagebrush shrubland with minor amounts of juniper woodland. The sagebrush shrubland appears to be predominantly mountain big sagebrush, however some Wyoming sagebrush appears to be present as well. The mountain big sagebrush shrublands vary in density and support an understory of graminoids, such as squirrel tail, Kentucky bluegrass, muttongrass (*Poa fendleriana*), needle-and-thread grass, western wheatgrass, and junegrass, as well as perennial

forbs such as dwarf lousewort (*Pedicularis centranthera*), wholeleaf Indian paintbrush, running fleabane, Lambstongue groundsel (*Senecio integerrimus*), balsamroot, tailcup lupine, brittle prickly pear cactus, mariposa lily, death camas, tapertip onion, pale agoseris (*Agoseris glauca*), coppermallow, mat penstemon, and desert parsley (*Lomatium sp.*). A few annual/biennial forbs are present as well, including blue-eyed Mary (*Collinsia parviflora*) and tansy mustard (*Descurainia incisa*). The Wyoming sagebrush stands appear to be complimented mainly by tapertip onion, dwarf lousewort, running fleabane, and junegrass. Scattered Utah juniper and pinyon pine are present in the sagebrush shrublands as well.

These well pads also appear to impact small amounts of pinyon pine-juniper woodland. These woodlands mainly consist of Utah juniper with an understory of scattered mountain mahogany (*Cercocarpus montanus*), and much bare ground. Twistflower (*Streptanthus cordatus*) is found here as well.

Access Road. The proposed access road for Wells D25W and M25W commences at the existing well pad for L25W. Near the existing well pad the access route traverses over a small amount of disturbed non-vegetated lands and a disturbed sagebrush shrubland with agricultural grasses, mainly smooth brome and crested wheatgrass. The access route then traverses northwest along a drainage swale, crosses over several small ephemeral drainage channels, and then northeast to the top of the mesa. The access route mainly includes pinyon pine-juniper woodland, however some sagebrush shrubland and oak shrubland are present as well. The pinyon pine-juniper woodland contains a predominance of Utah juniper, with a shrub layer of mountain mahogany, serviceberry, snowberry, and minor amounts of sagebrush. The herbaceous layer is generally sparse, but includes dominants such as junegrass, blue-eyed Mary, lobe-leaf groundsel, and dwarf lousewort. Less well represented are mountain desert parsley (*Lomatium grayi*), running fleabane, western wallflower (*Erysimum sp.*), Nuttall's larkspur (*Delphinium nuttallianum*), balsamroot, narrowleaf mountain trumpet (*Collomia linearis*), tansy mustard, Indian ricegrass, sharpleaf twinpod (*Physaria acutifolia*), two-grooved milkvetch (*Astragalus bisulcatus var. haydenianus*), tawny cryptantha (*Oreocarya nitida*) and scarlet gilia (*Ipomopsis aggregata*). The sagebrush shrubland encountered along the access route occurred on a north-east facing slope and supported mountain big sagebrush 3 to 4 ft tall, spaced 4 to 5 ft apart or continuous in distribution. The herbaceous layer is typical of other sagebrush shrublands in the area. The dominants include tapertip onion, wholeleaf Indian paintbrush, balsamroot, western wheatgrass, junegrass, mariposa lily, and shrubs of green rabbitbrush and isolated Utah juniper trees.

Well Pad J6SE. The majority of the proposed vegetation impacts for Well Pad J6SE are to pinyon pine-juniper woodland, however some sagebrush shrubland would also be impacted. The pinyon-juniper woodland consists mainly of Utah juniper with scattered pinyon pine and Gambel oak. The understory contains shrubs such as serviceberry, snowberry, mountain mahogany, bitterbrush (*Purshia tridentata*), and herbaceous plants including elk sedge, Indian rice grass, Kentucky blue grass, cheat grass, lobe-leaf groundsel, dwarf lousewort, mat penstemon, and rockcress (*Boechera lignifera*). In addition, Osterhout penstemon (*Penstemon osterhoutii*), which resembles Harrington penstemon, is quite common at this site. Rocky sandstone ledges occur on the south end of the pinyon-juniper woodland.

Sagebrush shrubland is also found within the well pad site. To the west and southwest of the proposed pad is a mountain big sagebrush-Wyoming sagebrush shrubland with a fairly

continuous canopy cover. Associated species include green rabbitbrush, Kentucky bluegrass, junegrass, western wheatgrass, running fleabane, mat penstemon, dwarf lousewort, lobe-leaf groundsel, false flax, salsify, mules ears (*Wyethia amplexicaulis*), largeflower hawksbeard (*Psilochenia occidentalis*), tapertip onion, balsamroot, desert parsley, scarlet gilia, and lambstongue groundsel. To the south and below the proposed well pad, is a big sagebrush shrubland (*Artemisia tridentata* cf. var. *tridentata*) up to 5 ft tall that is extremely dense and has little herbaceous component.

Access Road. The proposed access route for the J6SE well pad site originates at the existing H6 well pad and traverses southwest along a small ridge just east of Mamm Creek. The majority of the access route would impact an agricultural seeding of smooth brome and crested wheat grass, with scattered native forbs and graminoids, and isolated mountain big sagebrush. The sagebrush increases in density closer to the proposed pad site and grades into the undisturbed sagebrush shrublands described above.

Well Pad K19E. Well Pad K19E is located on a relatively flat bench above an ephemeral tributary to Middle Mamm Creek. The vegetation mainly consists of disturbed sagebrush shrubland with numerous dead sagebrush shrubs and an agricultural seeding of crested wheatgrass and smooth brome. A few native grasses also occur, including western wheatgrass, junegrass, and muttongrass. Above the well pad, to the south and southwest, is an undisturbed sagebrush shrubland. Here the sagebrush is of varying density and supports an herbaceous growth of lobe-leaf groundsel, balsamroot, running fleabane, mariposa lily, wholeleaf Indian paintbrush, death camas, coppermallow, brittle prickly pear, tapertip onion, Indian ricegrass, pale agoseris, egg milkvetch (*Astragalus oophorus* var. *caulescens*), and snakeweed (*Gutierrezia sarothrae*). On the ridgetop to the southwest is a pinyon-juniper community.

Access Road. The proposed access route traverses over the disturbed sagebrush shrubland and crosses the unnamed ephemeral tributary to Middle Mamm Creek. This small drainage is approximately 3 ft wide.

Well Pads D2SW, N26W, and F26W. The vegetation of the D2SW well pad site consists of Wyoming sagebrush and mountain big sagebrush shrublands. The Wyoming sagebrush appears to be discontinuous in places, with bare ground reaching 50% cover. The most dominant herbaceous species include mules ears, muttongrass, and western wheatgrass, however Kentucky bluegrass, lambstongue groundsel, running fleabane, wholeleaf Indian paintbrush, tapertip onion, mat penstemon, mountain desert parsley, and sticky gumweed are also present. Scattered snowberry and Gambel oak also occur. The mountain big sagebrush is dense with numerous branches touching and contains little herbaceous cover. The surrounding vegetation is dense Gambel oak shrubland.

Proposed Well Pad N26W is comprised of an open stand of Wyoming sagebrush. Common associates include junegrass and running fleabane, however muttongrass, Kentucky bluegrass, mountain trumpet, tapertip onion, wholeleaf Indian paintbrush, pale agoseris, brittle prickly pear, mat penstemon, sticky gumweed, and largeflower hawksbeard are also present.

Proposed Well Pad F26W consists of Wyoming sagebrush shrublands and pinyon-juniper woodlands. The pinyon-juniper woodlands consist mainly of Utah juniper with small mountain

big sagebrush openings. Serviceberry and Gambel oak are present as well. Common herbaceous species include Kentucky bluegrass, running fleabane, tailcup lupine, tapertip onion, lambstongue groundsel, rosy pussytoes (*Antennaria rosea*), and Nuttall's larkspur. The Wyoming sagebrush shrublands are fairly open with herbaceous species such as western wheatgrass, junegrass, running fleabane, as well as tapertip onion, wholeleaf Indian paintbrush, mat penstemon, and dwarf lousewort. To the north of the F26W, on the very northern tip of the ridgetop, is an eroded shale habitat dominated by stemless four-nerve daisy (*Tetranneuris acaulis*), stemless goldenweed (*Stenotus acaulis*), snakeweed, mat penstemon, and two-form pussytoes (*Antennaria dimorpha*). This eroded shale habitat looks like it is potential DeBeque phacelia habitat, however at approximately 7,700 ft in elevation, it is likely too high for this species (C. Scheck, BLM, personal communication as cited in Western Ecological Resources, 2005).

Access Roads. The access roads for these well pad sites mainly traverse over Wyoming sagebrush mountain big sagebrush shrublands and through Gambel oak woodlands. These communities have been described previously. However a small wetland was observed just west of the access road to F26W. This wetland appears to be a man-made stock pond which has become vegetated with broadleaf cattail (*Typha latifolia*), creeping spikerush (*Eleocharis palustris*), and meadow barley (*Hordeum jubatum*). Around the wetland is a dense stand of western wheatgrass, Kentucky bluegrass, and sticky gumweed. A small stand of sandbar willow (*Salix exigua*) was also observed.

Well Pads N23W, M23W, I27W, and P27W. Proposed Well Pads N23W and M23W occur on north-facing slopes dominated by sagebrush shrublands with minor amounts of Gambel oak shrubland and pinyon-juniper woodlands. The sagebrush shrublands for N23W and M23W consist of both mountain big sagebrush and Wyoming sagebrush of varying densities. The more open stands of sagebrush support a dense herbaceous cover of junegrass, muttongrass, running fleabane, and tapertip onion. Other species present include western wheatgrass, Kentucky bluegrass, mountain trumpet, tailcup lupine, sticky gumweed, wholeleaf Indian paintbrush, coppermallow, red clover (*Trifolium pratense*), and mariposa lily. Isolated Utah juniper is present as well.

Well Pads I27W and P27W both occur in Gambel oak shrublands. These shrublands support a dense overstory of Gambel oak with some serviceberry, and an understory consisting of snowberry, sticky false starwort, lambstongue groundsel, American vetch, white peavine (*Lathyrus leucanthus*), tailcup lupine, Long's phlox, rosy pussytoes, pale agoseris, northern bedstraw (*Galium septentrionale*), Nuttall's larkspur, Littleleaf alumroot (*Heuchera parviflora*), and Kentucky bluegrass. A few small openings of sagebrush are present as well.

Access Road. The proposed access route between these four well pad sites mainly traverses through Gambel oak shrublands, however some sagebrush shrublands are found in the vicinity of N23W and M23W, as well as in openings of the oak shrubland. The proposed access road follows a jeep trail for much of its route.

Well Pads I2SW, H2SW, and K2SW. The vegetation of proposed well pad I2SW consists of mountain and basin big sagebrush on a relatively flat terrace of Middle Mamm Creek, and Wyoming sagebrush shrublands on steep slopes descending from a ridge dominated by pinyon-

juniper woodland. The sagebrush shrublands on the relatively flat terrace consist of a relatively dense stand of sagebrush up to 5 ft in height, with snowberry shrubs, graminoids including Kentucky bluegrass, squirrel tail, and cheatgrass, and forbs including mat penstemon, running fleabane, lambstongue groundsel, wholeleaf Indian paintbrush, and mariposa lily. The Wyoming sagebrush is much less dense on the steep slopes just north of the proposed pad, and includes common associates such as lobe-leaf groundsel, sharpleaf twinpod, mat penstemon, coppermallow, and Osterhout's penstemon among isolated Utah juniper. Blocks of sandstone and much bare ground were found in this area. Proposed pad H2SW generally consists of Wyoming sagebrush of varying densities, with junegrass, mat penstemon, tapertip onion, and running fleabane. Other associates include muttongrass, western wheatgrass, pale agoseris, sticky gumweed, wholeleaf Indian paintbrush, and lambstongue groundsel. Some mountain big sagebrush is found in areas as well. Proposed Well Pad K2SW occurs just south of the steep side slopes of a ridge to the north. This pad occurs over a small amount of mixed sagebrush shrubland surrounded by Gambel oak and serviceberry shrubland. The sagebrush shrubland appears to consist of Wyoming sagebrush, with some mountain big sagebrush of varying densities. The most common associates include running fleabane, mat penstemon and Kentucky bluegrass, however, death camas, lambstongue groundsel, red clover, small leaf pussytoes (*Antennaria parvifolia*), hawksbeard, wholeleaf Indian paintbrush, dwarf lousewort, and Nuttall's larkspur are present as well.

Access Road. The construction of this road would impact Gambel oak shrublands, riparian habitat, and sagebrush shrublands. The Gambel oak shrublands occur northeast of the crossing of Middle Mamm Creek, and also just southeast of proposed pad K2SW. This community consists of an overstory of Gambel oak and serviceberry, with an understory of western wheatgrass, balsamroot, tapertip onion, pale agoseris, littleleaf alumroot, yarrow (*Achillea lanulosa*), tailcup lupine, and Kentucky bluegrass. The riparian habitat to be impacted mainly occurs at the crossing of Middle Mamm Creek. Here, an overstory of narrowleaf cottonwood (*Populus angustifolia*) occurs with mountain maple (*Acer glabrum*), river birch (*Betula occidentalis*), alder (*Alnus incana ssp. tenuifolia*), dogwood (*Cornus sericea*), Woods' rose (*Rosa woodsii*), and snowberry in the shrublayer, and orange sneezeweed (*Dugaldia hoopesii*), tailcup lupine, field horsetail (*Equisetum arvense*), American vetch, orchardgrass (*Dactylis glomerata*), northern bedstraw, geranium (*Geranium caespitosum*), and yarrow in the understory. The creek is approximately 8 ft wide and was carrying a high sediment load at the time of assessment. Further to the southwest, numerous blue spruce (*Picea pungens*) occur along the creek. A small portion of the blue spruce riparian habitat would also be impacted near the K2SW proposed well, however the understory at this location is dominated by agricultural plants and weeds. The majority of the road would impact a disturbed sagebrush shrubland along an existing jeep trail southwest of Middle Mamm Creek. This sagebrush shrubland has numerous dead sagebrush shrubs and a dense growth of smooth brome and crested wheatgrass. Native forbs and graminoids are present, including junegrass, western wheatgrass, tapertip onion, running fleabane, lambstongue groundsel, as well as non-native weeds such as false flax and cheatgrass.

Access Route to H2SW. This route was originally designated as an alternate route. This route has been re-evaluated by EnCana and is now considered to be the **proposed access road**. This proposed access road falls entirely within big sagebrush communities (see **Figure 8**). This route was not evaluated by Western Ecological Resource, as it was originally considered as an

alternate route. However, based on a telephone conversation with Rea Orthner, although habitat may exist along the proposed access road, based on the amount of surveys done throughout the Project Area and no plants identified, it is doubtful that Harrington Penstemon (*Penstemon harringtonii*) would be present. (Rea Orthner, Western Ecological Resource, Personal Communication, September 2005).

Environmental Consequences: Vegetation removal and soil disturbance associated with the construction and installation of the well pads, pipelines, and access roads would affect vegetation resources directly and indirectly. Direct effects would include the short-term loss of vegetation and the long-term modification of structure, species composition, and extent of cover types. Indirect effects may include the short-term and long-term increased potential for noxious weeds invasion, exposure of soils to accelerated erosion, shifts in species composition and changes in plant density.

The Gant Gulch Project Area contains approximately 1710 acres of big sagebrush, 687 acres of pinyon-juniper woodlands, 389 acres of Gambel oak habitat, 132 acres of aspen, 1 acre of dryland agriculture, and 0.5 acres of spruce-fir woodlands. The Proposed Action would result in short-term loss of 156.63 acres or 5.4 percent of vegetation from construction of well pads, access roads, and pipelines. After reclamation of the pipelines and partial reclamation of the unused portions of the well pads and access roads, the long-term vegetation disturbance would be 48.08 acres or 1.6 percent of the Gant Gulch Project Area (see **Table 2**). The Proposed Action would impact pinyon-juniper woodlands, sagebrush shrublands, and Gamble oak communities. The majority of the proposed roads and pipelines and seven of the proposed wellpads would be located in sagebrush communities. Six well pads and some access roads and pipelines would be located in pinyon-juniper communities, while four well pads and some access roads would be located in Gamble Oak woodlands (See **Figure 8**).

It is estimated that herbaceous ground cover would re-establish within 2-3 years. Revegetation of shrub species, such as sagebrush, would take at least 7-8 years (and perhaps, longer if not included in the seed mix), while pinyon pine and Utah juniper could take more than 100 years to successfully re-establish. The 48.08 acres of long-term disturbance would remain for the life of the project (i.e., until the wells are plugged and abandoned and roads entirely reclaimed). With the implementation of mitigation measures identified below, establishment of desirable vegetation species is anticipated.

Freshly cut, drought-stressed, or injured pinyon pines are susceptible to *Ips* beetle infestation. Where pinyon pines must be removed under the Proposed Action, those trees would increase the risk of attracting *Ips* beetles to the site and would place nearby pinyon pines at greater risk of infestation.

Mitigation: All surface disturbances would be recontoured and revegetated according to an approved Reclamation Plan. Only seed mixes approved by the Authorized Officer will be used. Reclamation would be considered successful when the objectives described in the Glenwood Springs Resource Area Reclamation Policy are achieved. The mitigation measures are provided below.

- In order to minimize the potential for attracting Pinyon *Ips* beetles to the GGGA, any pinyon

trees that would be removed due to construction activities during the *Ips* beetle active flight season (late March to early November) would either be chipped or buried on the site within 24 hours.

- On any locations which will not be reclaimed and revegetated within 6 months of initial surface disturbance, the stockpiled topsoil will be seeded with a temporary native grass mix to: 1) reduce wind and water erosion, 2) help ensure that weeds do not become established on the topsoil and 3) ensure that microorganisms in the topsoil remain viable for supporting desirable vegetative growth.
- A specified seed mix designed to meet interim reclamation standards while providing forage and browse for wintering deer and elk using a mixture of shrub and grass species shall be applied. The following seed mix and rates will be used on all disturbed surfaces:

<u>Species of Seed</u>	<u>Variety</u>	<u>Application Rate (PLS lbs/ac)</u>
Mountain big sagebrush		0.5
True Mountain mahogany		2.0
Western wheatgrass	Arriba	3.0
Bottlebrush squirreltail		2.0
Indian ricegrass	Paloma	1.5
Prairie junegrass		1.5
Arrowleaf balsamroot		0.5
<u>American vetch</u>		<u>1.0</u>
Total		12.0

- The seed mix may be modified with approval from the BLM based on site-specific conditions, the identification of additional useful species for site stabilization, cheatgrass competition, and winter wildlife habitat needs, species success in past revegetation efforts, and seed availability and cost. Native species will be used unless they are proven unsuitable for meeting BLM’s reclamation objectives.) Reclamation would be considered successful when the objectives described in the Glenwood Springs Resource Area Reclamation Policy are achieved. Refer to Appendix I. Surface Reclamation of the 6/98 GSFO’s Draft Supplemental EIS for Oil & Gas Leasing & Development (pages I-1 through I-8).
- The reclamation contractor will utilize a seed drill capable of plating the various types of seeds included in the specified seed mix at the correct depths.
- For seed planted using broadcast methods (e.g., sagebrush), raking or harrowing immediately before and after seeding will be necessary to ensure adequate seed/soil contact. For best success, broadcast seeding of sagebrush in strips is recommended.
- Areas being reclaimed will be fenced (using fence type approved by Authorized Officer) to exclude livestock for the first two growing seasons or until the seeded species have established. Seeded species will be considered successfully established when at least 50% of the seeded species are producing seed.
- Reclaimed areas will be monitored for revegetation success.
- EnCana will submit an annual report on the status of reclamation to the Authorized Officer.

Analysis on Public Land Health Standard for Plant Communities: The Project Area has not been the subject of a formal land health assessment. Given the information gathered during the botanical survey (Western Ecological Resource 2005), it appears that the Project Area includes

some areas of existing disturbance with invasive species, such as smooth brome and crested wheatgrass, and other areas that have been infested with Colorado State noxious weeds, such as yellow sweetclover, cheatgrass, and houndstongue. Most of the sagebrush and oakbrush communities within the Project Area seem to be healthy and productive, with a dense understory. However, a few sagebrush stands within the Project Area seem to be decadent and or heavily hedged or are becoming invaded by pinyon-juniper trees in what should be a sagebrush ecological site. Given the amount of new disturbance and potential for weed invasion resulting from the construction activities, the Proposed Action could result in a trend away from meeting the Public Land Health Standard. However, if all the mitigation measures identified above are successfully implemented, Land Health Standard 3 could be maintained

Visual Resources

Lease Stipulation: For lands in Sections 24, 25, and 26 of T7S, R93W and Sections 1 and 2 of T8S, R93W, a Conditional Surface Use stipulation applies to protect scenic values in VRM Class II areas (Leases C-54738 and C-55605).

Lease Notice: “Special design and construction measures may be required to minimize the visual impacts of drilling activities within five miles of all communities and population centers, major BLM or county roads, and state and federal highways. The overall goal of these measures would be to blend in the disturbance with the natural landscape as much as possible. At a minimum, operations should be designed to insure that the disturbance does not dominate the natural landscape character (VRM Class III objective). BLM acknowledges that activities on private lands may alter the landscape character and such alterations will be considered when evaluating mitigation proposals relative to the visual quality of the overall landscape.”

Affected Environment: The Gant Gulch Project Area is located approximately 15 miles south of Rifle, Colorado. The land cover is mainly characterized by big sagebrush. Pinyon-juniper and deciduous oak are found on the northwest and western portion, respectively, of the project area. The creek valleys of the two perennial streams, East Mamm and Middle Mamm, contain riparian vegetation.

Man-made modifications that are present within the Gant Gulch Project Area include existing 2 track roads and well pads, production facilities associated with the existing wells (tanks, wellheads, separator/dehydration units), residences of the private landowners, and fence lines and gates primarily associated with livestock grazing. These man-made modifications are scattered through the project area and are generally isolated in their locations. In some cases, these modifications attract the attention of the observer, but in most cases, they are subtle and generally blend in with the characteristic landscape or are screened from view by topography and pinyon-juniper vegetation north and south of the project area. In areas where they are not screened from view, proposed roads and pipeline corridors appear as linear man-made alterations that contrast in color and texture from the adjacent native vegetation. Similarly, well pads constructed within the last two years on adjoining private and BLM lands have altered the characteristic landscape in terms of color and texture, due to disruption of natural vegetation and exposure of native soils to the observer.

The BLM utilizes the Visual Resource Management (VRM) system to manage and protect visual/scenic resources. In the region including the Gant Gulch Project Area, BLM's visual resource management emphasis has been generally to protect the scenery visible from roads, residences, and areas with high sensitivity. This impact analysis is based on the views from selected Key Observation Points (KOPs). KOPs used for the Gant Gulch Project areas visual analysis was County Road (CR) 319 and CR 315 and I-70.

The Proposed Action would take place within areas classified by the BLM as Visual Resource Management (VRM) Classes II and III, as identified in the 1984 Glenwood Springs Resource Management Plan and amendments. More than one-half of the project area (northern and eastern portions) lies within VRM Class II. The remainder of the project area falls within VRM Class III. **Figure 9** provides a map showing the distribution of VRM classes in the Gant Gulch Project Area. Objectives for each of these two VRM classes, as defined in the BLM's Manual H-8410-1 - Visual Resource Inventory (BLM 1986), are described below:

- The objective of VRM Class II is to retain the existing characteristic landscape. The level of change in any of the basic landscape elements (line, form, color, texture) due to management activities in Class II areas should be low and not evident.
- The objective of VRM Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should 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.

Environmental Consequences: Short-term visual impacts due to construction, drilling and completion activities would occur on all new pads, and on existing pads where new wells are proposed. The existing landscape would be changed by introduction of new elements within the landscape in the form of new lines, colors, forms, and textures. New well pad facilities, roads and pipelines would increase natural gas-related visual elements (e.g., dozers, drilling rigs, truck traffic, heavy equipment, dust, flaring, lights, etc.) within the project area landscape. These activities, the presence of heavy equipment and drill rigs, and related surface disturbance would detract from the visual quality of the landscape and attract the attention of the observer. Construction would take place over a 2-year period. At a particular location, drilling activity would occur 24 hours per day for the 12-15 day/well drilling phase. Therefore, the lights from the drill rigs and well flaring would be visible in the distance at night for a 50- to 75-day duration for each well during drilling and completion over the 2-3 year drilling phase of the project.

From the Interstate 70 corridor, short-term construction and drilling-related visual impacts would be barely visible in the background perspective because of the 10+ mile distance from I-70. However, drilling activities and/or construction-related disturbance would be visible in the middle ground perspective along County Roads 315 and 319. Construction and drilling activities would not be visible from Rifle, Silt or New Castle due to distance and terrain obstacles.

Long-term impacts of the project consist of reduced visual character within portions of the landscape due to new contrasts from well pad facilities, pipelines and roads, where those facilities would not be screened from sight. The visibility of new well pads, roads, and production equipment would increase the existing visual contrasts associated with man-made

modifications already present in the GGGA. Well pads would undergo interim reclamation, and the size would be reduced from 4 to 9 acres to approximately 1 acre for the productive life of the project.

At these locations, cut banks and fill slopes could remain visible for many years, unless topography and vegetation screens them from view. Interim reclamation and revegetation of these slopes would largely mitigate the visual contrast of these long-term pads. Similarly, all production equipment, such as tanks, separator/dehydration units, and well heads would be painted Shale Green (Munsell 5Y 4/2), which would help them blend in with the adjacent vegetation. Given the distance of the GGGA from I-70, it is likely that the combination of interim reclamation of surface disturbance and the painting of production-facilities would reduce the visual contrast of project features to minor levels from the background distances. However, without visual mitigation applied, the small pads and associated access roads and facilities would result in long-term visual impacts.

Conformance with VRM Classes

The protection of VRM classes, landscape character and scenic quality on private and public lands and split estate is discussed on pages 3-41 through 3-45 of the 1999 Oil & Gas Leasing and Development FSEIS. Visual resource management objectives do not apply to non-BLM lands, but visual concerns may be addressed on split estate where federal minerals occur. VRM classes shown for non-public lands are an indication of the visual values for those lands, and those values are only protected by landowner discretion. The impacts of development are discussed on pages 4-49 through 4-54 of the 1999 FSEIS (BLM 1999a). **Table 18** provides a summary of the distribution of existing and proposed well pads by VRM class.

Table 18. VRM Classes of Existing and Proposed Well Pads, Access Roads, and Pipelines

Pad	Surface Location Section Township Range	Status	VRM Class	New Short-term Disturbance (acres)	Long-Term Disturbance (acres)
G1SW	1-T8S-R93W	Existing	II	1.0	1.0
K19E	19-T7S-R93W	Proposed	II	5.83	1.0
M24W	24-T7S-R93W	Proposed	II	4.84	1.0
D25W	25-T7S-R93W	Proposed	II	5.90	1.0
M23W	23-T7S-R93W	Proposed	II	5.07	1.0
N23W	23-T7S-R93W	Proposed	II	7.21	1.0
P26W	26-T7S-R93W	Proposed	II	7.84	1.0
C36W	1-T8S-R93W	Proposed	II	9.53	1.0
O31E	31-T8S-R92W	Proposed	II	4.52	1.0
J6SE	6-T8S-R92W	Proposed	II	5.07	1.0
Access Roads		Proposed	II	28.8	14.4
Total VRM Class II Disturbance				85.61	24.4
F26W	26-T7S-R93W	Proposed	III	5.47	1.0
I27W	27-T8S-R93W	Proposed	III	4.09	1.0
P27W	27-T7S-R93W	Proposed	III	5.05	1.0
N26W	26-T7S-R93W	Proposed	III	5.36	1.0
D2SW	2-T8S-R93W	Proposed	III	7.20	1.0
K2SW	2-T8S-R93W	Proposed	III	3.86	1.0
H2SW	2-T8S-R93W	Proposed	III	4.70	1.0
I2SW	2-T8S-R93W	Proposed	III	3.92	1.0
Access Roads		Proposed	III	31.35	15.67
Total VRM Class III Disturbance				71.0	23.67
Project Total				156.61	48.07

VRM Class II

Within Class II areas, seven pads and associated disturbances are on private surface, and five pads are on federal surface. The remaining pads within the proposed action are located on federal surface lands within VRM Class III areas

Locations on Private Surface: Pads and roads on private surface were specifically located at the landowner’s request. The L25W, G1SW, and the H6 pads are existing pads on private surface. The L25W is directly visible from a KOP at the gate on CR 315 at Schidler’s residence. This location would not meet VRM class II objectives as the pad and associated disturbances create contrasts and are evident within the existing landscape. The H6 and G1SW pads are not visible from any County road or from I-70 and would meet VRM Class II objectives in both the short and long term.

The P26W, C36W and O31E are proposed new pads on private surface. The C36W and O31E pads and access roads would not be visible from any KOPs due to the placement and screening within the existing landscape. Portions of the P26W pad and the access road will be seen from KOP on CR 315. Long term impacts will occur from portions of this access road due to the introduction of a new linear feature heading up the drainage. Short term impacts are expected during drilling and completion activities all of the above pads.

The K19E pad and access road would not be viewed from any KOP due to its location. However, portions of the road and pad viewed from County Road 316 in the background viewshed. Mitigation developed on-site will be followed to reduce the cut slopes.

Locations on Federal Surface: Within VRM Class II area all pads and associated disturbances were mitigated on site and/or with attached mitigation except for 2 locations. The current proposed action for the M23W and N23W and associated access road does not meet VRM Class II objectives. No mitigation has yet been developed that will bring the M23W and N23W wells or access road into conformance.

The M24W and D25W pad and access road will create short term impacts during drilling and completion activities due its location on top of the mountain. Efforts should be made to minimize disturbance to the trees on the Eastern, Northern and Western sides of both pads. Facilities should be co-located and carefully placed in order to reduce possible visibility from the KOPs down below. The access road was moved during on-site reviews to minimize contrast within the landscape as viewed from KOP CR 315. Only short segments of the road may be visible from CR315, due to vegetative screening and the topography. In the long term, the M24W and D25W pads and the associated access road with the attached mitigation will not be visible from any KOP and will meet VRM class II objectives.

The J6SE pad is not visible from any KOP. However, the access road could create a high degree of contrast within the existing landscape. In order to reduce the impacts of a linear line within the landscape, the road on federal surface should be moved to the south to follow the existing tree line. With the attached mitigation the J6SE pad and its associated access road will meet VRM Class II objectives.

VRM Class III

All 8 locations within VRM Class III areas are on Federal Surface.

The proposed D2SW pad and access road is within dense serviceberry and sage parks. The facilities would likely dominate the viewshed due to existing landscape characteristics such as vegetation, position within the topography, and elevation. A high degree of contrasts in line, color, form, and texture is likely. The following mitigation to reduce contrasts is recommended in order to meet Class III objectives. In order to mitigate long term contrasts within the landscape, move all facilities for this pad down to the “flat” just east of the badlands between N26W and D2SW. In order to enhance reclamation efforts and reduce contrasts, layback cut slopes as much as possible. Matting and/or hydro-seeding may also be necessary to reduce a high degree of color contrast.

The proposed H2SW location is within a diverse landscape that has a variety of colors, forms, lines, and textures. However, short term impacts are expected resulting from the excess pile that may be visible from a KOP CR 315 until interim reclamation. The proposed access road is along an existing two track. However, road improvements could dominate the viewshed from CR 315. With the following mitigation, long term impacts are not likely and the proposed action would meet VRM class III objectives. In order to enhance reclamation efforts and reduce contrasts, layback cut slopes as much as possible. Matting and/or hydro-seeding may also be necessary to reduce a high degree of color contrast.

The visual impacts associated with all 8 well pads proposed in VRM Class III would meet the management objectives with the general mitigation described below applied to all locations. Site-specific mitigation measures are also listed.

GAP-wide General Mitigation Measures:

- To help mitigate the contrast of bare, re-contoured slopes, interim reclamation will include measures to feather cleared lines of vegetation, and to save and redistribute cleared trees, debris, and rock over reshaped cut and fill slopes.
- All facilities, including corrugated metal containment rings placed around storage tanks, will be painted Shale Green (5Y 4/2) to blend in with the landscape background.
- To reduce the visibility of production facilities from visibility corridors, facilities will not be placed in visually exposed locations. Rather, facilities will be placed against backdrops or cut sides of pads and will be placed to allow the maximum re-shaping of cut and fill slopes.
- Trees and vegetation would be left along the edges of the pads and roads whenever feasible.
- Berms may need to be constructed on the fill portion on leading edges of pads with substantial cuts and fills.

Site-Specific Mitigation Measures:

M23W and N23W: The current proposed action for the M23W and N23W and associated access road does not meet VRM Class II objectives. No mitigation has yet been developed that will bring the M23W and N23W wells or access road into conformance. The results of a viewshed analysis for these two wells and mitigation measures will be provided in **Appendix G**, upon completion.

M24W and D25W: Efforts should be made to minimize disturbance to the trees on the Eastern, Northern and Western sides of both pads. In order to long term contrasts and possible visibility from KOPs below, the facilities for these two pads should be co-located and carefully placed at a location that won't be seen. (location determined after pad construction).

J6SE: In order to reduce the impacts of a linear line within the landscape, the road (on federal surface) should be moved to the south to follow the contours of the existing vegetation/tree line.

D2SW: In order to mitigate long term contrasts within the landscape and enhance reclamation efforts, move all facilities for this pad north 2500 feet to the N26W pad. Matting and/or hydro-seeding may also be necessary to reduce a high degree of color contrast.

H2SW: In order to enhance reclamation efforts and reduce contrasts, layback cut slopes as much as possible. Matting and/or hydro-seeding may also be necessary to reduce a high degree of color contrast.

Wildlife, Aquatic

Lease Stipulation: None.

Affected Environment: Middle Mamm Creek and East Mamm Creek are perennial streams that run through portions of the Gant Gulch project area. There are no records of fish species in these creeks. The Colorado River is approximately 15 miles to the north of the Project Area and numerous fish species are present in the Colorado River.

Environmental Consequences: Since there are no fish species in Middle Mamm and East Mamm Creeks, there would be no direct impact from the Proposed Action to fish species in these creeks. However, erosion and increased sedimentation could impact the fish species that inhabit the Colorado River north of the Project Area. Potential indirect effects to threatened and endangered fish Colorado River fish may occur and are discussed in the section on Threatened, Endangered, and Sensitive species.

Mitigation: Mitigation measures would include erosion control to reduce sedimentation into Middle Mamm and East Mamm Creeks. Measures specified in the Gant Gulch GAP include:

- All unused disturbed areas will be seeded within 24 hours after completing dirt work, unless a change is requested by EnCana and approved by the Authorized Officer.
- Unused disturbed areas along access roads and cut slopes will be backfilled and re-contoured and graded to prevent erosion.

For additional mitigation measures to minimize erosion and sedimentation into aquatic habitats, refer to the mitigation measures identified in the soils section and

Analysis on the Public Land Health Standard for Aquatic Wildlife: The lands affected by the actions addressed in this EA have not had a formal Land Health Assessment completed. However, with the implementation of the mitigation measures identified in this EA, it is anticipated that Standard 3 would be maintained.

Wildlife, Terrestrial

Lease Stipulation: The lease stipulation for terrestrial wildlife is a timing limitation whereby no surface occupancy is allowed from December 1 to April 30 in big game winter habitat (mule deer and elk), which includes severe big game winter range and other high value winter habitat, as mapped by the Colorado Division of Wildlife (CDOW). This stipulation does not apply to operation and maintenance of production facilities. Under mild winter conditions, the last 60 days of the seasonal limitation may be suspended after consultation with the CDOW. Severity of the winter will be determined on the basis of snow depth, snow crusting, daily mean temperature, and whether animals were concentrated during the winter months. The limitation may apply to

work requiring a Sundry Notice pending environmental analysis of any operational or production aspects. The leases and associated wells for the Gant Gulch Project Area that have timing limitations for big game habitat are shown in **Table 19** below. There are no game species timing limitations for the wells located on leases C-56605 and C-52889.

Table 19. Leases with Timing Limitations for Big Game Winter Habitat

Lease Number	Well Pads Included	Stipulation
C-54738	M24W, N23W, D25W, F26W	Timing Limitation: Big Game Winter Habitat (12/1-4/30). Exception may be allowed last 60 days
C-51156	J6SE	TL: no surface use allowed between January 16 through April 29 to protect critical deer and elk winter range.
C-56258	K19E	TL: no surface use allowed between January 16 through April 29 to protect critical deer and elk winter range.

Affected Environment: Numerous terrestrial wildlife species are present in the Gant Gulch Project Area. Mammals likely to occur in the area are provided in **Table 20** and include elk, mule deer, black bear, mountain lion, bobcat, coyote, raccoon, badger, porcupine, Nuttall's cottontail, white-tailed jackrabbit, red fox, ringtail, striped skunk, and various species of shrews, rodents and bats. Bird species include numerous migratory and upland game birds, and raptors. Reptiles potentially found in the Gant Gulch Project Area include the plateau lizard, sagebrush lizard, smooth green snake, Great Plains rat snake, western terrestrial garter snake, and western rattlesnake (Hammerson 1999).

Table 20. Common Mammals in Garfield County and Potentially Present within the Gant Gulch Project Area.

Common Name	Scientific Name	Abundance
American Badger	<i>Taxidea taxus</i>	Fairly Common
American Beaver	<i>Castor canadensis</i>	Fairly Common
American Elk	<i>Cervus elaphus</i>	Abundant
Bighorn Sheep	<i>Ovis canadensis</i>	Fairly Common
Black Bear	<i>Ursus americanus</i>	Common
Bobcat	<i>Lynx rufus</i>	Common
Common Muskrat	<i>Ondatra zibethicus</i>	Common
Coyote	<i>Canis latrans</i>	Abundant
Desert Cottontail	<i>Sylvilagus audubonii</i>	Common
Mountain Cottontail	<i>Sylvilagus nuttallii</i>	Common
Mountain Lion	<i>Felis concolor</i>	Common
Mule Deer	<i>Odocoileus hemionus</i>	Abundant
Northern Pocket Gopher	<i>Thomomys talpoides</i>	Common
Pine Squirrel	<i>Tamiasciurus hudsonicus</i>	Fairly Common
Raccoon	<i>Procyon lotor</i>	Abundant
Snowshoe Hare	<i>Lepus americanus</i>	Fairly Common
Striped Skunk	<i>Mephitis mephitis</i>	Abundant
White-tailed Jackrabbit	<i>Lepus townsendii</i>	Common
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	Fairly Common
Wyoming Ground Squirrel	<i>Spermophilus elegans</i>	Common
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	Common

Information on elk and mule deer seasonal activity areas were researched and downloaded from the CDOW’s Wildlife Resource Inventory System (WRIS) for several types of habitats: summer range, winter range, summer concentration areas, winter concentration areas, and severe winter range (CDOW 2005). Ranges of black bear and mountain lion within the Gant Gulch Project Area were also ascertained and cover the entire Project Area. Definitions of these types of habitat, as specified by the CDOW, are provided in **Table 21**.

Table 21. CDOW Seasonal Big Game Range Definitions

Seasonal Range	Definition
Summer Range	That part of the range of a species where 90 percent of the individuals are located between spring green-up and the first heavy snowfall, or during a site specific period of summer as defined for each data analysis unit (DAU). Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.
Winter Range	That part of the overall range where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.
Summer Concentration Area	Those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high-energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.
Winter Concentration Area	That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.
Severe Winter Range	That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.
Production Area	That part of the overall range of elk occupied by the females from May 15 to June 15 for calving. Only known production areas have been mapped by the CDOW, additional production areas in each DAU may exist.
Migration Corridors	A specific identifiable corridor through which large numbers of animals migrate and loss of which would change migration routes.

Elk seasonal use areas in the Gant Gulch Project Area include the following:

- Summer range – The elk summer range lies west of the Project Area. However, individual elk may be observed on occasion within the area.
- Elk winter range – is found throughout the Gant Gulch Project Area. Approximately 2,908 acres of elk winter range are within the project and all well pads and access roads are located within elk winter range.
- Elk winter concentration area – is found throughout the eastern one-third of the Gant Gulch Project Area. Approximately 1,241 acres of elk winter concentration areas are within the Project Area. Proposed well pads within the winter concentration area include M24W, D25W, P26W, C36W, I2SW, O31E and the new access roads connecting these wells to existing roads (**Figure 10**).

- Elk severe winter range – is present in the northeastern portion of the project area. Approximately 919 acres of elk severe winter range is found within the Project Area. Proposed well pads within the elk severe winter range include M24W, D25W, C36W, O31E and K19E and proposed roads connecting these wells to the existing roads (**Figure 11**).

Mule deer seasonal use areas in the Gant Gulch Project Area include the following:

- Summer range – Mule deer summer range is in the south and southwest portion of the Project Area and includes proposed well pads F26W, P27W, P26W, N26W, D2SW, B2SW, H2SW, E2SW, I2SW, and access roads connecting the wells and connecting to the existing roads.
- Mule deer winter range – Mule deer winter range occurs in the northeastern and southeastern portion of the Gant Gulch Project Area and includes proposed well pads K19E, D25W, M24W, M23W, N23W, I27W, P26W, C36W, J6SE, O31E and proposed access roads connecting the wells. Approximately 1,613 acres of mule deer winter range are within the Project Area.
- Mule deer winter concentration area – Mule deer winter concentration area is mainly to the northeast of the Project Area. Well pad K19E and its associated access road are within the winter concentration area. Approximately 95 acres of mule deer winter concentration area are within the Project Area (**Figure 12**).
- Mule deer severe winter range – Mule deer severe winter range is mainly to the northeast of the Project Area. Well pad K19E and its associated access road are within the severe winter range. Approximately 95 acres of mule deer severe winter range are within the Project Area (**Figure 13**).

Environmental Consequences: The Proposed Action would result in initial loss and fragmentation of 156.63 acres of wildlife habitat in the Gant Gulch Project Area (see **Table 2**). Much of the Project Area consists of sagebrush communities. However, pinyon-juniper woodlands are abundant in the northwestern portion of the project area, and Gambel oak occurs in the western portion of the project area and also at well site J6SE. Aspen communities would only be potentially impacted by road construction from well I2SW adjacent to Middle Mamm Creek. Following reclamation of pipelines and partial reclamation of well pads and access roads, habitat disturbance would be reduced to 48.08 acres.

The primary concern for terrestrial wildlife is the potential effect of the Proposed Action on big game, particularly impacts to big game wintering habitats. The Gant Gulch Project Area contains summer range, winter range, winter concentration areas, and severe winter range for the mule deer and winter range, winter concentration areas, and severe winter range for elk. As shown in **Table 19**, and discussed above, only some of the leases have big game winter timing limitations. The remaining leases have no winter timing limitations for big game species, which could result in impacts from construction and drilling activities, as well as visual and noise impacts. These impacts are discussed below.

Construction activities, vegetation disturbance, and traffic could potentially result in the introduction and spread of weed species within the Gant Gulch Project Area. Weed invasion and establishment has become an increasingly important concern associated with surface disturbing activities in Colorado and other western states. Weeds often out-compete native plant species, rendering an area less productive as a source of forage for wildlife. However, implementation of

the suggested mitigation measures discussed in the Invasive, Noxious Weed section of this EA would minimize the potential for invasion and establishment of noxious weeds in the Gant Gulch Project Area.

Construction and drilling activities within winter ranges and winter concentration areas also would have the potential to displace mule deer, elk, and other wildlife species. Displacement from habitats could result in increased animal mortality rates and reduced breeding success. The increased network of roads and associated traffic could increase mortality and injury to big game from collisions with vehicles and illegal hunting.

The extent to which human activity disturbs big game varies by species and other factors, such as timing of disturbance, topography, vegetative screening, habituation to disturbance, and frequency and intensity of disturbance. The amount of habitat lost due to displacement is termed “effective habitat loss”. In some areas, research has shown that big game reduce their habitat use within a 1/8-mile buffer on either side of roads. This “effective habitat loss” displacement factor was used in the Glenwood Springs Resource Area Oil and Gas Leasing Development Record of Decision and Resource Management Plan (BLM 1999b) to analyze indirect impacts to big game species. The same methodology is used here to evaluate impacts to big game in the Gant Gulch Project Area. Using a one-eighth mile buffer of existing and proposed roads and facilities, the Proposed Action would indirectly result in decreased habitat use and forage in approximately 2,094 acres of the Gant Gulch Project Area.

Elk and mule deer forage on a variety of vegetation, and diet of these species is largely dependant upon the season and amount of available forage. In spring and summer mule deer feed on green leaves, herbs, weeds and grasses more than on browse species. The reverse is true in fall and winter. Elk on the other hand are predominantly grazers, and generally consume browse during winter months. **Table 22** shows the acreage of each vegetation type within the 1/8-mile well pad, pipeline and access road buffer in the Gant Gulch Project Area. Although big game typically avoid areas of human disturbance, habitat avoidance typically is short-term in nature (i.e., during construction and when human activity occurs).

Table 22 Vegetation within a One-eighth Mile Buffer Surrounding the Proposed Roads, Well Pads and Pipelines within and adjacent to the Gant Gulch Project Area¹.

Vegetation Type	Area within 1/8-mile Buffer (acres)	Percent of Total Buffer
Big Sage	960.0	60.71
Pinyon-Juniper	282.4	17.86
Deciduous Oak	277.7	17.56
Aspen	31.8	2.01
Dry Agriculture	24.7	1.56
Spruce-Fir	4.8	0.30
TOTAL	1,581.4	100

¹Also includes proposed access roads that are not within the boundary of the Project Area.

Mitigation: Standard mitigation measures, incorporated into the Gant Gulch APD along with other measures implemented to conform with the BLM FSEIS (BLM 1999), will reduce wildlife impacts. In addition, public access and use of the roads for all the proposed well sites will be restricted on private lands. This will minimize disturbance and reduce effective habitat loss.

The following well pads (M24W, N23W, D25W, F26W), have timing limitations, in which no road or pad construction, drilling, or completion work including all surface completion, pipeline construction, movement of equipment, etc., will be allowed from December 1 to April 30, in order to protect wintering big game. For the J6SE and K19E well pads, the winter timing stipulation placed on the leases will apply from January 16 through April 29, with the applicable exception criteria.

Since the federal leases associated with proposed well pads M23W, P27W, N26W, P26W, C36W, D2SW, K2SW, H2W, I2SW, I27W and O31E contain no big game winter timing limitation, a 60-day Condition of Approval (COA) will be invoked by the BLM in order to protect wintering big game in the area (J. Byers, BLM, personal communication, August 2005). Compliance with this timing limitation will minimize impacts to wintering big game by prohibiting well pad construction, drilling, and all completion work construction during the 60-day period of the critical winter months – January 15 through March 15.

Additional mitigation measures identified below focus on game species but are applicable to all terrestrial wildlife.

- EnCana will implement policies designed to control poaching and will notify all employees that conviction of a major game violation within the Gant Gulch GAP area could result in disciplinary action or dismissal (of contractors).
- EnCana's policy does not permit hunting and pets within the Project Area during working hours by employees or contractors
- Main access roads will be signed to restrict vehicular use to oil and gas company personnel only.
- Remote monitoring will be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife. In addition, scheduled winter visits (those other than for emergency purposes), would occur between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife.

Mitigation measures identified in the recreation section (e.g. gates), soil section (e.g., erosion control), invasive plants section (e.g., weed control), vegetation section (e.g., reclamation monitoring), migratory bird section (e.g., no surface occupancy), as well as Appendices B (Standard Conditions of Approval and C (Site-Specific Conditions of Approval) also serve to reduce impacts to wildlife in the Gant Gulch Project Area.

Threshold Analysis for Wildlife and Wildlife Habitat Mitigation: In addition to the mitigation measures proposed above, the FSEIS Record of Decision (March 1999) on page 14 it states that: *“Within high value or crucial big game winter range, the operator is required to implement specific measures to reduce impacts of oil and gas operations on wildlife and wildlife habitat...Measures to reduce impacts would generally be considered when well density exceeds four wells per 640 acres, or when road density exceeds three miles of road per 640 acres.”* Furthermore, Lease Notice GS-LN-05 states: *“Within high value or crucial big game winter range, the operator is required to implement specific measures to reduce impacts of oil and gas operations on wildlife and wildlife habitat.”*

The road and well density threshold analysis (**Appendix E**) was completed for the seventeen new surface locations, associated access roads, and the existing natural gas development within the Project Area boundary. Results show that 13 well pads would be present on BLM surface. The threshold is 17.16 well pads. The road density on BLM surface will be 5.86 miles and the threshold is 12.87 miles. The well pad threshold for all lands (cumulative effects) is 18.92 pads. A total of 18 pads, which includes one existing pad and four pads on fee lands, are below the threshold. The road threshold on all lands (cumulative effects) is 14.19 miles. The actual miles of roads that will be constructed or upgraded are 6.96 miles. Thus, the threshold for well pads and access roads has not been exceeded. Since the actual number of pads is close to the allowable threshold, additional well pad construction within the Gant Gulch Project Area would exceed the threshold and require additional mitigation (BLM 1999b).

Analysis on Public Land Health Standard for Animal Communities: The lands affected by the actions addressed in Proposed Action have not had a formal Land Health Assessment completed. As the Gant Gulch Project Area on BLM lands is currently undeveloped, the Proposed Action could have a negative trend with respect to the ability to meet, maintain, or move towards achieving Standard 3 for terrestrial wildlife.

OTHER NON-CRITICAL ELEMENTS:

Table 23 provides a list of other non-critical elements, and whether they have been brought forward for analysis in the EA, not analyzed due to no impact, or are not applicable to this project.

Table 23. Other Non-Critical Elements

Non-Critical Element	Applicable and Present and Brought Forward for Analysis	Applicable or Present, No Impact	NA or not Present
Travel/Access	X		
Cadastral Survey			X
Fire/Fuels Management			X
Forest Management			X
Geology and Minerals	X		
Hydrology/Water Rights	X		
Law Enforcement			X
Paleontology	X		
Noise	X		
Range Management	X		
Realty Authorizations		X	
Recreation	X		
Socio-Economics	X		
Transportation	X		
Visual Resources	X		

ADDITIONAL ISSUES

None

CUMULATIVE IMPACTS SUMMARY

The 2004 Draft Roan Plateau Resource Management Plan & Environmental Impact Statement released in November, 2004 (BLM 2004) analyzed five alternatives for oil and gas development in the Roan Plateau planning area. These alternatives assessed impacts, including cumulative impacts, for oil and gas scenarios ranging from 855 to 1,582 new gas wells on public lands. The drilling of the wells addressed in this Environmental Assessment is well below the range of development analyzed in the DEIS.

Since the completion of the 1999 Oil and Gas Leasing and Development FEIS, the number of wells analyzed in subsequent NEPA documents has exceeded the 230 federal wells forecast in the RFD for lands outside the Naval Oil Shale Reserve (NOSR) Production Area. However, drilling technology advancements have drastically reduced the expected surface disturbance of 3.4 acres per well or 1,020 acres from federal wells analyzed in the 1999 FSEIS. For example the long-term surface disturbance from well pads is 0.61 acres per well. The FSEIS analysis was based on a reasonably foreseeable development scenario, including the number of wells, well spacing, required equipment, and assumed pollutant emission rates. Since completion of the FSEIS, the majority of new wells has been drilled directionally and, in many instances, is being drilled from existing well pads thereby reducing the overall anticipated surface impact addressed in the 1999 FSEIS.

The air quality analysis conducted in the 2004 DEIS assesses the cumulative impacts to the airshed from oil and gas development within and around the Roan Plateau Planning Area. The Proposed Action addressed in this document, which includes well pad and road construction, well drilling and well completion work typical for oil and gas development, would not represent an increase in emissions beyond that anticipated in the 2004 DEIS.

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 EnCana’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 Gant Gulch GAP.

The legal notice addressing the GGGAP Proposed Action was published in two local newspapers with circulation in Garfield County, including the Glenwood Springs Post Independent (July 2, July 5, and July 12, 2005) and the Rifle Citizen Telegram (July 7, July 14, and July 21, 2005). Additionally, a copy was mailed directly to multiple state and federal agencies, adjacent landowners, the Garfield County oil and gas auditor, and the Colorado Department of Wildlife. The 30-day comment period ended on August 1, 2005.

Three written comments were received and oral comments during a meeting held on July 27, 2005 with the landowners in the area, were recorded. The written and oral comments are summarized below.

Colorado Division of Wildlife

- The Project Area lies within “winter range”, “severe winter range”, and “winter concentration areas” for mule deer and elk. Construction and drilling activities from December 1 to April 30 each year could negatively impact wintering deer and elk. Negative impacts to big game could be minimized if construction and drilling were avoided during the sensitive winter time period.
- During the production phase of the project, winter impacts to big game could be further minimized if remote telemetry equipment were used to monitor production so that human activity and vehicle traffic are reduced during the winter period.
- Since the leases fall under different stipulations, the DOW recommends that voluntary mitigation be undertaken by the leaseholder during the winter months.
- The DOW also recommends gates and locks with timing restrictions into the area during the winter months.
- Fragmentation is of utmost concern to the DOW and should be considered when evaluating proposed roads in the area.
- The proposed well locations lie in areas where native vegetation provides foraging, nesting, thermal and escape habitats for numerous species of wildlife. The limiting factor is sagebrush. Moving pads and new roads towards edges of the sagebrush habitat and into pinyon-juniper habitat would benefit wildlife and could enhance this habitat type.
- Rehabilitation of soils should include loosening with a “ripping tool” to increase moisture retention. This plus planting suitable plant mixture would increase seed germination.
- A performance-based reclamation plan would greatly improve habitat after well operations are complete.
- Control and removal of non-native weeds on the disturbed/rehabilitated sites would help restore native vegetation that is valuable to wildlife.
- The increased number of roads as a result of the Proposed Action would increase public access into the area. The negative impacts to wildlife from new road construction could be minimized by making new access roads closed to motor vehicles of the public. Travel management should be taken into consideration in the planning of development.
- The DOW feels that an assess of land health prior to development is crucial in identifying problematic revegetation and reclamation of the planning area at post development periods. Standards for reclamation and prior knowledge of range health will promote overall range health in the future.
- To protect wildlife, the slope of evaporation pits should be kept at a 3:1 or lower, ratio. Since pit linings are “slippery,” escape ramps, 24 inches wide, should be placed at 50-foot intervals on the pit banks and at each corner of the pits.
- Since chemicals in evaporation ponds are detrimental to waterfowl, the evaporation ponds should be netted to prevent birds from using the ponds.
- The well locations lie within black bear habitat. The potential for human/bear conflicts in the Project Area would be reduced by use of “bear proof” trash containers. Workers at the project site should be advised not to feed bears, since this activity is a violation of Colorado Wildlife Commission regulations and is detrimental to wild bears.

Jeff Mead, President, Mamm Peaks Outfitter

- Mr. Mead protests the oil and gas drilling that is occurring in Garfield County.
- The drilling significantly impacts our business. It keeps us from booking the area with paying clients.
- It will cause the loss of clientele for hunts and result in a significant loss of revenue. It would make the area virtually worthless.
- Our clients have said that they would not rebook hunting time with us because of the environmental impact to the natural habitat, elk population and serenity of the wooded areas.

Nancy Pitman, Landowner

- We object to the Gant Gulch proposal by EnCana.
- It is a pristine rugged area untouched by drilling.
- The pace, beauty, and relatively clean area will be compromised.
- We will lose acres of grazing and natural areas.
- It is the habitat to deer, elk, lion, and bear and one of the only undisturbed travel and migration corridors for these animals.

Oral Comments, Landowner Meeting on Gant Gulch GAP

- There are problems with the cattleguards – Nancy Pitman, Kelly Couey.
- Gates are left open along access roads; Electric gates should be used; gate keepers are essential to keep gates closed – Barry Shideler, Kelly Couey, Walt Wieben.
- The proposed access roads would enable livestock to cross between allotments; the landowners don't want cattle crossing allotment boundaries; access roads crossing allotments should be minimized; access roads should be divided by the allotments – Kelly Couey, Walt Wieben, Ben Shideler.
- The landowners are opposed to access through their property – Walt Wieben, Nancy Pitman, Barbara Pitman.
- Access roads constructed up steep terrain would be destructive – Ben Shideler.
- Project would devastate important game habitat – Barbara Pitman, Barry Shideler.
- The landowners are concerned about air quality; diesel emissions from rigs and equipment are objectionable – Nancy Pitman.
- The landowners are concerned with weed control and dust control; white top and knapweed are the biggest problems – Nancy Pitman, Kelly Couey
- Truckers drive too fast through their property – Nancy Pitman.
- EnCana should be responsible for maintaining new fences – Barry Shideler.

Key Issues

Key issues are defined as issues that 1) drive the analysis of environmental effects; 2) prescribe or necessitate the development of mitigation measures; 3) drive the development of additional project alternatives. These key issues are itemized below:

- Effects on big game and winter range
- Recreation and big game hunting
- Soil Erosion

- Construction and operational methods to prevent erosion.
- Interim reclamation methods
- Public Access

Non-Key Issues

Non-key issues are identified as those: 1) outside the scope of the Proposed Action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence; or 5) are general opinions or position statements of a general nature; 5) public issues/requests/concerns that cannot be enforced by BLM. The CEQ NEPA regulations require this delineation in Sec. 1501.7; "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)". These non-key issues are summarized as follows:

- Trespass onto private roads by members of the public (BLM has requested that EnCana restrict access to the public on most roads through installation of locked gates).
- Use of bright lights during night-time drilling (the COGCC regulations require the use of night lighting during night-time drilling operations).
- Objection to any drilling in the Gant Gulch GAP.
- Objection to drilling on fee surface.

AGENCIES CONSULTED

In addition to the public "scoping" period, BLM has initiated formal consultation with the Southern Ute, Ute Mountain Ute, and Northern Ute Tribes. BLM has also coordinated with the Colorado Division of Wildlife.

LIST OF PREPARERS AND INTERDISCIPLINARY REVIEW

The EA was prepared by an interdisciplinary team of resource specialists from Buys & Associates Environmental Consultants (a third-party contractor). Cultural surveys, visual resource analysis, and paleontological surveys were conducted by other contractors as specified below. Direction and independent review was provided by the BLM staff in the Glenwood Springs Field Office. **Table 24** identifies the preparers of the Gant Gulch EA and **Table 25** lists the BLM staff members who provided guidance and review for this EA.

Table 24. List of Preparers

Resource Parameter/Area of Responsibility	Responsible Person
Project Management	Marion Fischel
Environmental Justice, Socioeconomics, Transportation, Recreation	Lloyd Levy
Air Quality, Noise	Jon Torizzo
Aquatic/Terrestrial Wildlife, Vegetation, Wetlands/Riparian, Range Management, Noxious Weeds	Marion Fischel/Colin Mann
Geology and Minerals, Soils, Water, Hazardous and Solid Wastes	Dave Nicholson
Paleontology	Uinta Paleontological Associates, Inc.
Visual Resources	Otak (landscape architects)
Cultural Resources	Metcalf Archaeological Consultants, Inc.
GIS	Gary Thompson
NEPA Review, Technical Editor	Don Douglas

Table 25. List of BLM Interdisciplinary Reviewers

Resource Parameter/Area of Responsibility	Responsible IDT Member
Air Quality	Mark Wimmer
Areas of Critical Environmental Concern	Kay Hopkins
Cultural Resources	Cheryl Harrison
Environmental Justice	Jim Byers
Farmlands, Prime and Unique	Jim Byers
Floodplains	Mark Wimmer
Invasive, Non-Native Species	Carla Scheck
Migratory Birds	Tom Fresques
Native American Religious Concerns	Cheryl Harrison
Threatened, Endangered and Sensitive Species	Tom Fresques (wildlife), Carla Scheck (plants)
Wastes, Hazardous or Solid	Jim Byers
Water Quality, Surface and Ground (404 permit issues)	Mark Wimmer
Wetlands and Riparian Zones	Mike Kinser
Soils	Mark Wimmer
Vegetation	Carla Scheck
Wildlife, Aquatic	Tom Fresques
Wildlife, Terrestrial	Tom Fresques
Travel/Access	Brian Hopkins
Geology and Minerals	Bruce Fowler
Hydrology/Water Rights	Mark Wimmer
Paleontology	Harley Armstrong
Range Management	Mike McGuire
Realty Authorizations	Carlos Sauvage
Recreation	Brian Hopkins
Socio-economics	Brian Hopkins
Visual Resources	Kay Hopkins

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FIGURES

Figure 1 – Location of the Gant Gulch Project Area

Figure 2 – Gant Gulch Project Area

Figure 3 – Gant Gulch Project Area Geologic Map

Figure 4 – Gant Gulch Project Area Range Allotments

Figure 5 – Gant Gulch Project Area Soils

Figure 6 - Gant Gulch Project Area Fragile Soils Map

Figure 7 – Road Access to Gant Gulch Project Area

Figure 8 - Gant Gulch Project Area GAP Vegetation

Figure 9 – Visual Resource Management Classes in the Gant Gulch Project Area

Figure 10 - Gant Gulch Project Area – Elk Winter Concentration Area

Figure 11 - Gant Gulch Project Area – Elk Severe Winter Range

Figure 12 - Gant Gulch Project Area – Mule Deer Winter Concentration Area

Figure 13 - Gant Gulch Project Area – Mule Deer Severe Winter Range

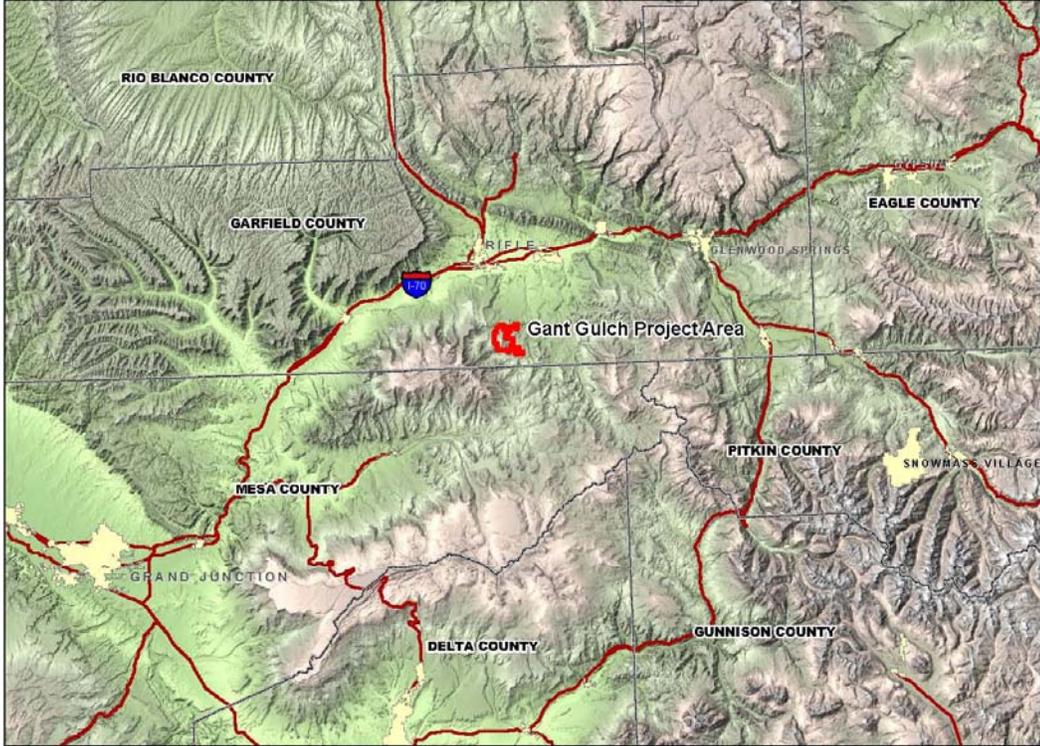


Figure 1. Location of the Gant Gulch Project Area

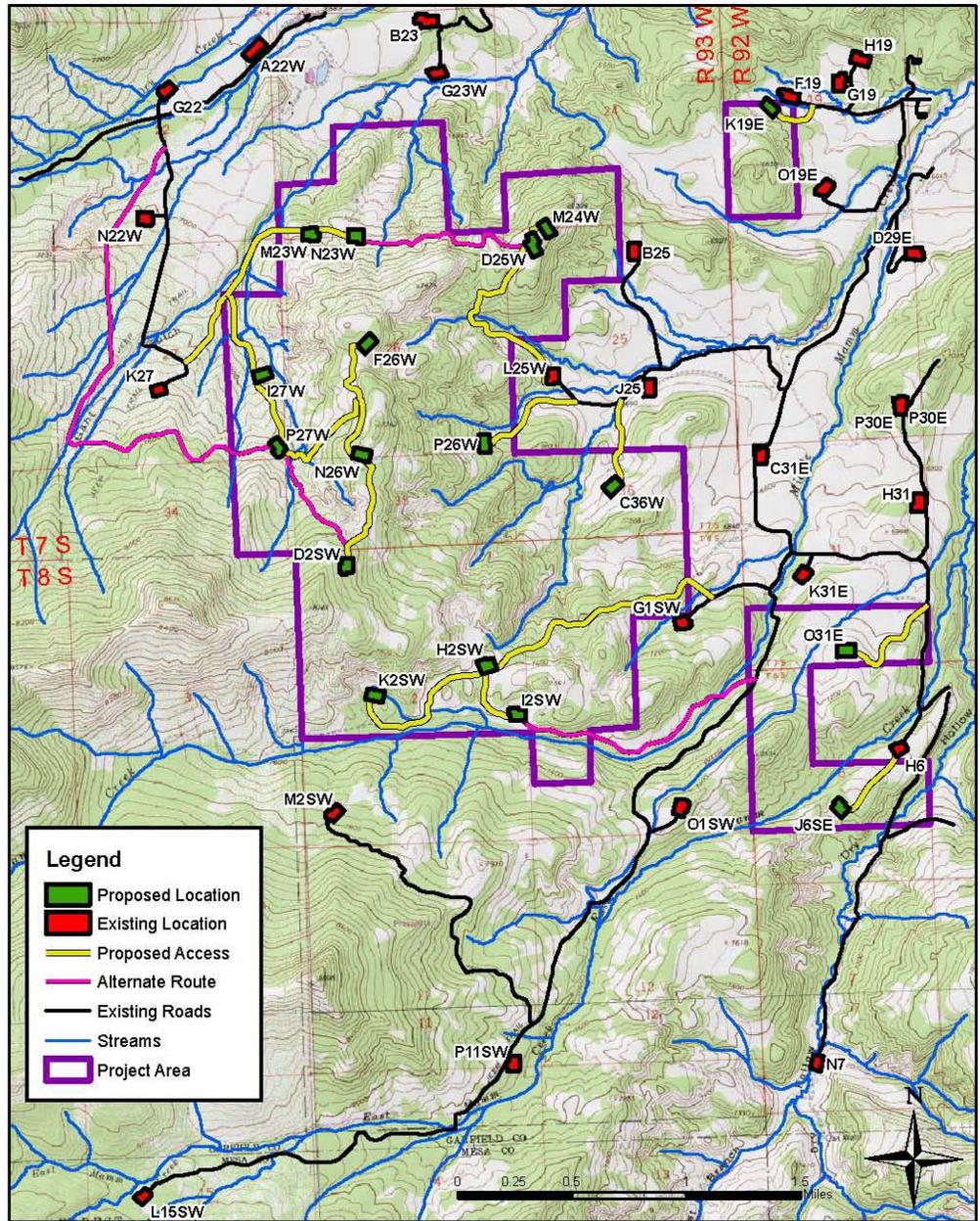


Figure 2. Gant Gulch Project Area

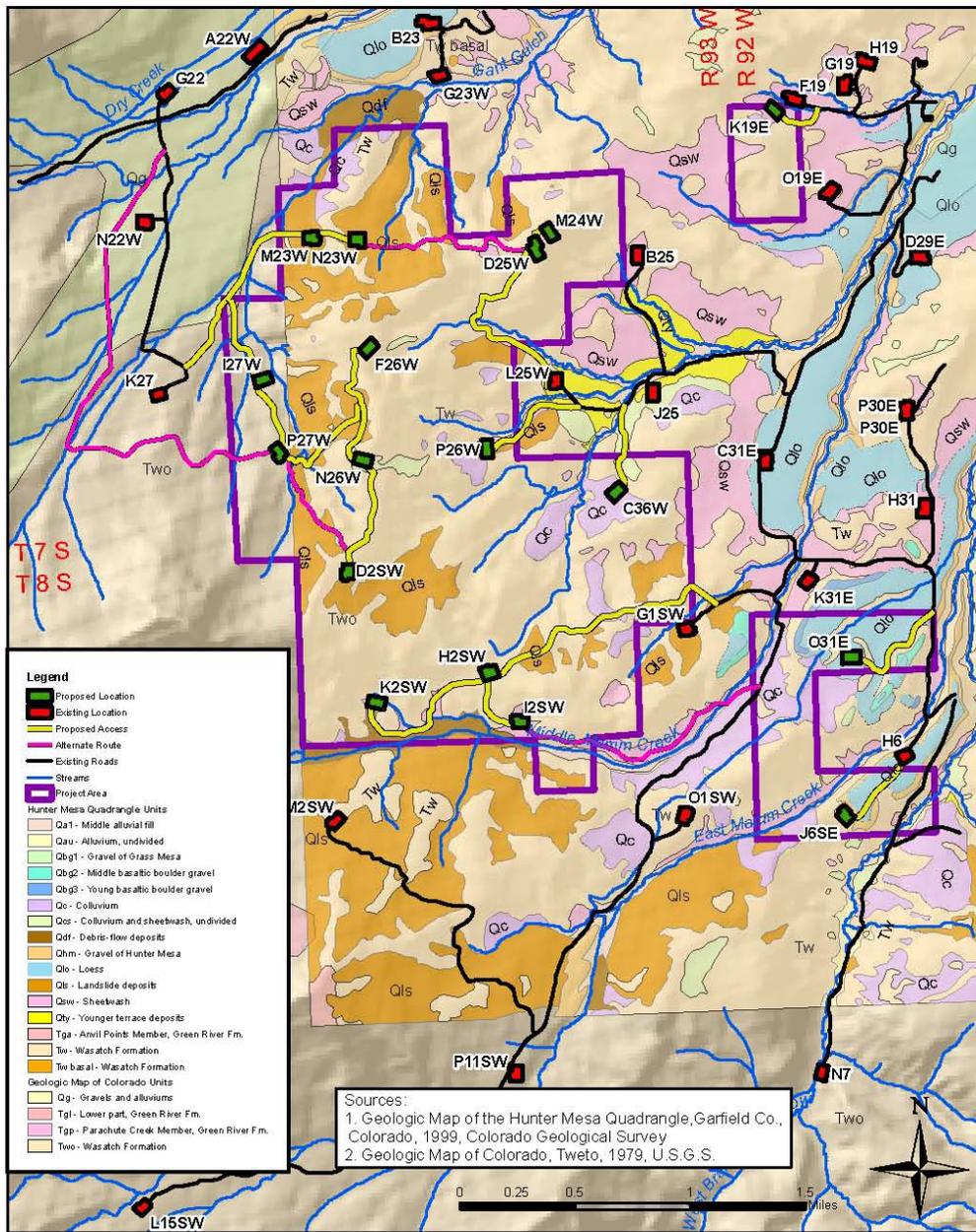


Figure 3. Gant Gulch Project Area Geologic Map

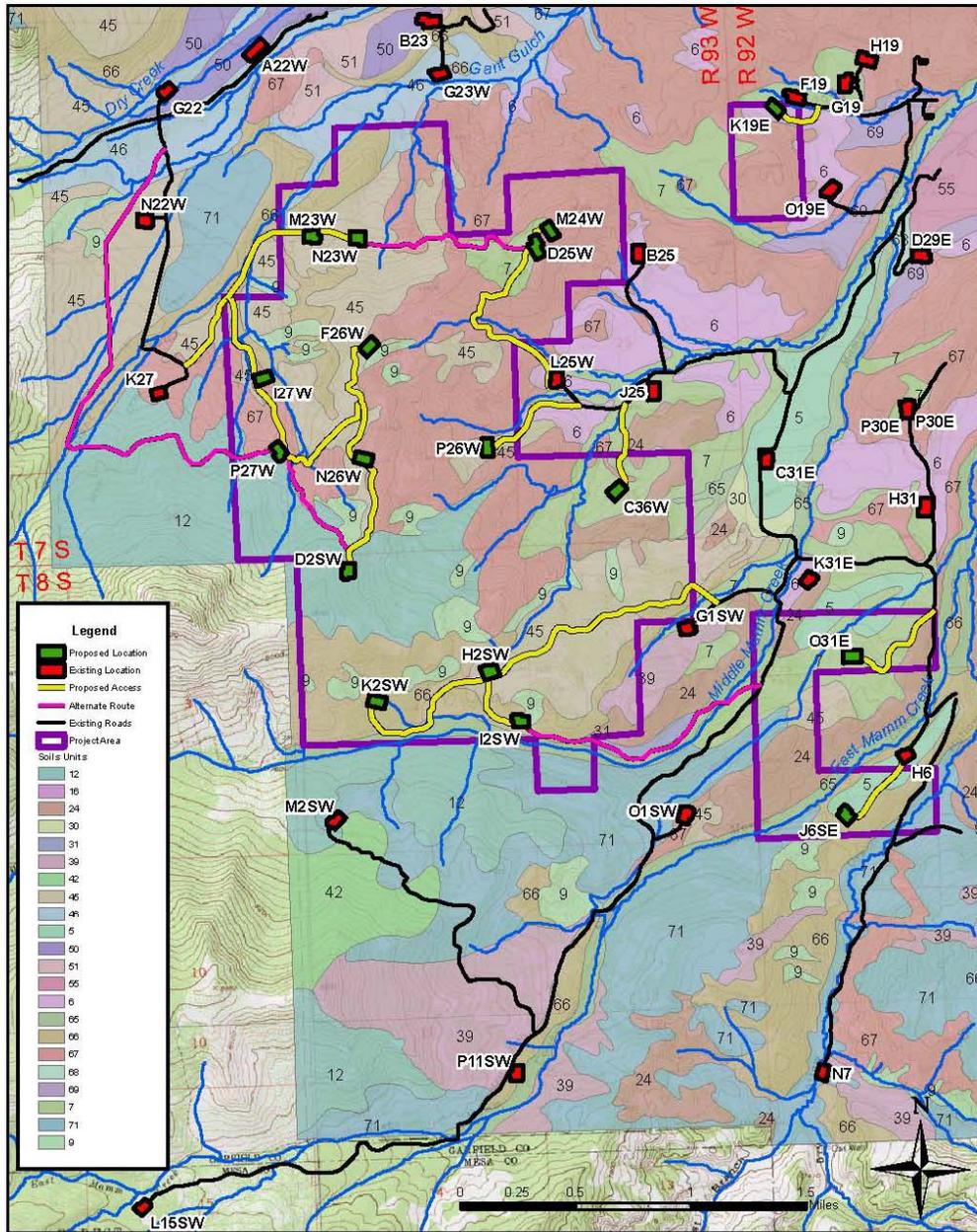


Figure 5. Gant Gulch Project Area Soils

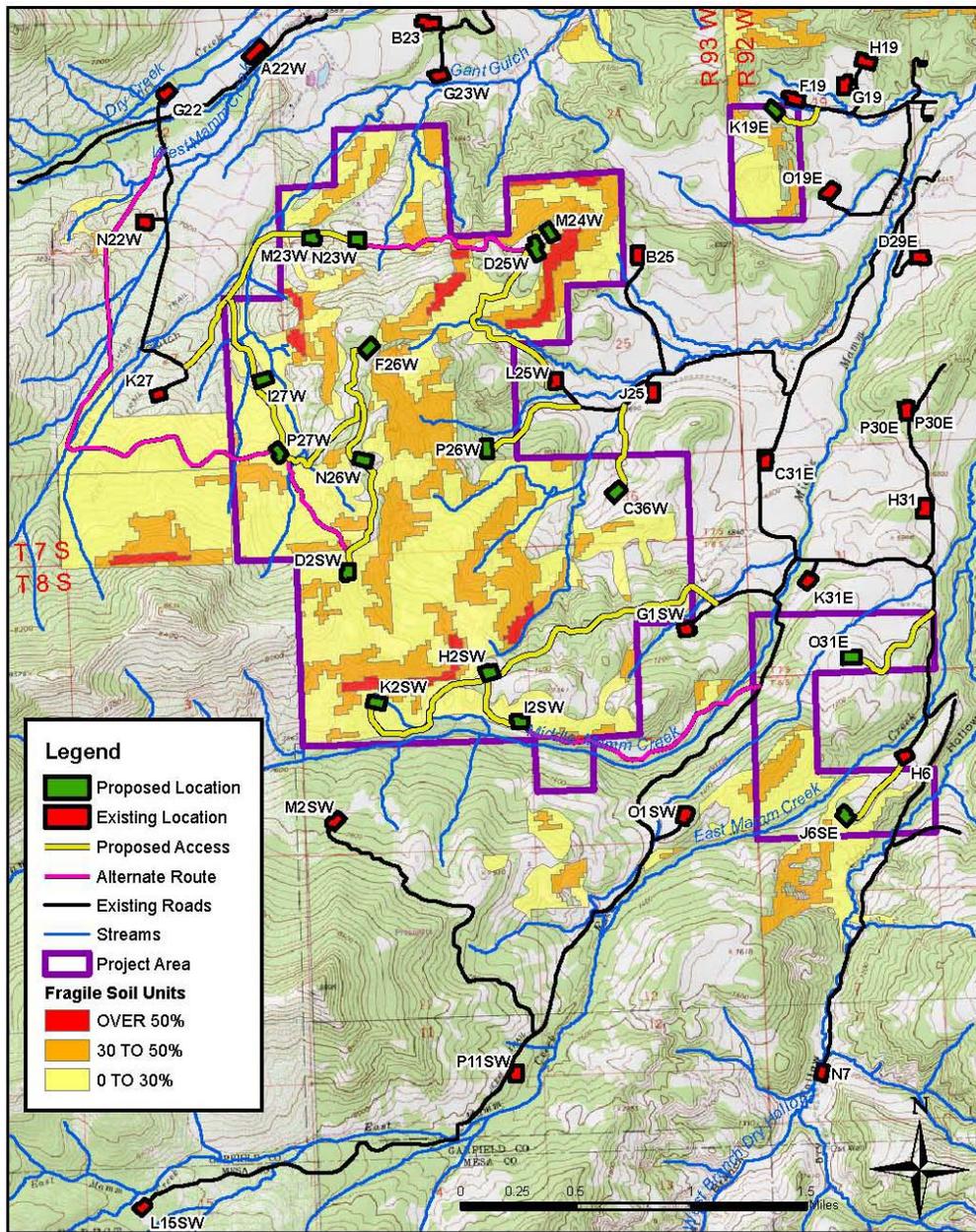


Figure 6. Gant Gulch Project Area Fragile Soils Map

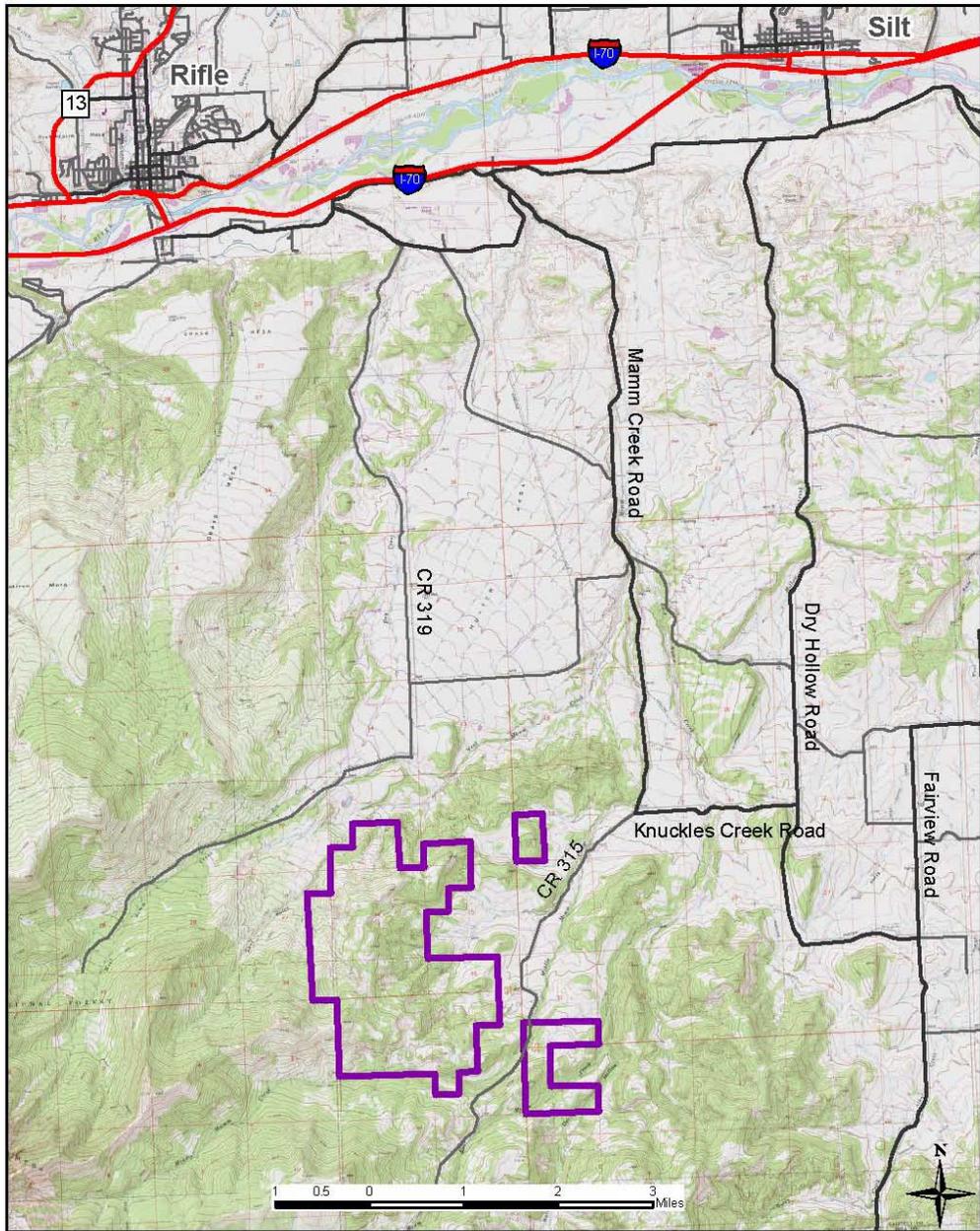


Figure 7. Road Access to Gant Gulch Project Area

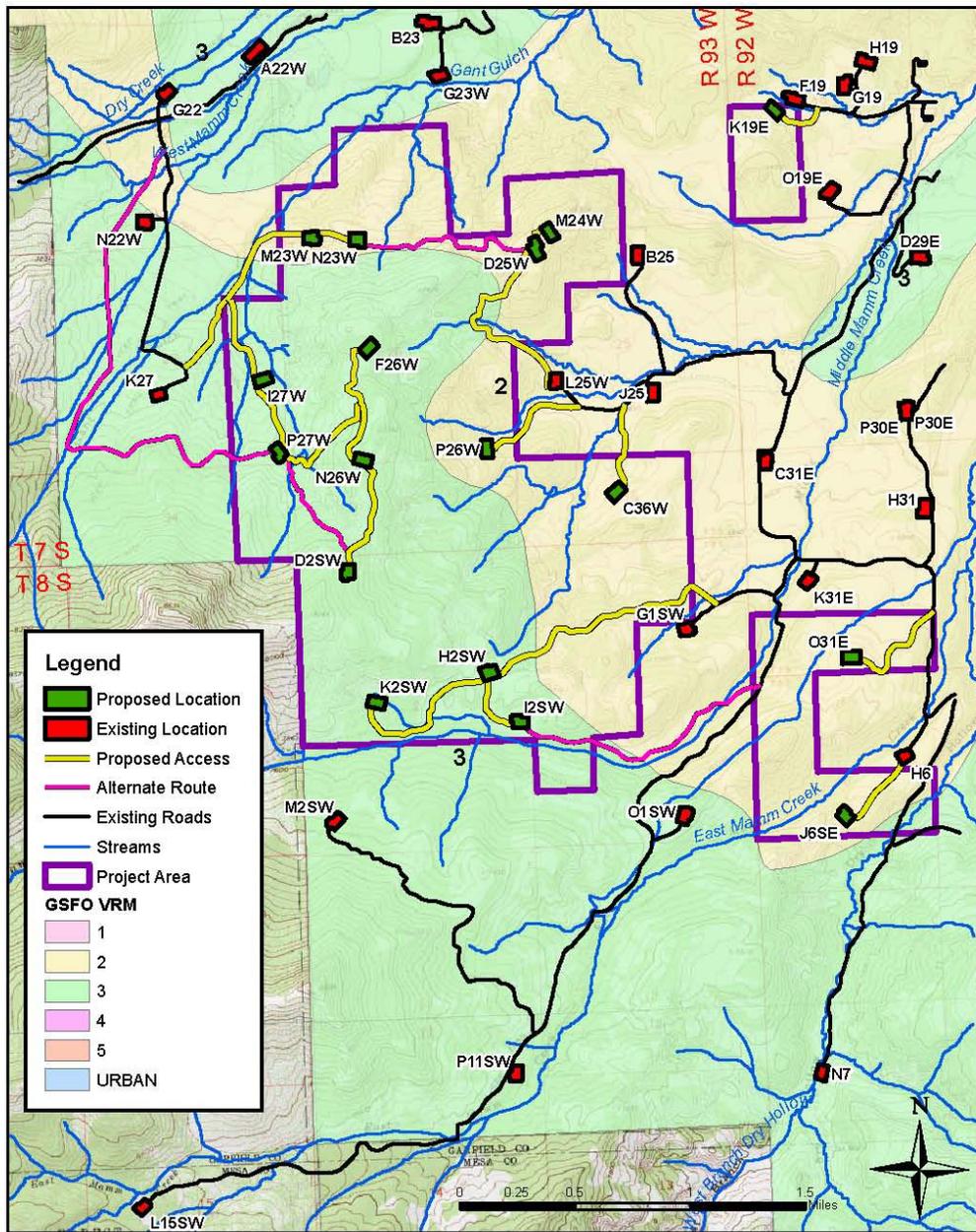


Figure 9. Visual Resource Management Classes in the Gant Gulch Project Area

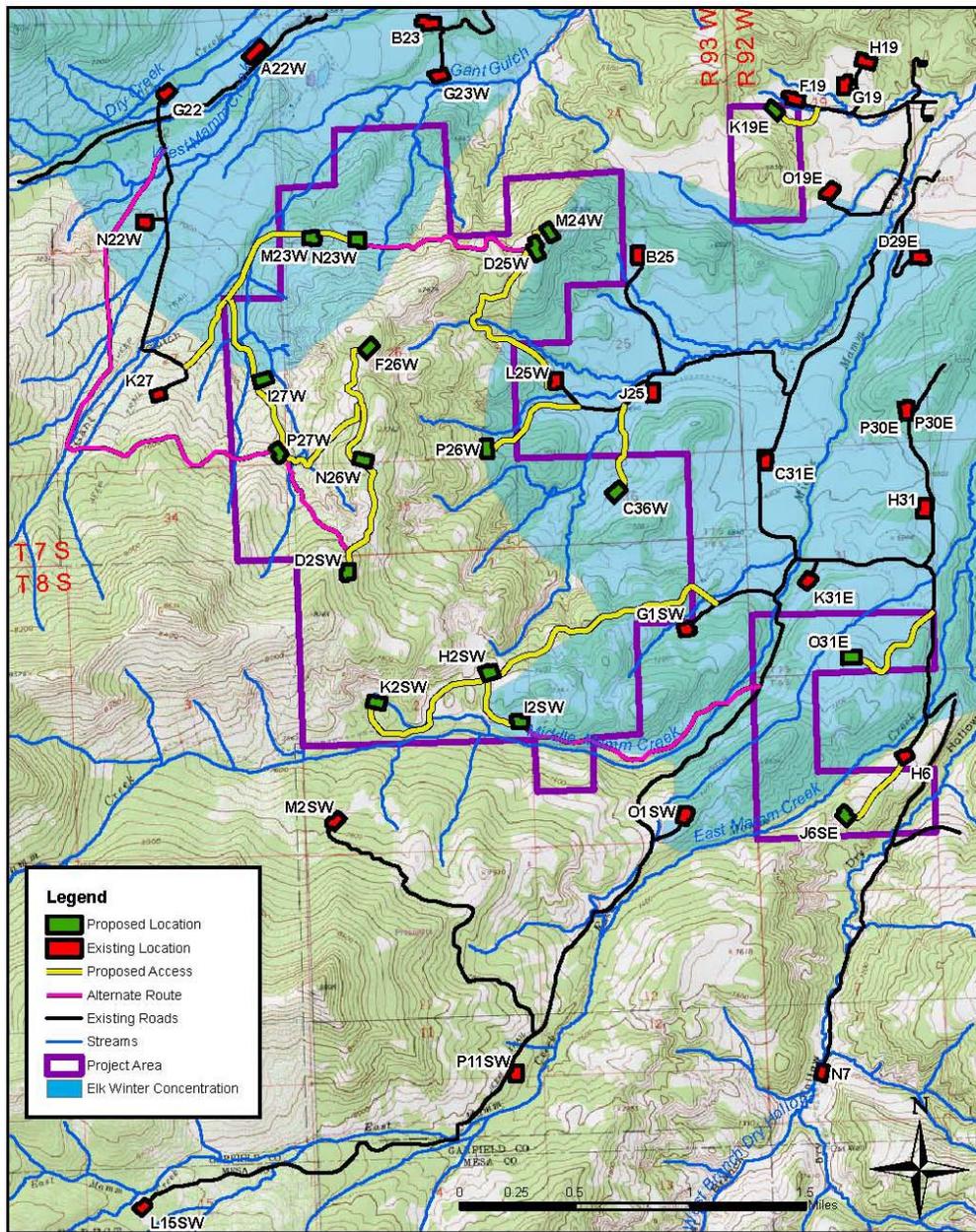


Figure 10. Gant Gulch Project Area - Elk Winter Concentration

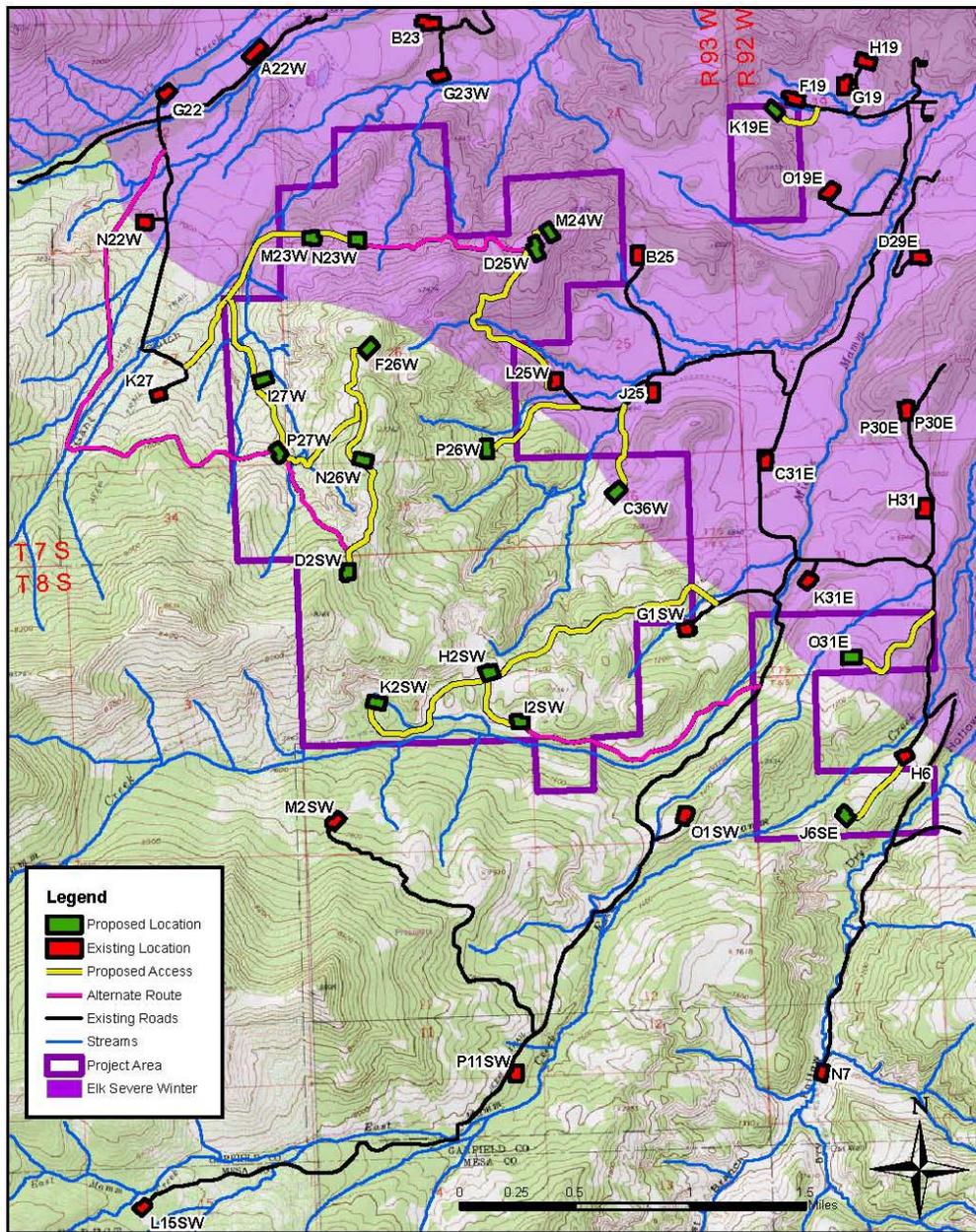


Figure 11. Gant Gulch Project Area - Elk Severe Winter

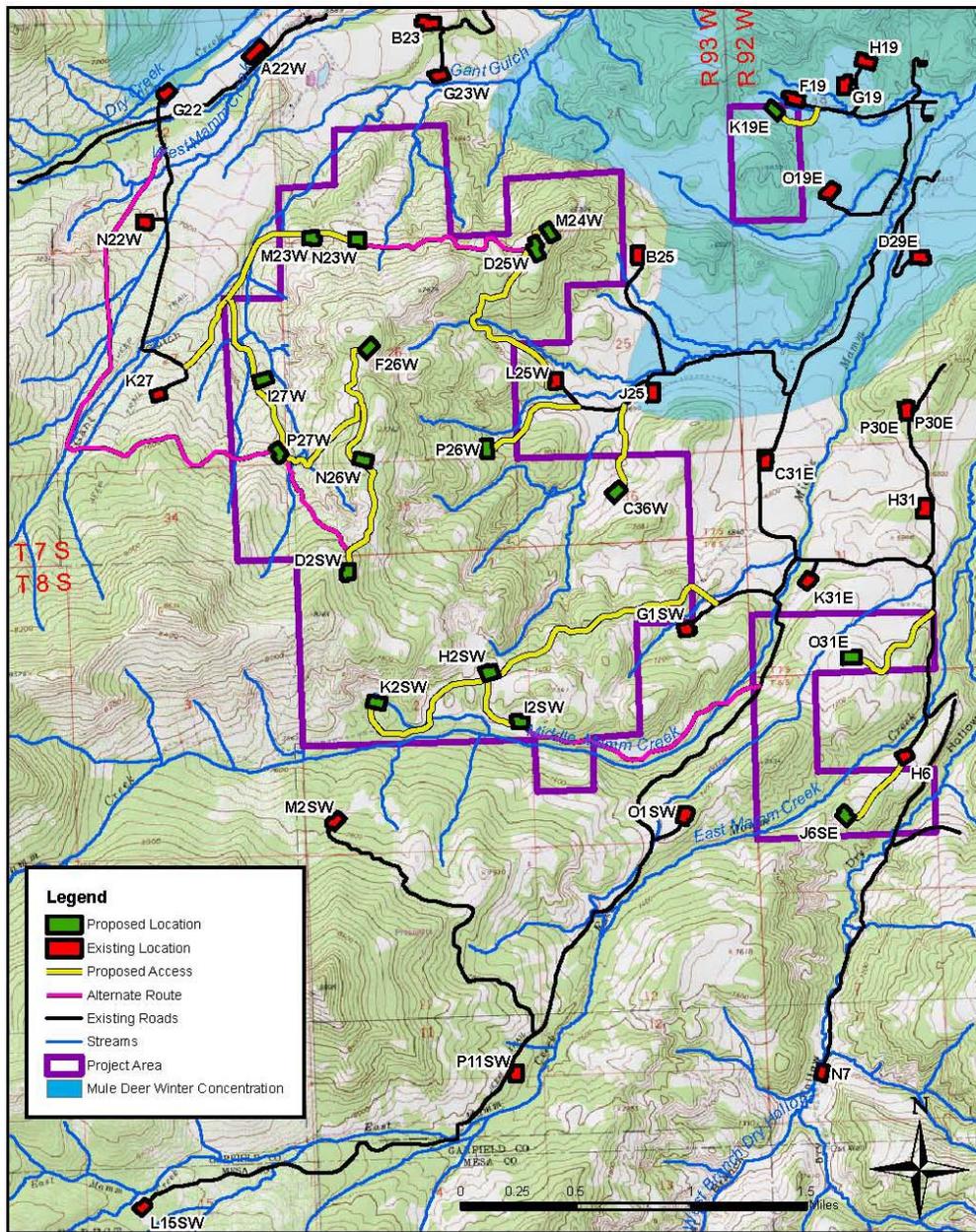


Figure 12. Gant Gulch Project Area - Mule Deer Winter Concentration

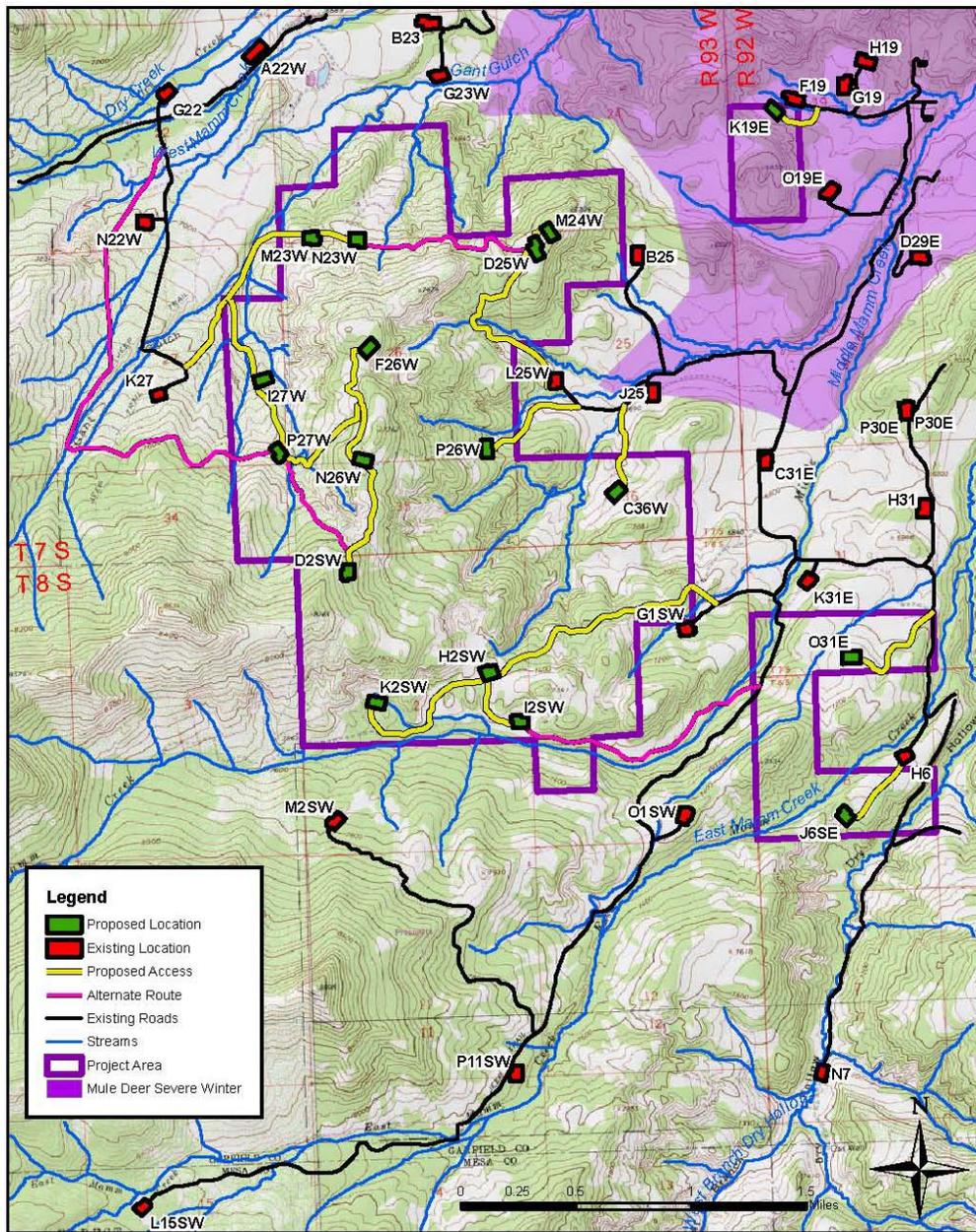


Figure 13. Gant Gulch Project Area - Mule Deer Severe Winter

LIST OF APPENDICES

APPENDIX A – GAP Map, 13-Point Surface Use Plan, 10-Point Drilling Plan

APPENDIX B – Standard Conditions of Approval

APPENDIX C – Site Specific Conditions of Approval

APPENDIX D – Survey Plat Information

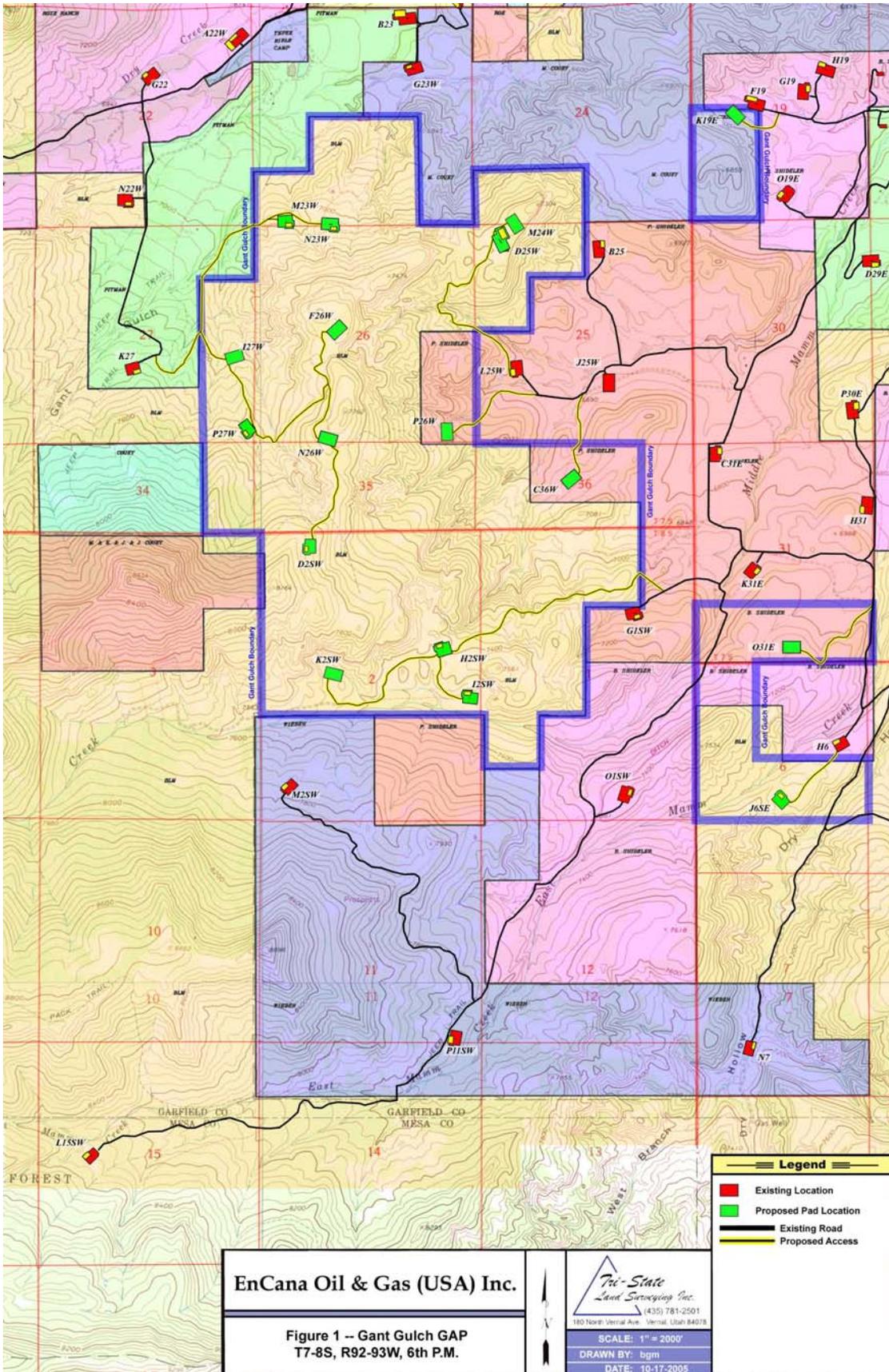
APPENDIX E – Wildlife Threshold Analysis

APPENDIX F – Original GAP Map

APPENDIX G – Viewshed Analysis (prepared by Otak)

**APPENDIX A
GAP MAP, 13-POINT SURFACE USE PLAN,
AND
10-POINT DRILLING PLAN
FOR THE
GANT GULCH GAP**

**T7S, R92W SECTIONS 19 AND 31
T7S, R93W, SECTIONS 23-27, 34-36
T8S, R92W, SECTION 6
T8S, R93W, SECTIONS 1 AND 2, SIXTH PRINCIPAL MERIDIAN
GARFIELD COUNTY, COLORADO**



13 Point Surface Use Plan

1. EXISTING ROADS

- A. The proposed wellsite is staked and reference stakes are present as shown on attached Topo maps.
- B. Access Roads – refer to Topo maps “A” and “B”.
- C. Access Roads within a one-mile radius – refer to Topo map “B”.
- D. The existing roads will be maintained in the same or better condition as existed prior to the commencement of operations and said maintenance will continue until final abandonment and reclamation of the well location. Excessive rutting or other surface disturbance will be avoided. Operations will be suspended temporarily during adverse weather conditions if excessive rutting is occurring when access routes are wet, soft, or partially frozen.

2. PLANNED ACCESS ROAD

All proposed access roads are shown on Topo map “B”.

- A. Width maximum – 30 feet overall right-of-way with an 18-foot road running surface, crowned and ditched and/or sloped and dipped.
- B. Construction standard – the access road will be constructed to the same standards as previously accepted in this area.

The road will be constructed to meet the standards of the anticipated traffic flow and all weather requirements. Construction will include ditching, draining, crowning and capping or sloping and dipping the roadbed as necessary to provide a well-constructed and safe road.

Prior to construction/upgrading the roadway shall be cleared of any snow cover and allowed to dry completely.

Traveling off of the thirty (30) foot right-of-way will not be allowed.

Road drainage crossings shall be of the typical dry creek drainage crossing type. Crossings shall be neither designed so they will not cause siltation or the accumulation of debris in the drainage crossing nor shall the drainages be blocked by the roadbed. Diverting water off at frequent intervals by means of cutouts shall prevent erosion of the drainage ditches by runoff water.

Upgrading shall not be allowed during muddy conditions. Should mud holes develop, they will be filled in and detours around them avoided.

- C. Maximum grade – the average grade will be 10% or less, wherever possible. The 10% grade will only be exceeded in areas where physical terrain or unusual circumstances require it.

- D. Drainage design – the access road will be crowned and ditched or sloped and dipped, and water turnouts installed as necessary to provide proper drainage along the access road route.
- E. Turnouts will be constructed along the access route as necessary or required to allow for the safe passage of traffic.
- F. Culverts – none will be required unless otherwise specified during the onsite inspection.
- G. Surface materials – surfacing materials will consist of native soil. If any additional surfacing materials are required they will be purchased from a local contractor having a permitted source of materials in the area. None are anticipated at this time.
- H. Gates, cattle guards or fence cuts – none required unless specified during the onsite inspection.
- I. Road maintenance – during both the drilling and production phase of operations, the road surface and shoulders will be kept in a safe and legal condition and will be maintained in accordance with the original construction standards. The access road right-of-way will be kept free of trash during operations.
- J. The proposed access road has been centerline flagged.
- K. Dust will be controlled on the roads and locations during construction and drilling by periodic watering of the roads and locations.

3. LOCATION OF EXISTING WELLS WITHIN A ONE MILE RADIUS

Please refer to Topo Map “C”.

4. LOCATION OF EXISTING AND/OR PROPOSED FACILITIES

- A. At each drill location, surface disturbance will be kept to a minimum. Each drill pad will be leveled using cut and fill construction techniques as noted in the attached survey.
- B. Should drilling result in established commercial production the following will be shown:
 - 1. Proposed location and attendant lines, by flagging, if off well pad.
 - 2. Dimensions of facilities.
 - 3. Construction methods and materials.
 - 4. Protective measures and devices to protect livestock and wildlife.
 - 5. All buried pipelines will be buried to a depth of 4 feet from ground surface to top of pipe.
 - 6. Construction width of the right-of-way/pipeline route shall be restricted to 60 feet of disturbance.
 - 7. Pipeline location warning signs shall be installed within 90 days after construction is completed.
 - 8. EnCana shall condition pipeline right-of-ways in a manner to preclude vehicular travel upon said rights-of-way, except for access to pipeline drips and valves.
 - 9. Pipeline right-of-way requested on the APD will be for 60’ working surface during construction with 30’ rehabilitated after construction is complete. In the event production is established this well will be tied-in to

an existing pipeline as shown in Topo map "D". The area used to contain the proposed production facilities will be built using native materials. If these materials are not acceptable, arrangements will be made to acquire appropriate materials from private sources.

10. A dike will be constructed completely around any production facilities which contain fluids (i.e. production tanks, produced water tanks, etc.) These dikes will be constructed of compacted subsoil, be impervious, hold 110% of the capacity of the largest tank, and be independent of the back cut.
11. All permanent (onsite for six months or longer) above-the-ground constructed or installed, including pumping units, will be painted a flat non-reflective, earthtone color to match one of the standard environmental colors as determined by the five State Rocky Mountain Interagency committee. All production facilities will be painted within six months of installation. Facilities that are required to comply with Occupation Health and Safety Act Rules and Regulations will be excluded from this painting requirement.
12. The production (emergency) pit will be 8 feet in diameter and 8 feet deep. It will be lined with corrugated steel with a steel mesh cover.
13. If different production facilities are required, a sundry notice will be submitted.

- C. EnCana Oil & Gas (USA) Inc. shall protect all survey monuments, witness corners, reference monuments and bearing trees in the affected areas against disturbance during construction, operation, maintenance and termination of the facilities authorized herein.

EnCana Oil & Gas (USA) Inc. shall immediately notify the authorized officer in the event that any corners, monuments or markers are disturbed or are anticipated to be disturbed. If any monuments, corner or accessories are destroyed, obliterated or damaged during construction, operation or maintenance, EnCana shall secure the services of a Registered Land Surveyor to restore the disturbed monuments, corner or accessories, at the same location, using surveying procedures found in the Manual of surveying Instructions for the Survey of the public Lands of the United States, latest edition. EnCana shall ensure that the Registered Land Surveyor properly records the survey in compliance with the Colorado Revised Statutes 38-53-101 through 38-53-112 (1973) and shall send a copy to the authorized officer.

- D. During drilling and subsequent operations, all equipment and vehicles will be confined to the access road right-of-way and any additional areas as specified in the approved Application for Permit to Drill.
- E. Reclamation of disturbed areas no longer needed for operation will be accomplished by grading, leveling and seeding as recommended by the Bureau of Land Management.

EnCana Oil & Gas (USA) Inc. will be responsible for road maintenance from the beginning to completion of operations.

5. LOCATION AND TYPE OF WATER SUPPLY

- A. Water to be used for the drilling of these wells will be hauled by truck over the roads described in item #1 and item #2, from the nearest water supply. Water volume used in drilling operation is dependent upon the depth of the well and any losses that might occur during drilling.

6. SOURCE OF CONSTRUCTION MATERIALS

- A. All access roads crossing Federal land are described under Item #2, and shown on Map “A”.
All construction material for these location sites and access roads shall be borrowed material accumulated during the construction of the location sites and access roads. No additional construction material from other sources is anticipated at this time. If in the future it is required, the appropriate actions will be taken to acquire it from private sources.
- B. All trees on the locations, access road, and proposed pipeline routes shall be disposed of by one of the following methods:
 - 1. Trees shall be cut with a maximum stump height of six inches (6”) and cut to 4-foot lengths and stacked off location. Trees will not be dozed off the location or access road, except on private surface where trees may be dozed. Trees may also be dozed on pipeline routes and then pulled back onto right-of-way as part of final reclamation.
 - 2. Limbs may be scattered off location, access road or along the pipeline, but not dozed off.

Rootballs shall be buried or placed off location, access road, or pipeline route to be scattered back over the disturbed area as part of the final reclamation.

7. METHODS OF HANDLING WASTE MATERIALS

- A. Cutting will be deposited in the reserve/blooiie pit.
- B. Drilling fluids including salts and chemicals will be contained in the reserve/blooiie pit. Upon termination of drilling and completion operations, the liquid contents of the reserve pit will be removed and disposed of at an approved waste disposal facility within ninety (90) days after termination of drilling and completion activities.

In the event that adverse weather conditions prevent removal of the fluids from the reserve pit within this time period, an extension may be granted by the Authorized Officer upon receipt of a written request from EnCana Oil & Gas (USA) Inc. The reserve pit will be constructed so as not to leak, break or allow discharge.

- C. Produced fluids – liquid hydrocarbons produced during completion operations will be placed in test tanks on the location. Produced wastewater will be confined

- to a lined pit (reserve pit) or storage tank for a period not to exceed ninety (90) days after initial production. During the permanent disposal method and location, along with the required water analysis shall be submitted for the Authorized Officer's approval. Failure to file an application within the time frame allowed will be considered an incidence of noncompliance.
- D. Sewage- self-contained, chemical toilets will be provided for human waste disposal. Upon completion of operations, or as needed, the toilet holding tanks will be pumped and the contents thereof disposed of in the nearest, approved, sewage disposal facility.
 - E. Garbage and other waste material – garbage, trash and other waste materials will be collected in a portable, self-contained and fully – enclosed trash cage during drilling and completion operations. Upon completion of operations (or as needed) the accumulated trash will be disposed of at an authorized sanitary landfill. No trash will be burned on location or placed in the reserve pit.
 - F. 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 adverse materials will be left on the location. Any open pits will be maintained until such time as the pits are backfilled.
 - G. The reserve and/or production pit will be constructed on the existing location and will not be located in natural drainages where a flood hazard exists or surface runoff will destroy or damage the pit walls. All pits will be constructed so as not to leak, break, or allow the discharge of liquids there from.
 - H. Any spills of oil, gas, salt water or other potentially hazardous substances will be reported immediately to the BLM, and other responsible parties, and will be mitigated immediately, as appropriate, through clean up or removal to an approved disposal site.

8. ANCILLARY FACILITIES

Self-contained travel-type trailers may be used on site during drilling operations. Standard drilling operation equipment to be on location will include: drilling rig with associated equipment; living facilities for company representative, tool pusher, mud logger, directional driller; toilet facilities and trash containers.

Facilities other than those described in this surface use plan to support drilling operations will be submitted to the Authorized Officer via a sundry notice (form 3160-5) for approval prior to commencing operations.

WELLSITE LAYOUT

- A. The attached location plat specifies the drill site layout as staked. Cross sections have been drafted to visualize the planned cuts and fills across the location. An average minimum of six (6) inches of topsoil will be stripped from the location (including the areas of cut, fill and/or subsoil storage) and stockpiled for future reclamation of the well site. The stockpiled soil will be seeded within 48 of completion of the pad.
- B. A production schematic showing the proposed production facility layout is attached.

- C. The reserve pit and blooie pit will be constructed as a combination pit capable of holding approximately four times the TD hole volume. The pits were combined, as these are gas wells and there will be no danger of the accumulation of hydrocarbons that could result in a potential safety hazard. The blooie pit might be used for testing, but only after the drilling is completed and the drilling equipment and personnel are off the well site location. In the event that drilling fluid (mud) will have to be used then this pit will also serve as the reserve pit. The reserve pit will be lined to prevent seepage.

This requirement may be waived by the Bureau of Land Management upon receipt of additional information from EnCana Oil & Gas (USA) Inc. concerning the location of fresh water aquifers and potential flow rates, chemical analyses of waters from the aquifers, and information concerning both the mechanics and nature of the air mist drilling system including any additives used therein.

- D. Prior to the commencement of drilling operations, the reserve pit will be fenced on three (3) sides using three strands of barbed wire according to the following minimum standards:
 - 1. Corner posts shall be cemented and/or braced in such a manner to keep the fence tight at all times.
 - 2. Standard steel, wood, or pipe posts shall be used between the corner braces. The maximum distance between any two (2) posts shall be no greater than sixteen (16) feet.
 - 3. All wire shall be stretched using a stretching device before it is attached to the corner posts.

The fourth side of the reserve pit will be fenced immediately upon removal of the drilling rig and the fencing will be maintained until the pit is backfilled.

- E. Any hydrocarbons on the pit will be removed from the pit as soon as possible after drilling operations are completed.
- F. Operator will notify the Authorized Officer at least three (3) working days prior to construction of the well pad and/or related facilities and within two (2) working days after completion of the well pad.

9. PLANS FOR RECLAMATION OF THE SURFACE:

The BLM will be contacted prior to commencement of any reclamation operations.

A. Production

- 1. Immediately upon well completion, the well location and surrounding areas(s) will be cleared of all debris, materials, trash and junk not required for production.
- 2. Immediately upon well completion, any hydrocarbons in the pit shall be removed in accordance with 43CFR 3162.7-1.
- 3. Before any dirt work to restore the location takes place, the reserve pit will be completely dry and all cans, barrels, pipe, etc. will be removed.

Other waste and spoil materials will be disposed of immediately upon completion of drilling and workover activities.

4. The reserve pit and that portion of the location and access road not needed for production facility/operations will be reclaimed within ninety (90) days from the date of well completion, weather permitting.
5. If the well is a producer, EnCana will upgrade and maintain access roads as necessary to prevent soil erosion, and accommodate year round traffic. Areas unnecessary to operations will have areas reshaped. Topsoil will be redistributed and disked. All areas outside the work area will be re-seeded according to the Bureau of Land Management recommendations for seed mixture.
6. If the well is abandoned or a dry hole, EnCana will restore the access road and location to approximately the original contours. During reclamation of the site, fill material will be pushed into cuts and up over the backslope. No depressions will be left that will trap water or form ponds. Topsoil will be distributed evenly over the location and seeded according to the recommended seed mixture. The access road and location shall be ripped or disked prior to seeding. Perennial vegetation must be established. Additional work shall be required in case of seeding failures, etc.

Seedbed will be prepared by disking then roller packing following the natural contours. Seed will be drilled on contours at a depth no greater than one-half inch (1/2). In areas that cannot be drilled, seed will be broadcast at double the seeding rate and harrowed into soil. Certified seed will be used whenever available.

Fall seeding will be completed after September 1, and prior to prolonged ground frost. To be effective, spring seeding will be completed after the frost has left the ground and prior to May 15th.

7. Upon completion of backfilling, leveling and recontouring, the stockpiled topsoil will be evenly spread over the reclaimed areas(s). Prior to reseeded, all disturbed surfaces will be scarified and left with a rough surface. No depressions will be left that would trap water and form ponds. All disturbed surfaces will be re-seeded with a seed mixture to be recommended by the BLM.

Seed will be drilled on the contour to approximately a depth of one-half (1/2) inch. All seeding will be conducted after September 1 and prior to ground frost. Spring seeding will be done after the frost leaves the ground and no later than May 15th. If the seeding is unsuccessful, EnCana may be required to make subsequent seedings.

B. DRY HOLE/ABANDONED LOCATIONS

- A. On lands administered by the BLM, abandoned well sites, roads or other disturbed areas will be restored to near their original condition.

This procedure will include:

1. Re-establishing irrigation systems where applicable,
 2. Re-establishing soil conditions in irrigated field in such a way as to ensure cultivation and harvesting of crops and,
 3. Ensuring revegetation of the disturbed areas to the specification of the BLM at the time of abandonment.
- B. All disturbed surfaces will be recontoured to the approximate natural contours and re-seeded according to BLM specifications. Reclamation of the well pad and access road will be performed as soon as practical after final abandonment and reseeded operations will be performed in the fall or spring following completion of reclamation operations.

10. SURFACE OWNERSHIP

Surface ownership may be either Fee or Federal and is noted on the APD.

11. OTHER INFORMATION

- a. A Class III Cultural Resource Inventory of the proposed drill sites, access roads and other facilities on Federal lands will be conducted and a report filed with the appropriate BLM office.
- b. If archaeological, historical or vertebrate fossil materials are discovered during the course of any construction activities, EnCana will suspend all operations that further disturb such materials and immediately contact the appropriate BLM office. Operations in the area of discovery will not resume until written authorization to proceed has been issued by the BLM Authorized Officer (AO).
- c. EnCana will be fully responsible for the actions of their subcontractors. A copy of the approved APD and Conditions of Approval will be on location during drilling and completion operations.
- d. Any construction activity in the areas shall be done with awareness that many natural gas pipelines are buried. Some are apparent as to location; some have grown over with weeds and brush. It is suggested that the contractor contact the operators in the area to locate all lines before digging.

12. REPRESENTATIVES AND CERTIFICATION

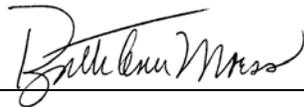
- A. Representative:
RuthAnn Morss
EnCana Oil & Gas (USA) Inc.
370 17th Street, Suite 1700
Denver, CO 80202
(720)-876-5060

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 any applicable Notice to Lessees.

The Operator will be fully responsible for the actions of its subcontractors. A complete copy of the approved Application for Permit to Drill will be furnished to the field representatives to ensure compliance and shall be on location during all construction and drilling operations.

B. Representative Certification:

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



RuthAnn Morss
EnCana Oil & Gas (USA) Inc.
(720) 876-5060
June 24, 2005

10-POINT DRILLING PLAN – Gant Gulch GAP

All lease and/or unit operations will be conducted in such a manner that full compliance is made with applicable laws, regulations (43CFR3100), Onshore Oil and Gas Orders No. 1 and No. 2 and the approved Plan of Operations. The Operator is fully responsible for the actions of its subcontractors. A copy of the Conditions of Approval will be furnished to the field representatives to ensure compliance.

EnCana Oil & Gas (USA) Inc. will be operating under its Nationwide Bond # RLB0004733.

1. Estimated Tops of Important Geologic Markers

- a. Formations and depths will be submitted with the site specific APD.

2. Estimated Depths of Anticipated Water, Oil Gas or Mineral Formations

- a. The proposed casing and cementing program has been 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. Any isolating medium other than cement shall receive approval prior to use.

The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing.

Please see attached map exhibit provided by Operator's third party contractor which identifies known domestic water wells, depths, and independent definition of known useable water in the Gant Gulch Area. Operator's domestic water well testing procedures are also stated on this exhibit.

3. Pressure Control Equipment

- a. Minimum working pressure on rams and BOPE will be 3,000 psi.
- b. Function test and visual inspection of the BOP will be conducted daily and noted in the IADC Daily Drilling Report.
- c. Both high and low pressure tests of the BOPE will be conducted.
- d. The Annular BOP will be pressure tested to a minimum of 50% of its rated working pressure.
- e. Blind and Pipe Rams/BOP will be tested to a minimum of 100% of rated working pressure (against a test plug)
- f. BOP testing procedures and testing frequency will conform to Onshore Order No. 2.
- g. BOP remote controls shall be located on the rig floor at a location readily accessible to the driller. Master controls shall be on the ground at the accumulator and shall have the capability to function all preventors.
- h. The kill line shall be 2" minimum and contain two kill line valves, one of which shall be a check valve.
- i. The choke line shall be 3" minimum and contain two choke line valves (3" minimum).
- j. The choke and manifold shall contain two adjustable chokes.

Casing	Depth	Hole Size	Size	Weight	Grade	Cement Volume
Conductor	0-40'	± 24" or ± 30"	16" or 20"	0.25" Wall	X42	± 5 yds ready mix (as required to cement to surface)
Surface	Surface to ±70' 1200' - 1500'	12 1/4"	9 5/8" xo to 8 5/8"	36# 24#	J-55, STC All New	± 850 sks to ± 1060sks Class (G) 15.8ppg 1.17 ft ³ /sx
Production	0' - 4000' and 4000' - TD	7 7/8"	4 1/2"	11.6#	P110, LTC and I80, LTC All New	Lead: ± 500 sacks, 12.0 – 12.5 ppg Yield: ± 1.35 cu ft / ft Tail: ± 750 sacks, 13.0 13.5 ppg Yield: ± 1.27 cu ft / ft

- k. Hand wheels shall be installed on all ram preventors.
- l. Safety valves and wrenches (with subs for all drill string connections) shall be available on the rig floor at all times.
- m. Inside BOP or float sub shall also be available on the rig floor at all times.
- n. Upper Kelly cock valve (with handle) shall be available at all times.

Proposed BOP and Choke Manifold arrangements are attached.

4. Proposed Casing and Cementing Program

- a. The specific casing setting depths will vary depending on well location and drilling conditions. The depths listed in the table give the approximate anticipated setting depth.
- b. The production casing design cement volumes will be based on the tail slurry having a height designed for 1000' above the geologist "top of gas" pick, and the lead slurry having a height designed to a minimum cement top which is 200' > top of the Mesa Verde formation.
- c. Unless otherwise stated, the cement volume excess for surface casing cement slurries will be 100% for any slurry design.
- d. Unless otherwise stated, the minimum cement volume excess for production casing cement slurries will be:
 - a. Lead Slurry: 50% excess without open hole caliper log and 10% with caliper log.
 - b. Tail Slurry: 30% excess without open hole caliper log and 10% with caliper log.
- e. The proposed casing and cementing program shall be conducted as approved 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. Any isolating medium other than cement shall receive approval prior to use. The casing setting depth shall be calculated to position the casing seat opposite a competent formation which will contain the maximum pressure to which it will be exposed during normal drilling operations. Determination of casing setting depth shall be based on all relevant factors, including: presence/absence of hydrocarbons, fracture gradients, usable water zones, formation pressures, lost circulation zones, other minerals or other unusual characteristics.
- f. All casing, except conductor casing, shall be new or reconditioned and tested. Approval will be obtained from the Authorized Officer prior to using reconditioned casing. Used casing shall meet or exceed API standards for new casing.

- g. The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing. Cement volumes based on 100% excess above annular volume; or as required based on field experience to ensure cement is circulated to surface. If drive pipe is used, it may be left in place its total length is less than twenty feet below the surface. If the total length of the drive pipe is equal to or greater than twenty feet, it will be pulled prior to cementing surface casing, or it will be cemented in place.
- h. Surface casing shall have centralizers on the bottom three joints, with a minimum of one centralizer per joint.
- i. Top plugs shall be used to reduce contamination of cement by displacement fluid. A bottom plug or other acceptable technique, such as a suitable pre-flush fluid, inner string cement method, etc. shall be utilized to help isolate the cement from contamination by the mud being displaced ahead of the cement slurry.
- j. All casing strings below the conductor shall be pressure tested to 0.22 psi per foot of casing string length or to 1500 psi, whichever is greater, but not to exceed 70% of the minimum internal yield. If pressure declines more than 10% in 30 minutes, corrective action shall be taken.
- k. Casing design is subject to revision based on geologic conditions encountered.

5. Proposed Casing and Cementing Programs:

Casing Programs will be adjusted as necessary to maintain minimum design criteria – based on Operator’s internal design assumptions.

a. Surface casing @ 1500’ MD; 8-5/8” 24# J-55 STC

Purpose: Protect shallow fresh water and contain MASP to TD

- Maximum anticipated mud weight at surface casing depth: = 9.0 ppg
- Maximum anticipated mud weight at TD: = 10.0 ppg
- Maximum anticipated equivalent formation pressure at TD = 9.5 ppg

Collapse Design:

- Evacuated 8-5/8” 24# J-55 casing with 9.0 ppg drilling fluid density:
- Load = $9.0 \times 0.052 \times 1500'$ = 702 psig
- Rating: = 1370
- S.F. = 1.9
- Minimum Design Criteria = 1.0

Burst Design: Assume kick with partially evacuated hole and an influx gradient of 0.22 psi/ft.

- 8-5/8” 24# J-55
- MASP (Load) = $8500' \times (0.494 - 0.22)$ psi/ft = 2329 psig
- Rating: = 2950 psig
- S.F. = 1.26
- Minimum Design Criteria = 1.1

Tensile Design: Designed on Air Weight * Buoyancy + overpull margin

- 8-5/8” 24# J-55
- Rating: = 372,000 lbs
- Load: $1500' \times 24# \times 0.847 + 100,000$ lbs (OPM) = 130,492 lbs
- S.F. = 2.85
- Minimum Design Criteria = 1.2

- b. Production Casing @ 8500' MD; 4-1/2", 11.6#, I80, LTC
- | | |
|--|----------------|
| Maximum Anticipated Mud Weight at Total Depth | = 10.0 ppg |
| Maximum Anticipated Equivalent Formation Pressure at Total Depth | = 9.5 ppg |
| Maximum Surface Treating Pressure for Fracturing Operations | = 7000 psig |
| Assumed Gas Gradient for Production Operations | = 0.115 psi/ft |

Collapse Design: Designed on evacuated casing properties with 10.0 ppg drilling fluid density with no internal back-up.

Load = $10.0 \times 0.052 \times 8500'$	= 4420 psig
Rating	= 6350 psig
S.F.	= 1.43
Minimum Design Criteria	= 1.0

Burst Design: Assume maximum surface shut-in pressure during production, and maximum surface treating pressure during fracture stimulation operations.

Design Consideration #1: Maximum Surface Shut-In Pressure
 Design Point #1: 4-1/2" 11.6#, I-80 from 0' to 8500'

MASSIP (Load) = $8500' \times (0.494 - 0.115)$ psi/ft	= 3222 psig
Rating	= 7780 psig
S.F.	= 2.41
Minimum Design Criteria	= 1.1

Design Consideration #2: Maximum Surface Treating Pressure During Frac Operations

Design Point #1: 4-1/2" 11.6# I-80 from 0' to 8500'

MATP (Load):	= 7000 psig
Rating:	= 7780 psig
S.F.	= 1.11
Minimum Design Criteria	= 1.1

Tensile Design: Designed on Air Weight * Buoyancy + overpull margin

Load = $(8500' \times 11.6 \text{ lb/ft} \times 0.847) + 75,000 \text{ lbs (OPM)}$	= 158,514 lbs
Rating	= 212,000 lbs
S.F.	= 1.33
Minimum Design Criteria	= 1.2

*Cementing Volume Design Clarification:

Surface Casing @ 1200' to 1500':

*Cement designed to cover the entire string with 100% excess.

Production Casing

*Designed to 200' above top of Mesa Verde formation. Volume assumes 7-7/8" gauge hole diameter plus 30-50% excess based on Operator's experience with offset wells.

*If open-hole logs are run, cement volumes will be determined from the caliper plus 10% excess.

6. Directional Drilling Program

An S-shaped directional design will be used to reach the targeted bottom hole locations. In general, a target radius of 200' will be used. Specific directional plans for each well will be included with the APD.

7. Proposed Drilling Fluids Program

<u>DEPTH</u>	<u>MUD TYPE</u>	DENSITY Lb/gal	VISCOSITY (sec/qt)	FLUID LOSS (cc)
0' – 1500'	Fresh Water Gel	8.4 - 9.0	28 – 35	NC
1500' – TD	LSND	8.8 – 9.0	35 – 45	5 - 15 cc

- a. The drilling fluids have been designed for optimal wellbore hydraulics and hole stability.
- b. Mud flow and volume will be monitored both visually and with electronic pit volume totalizers.

8. Testing, Coring and Logging

- a. Drill Stem Testing – none anticipated
- b. Coring – As deemed necessary by geology
- c. Mud Logging – Optional
- d. Logging:

Logging Statement: It is Operator’s intent to run one open hole log per pad drilled on both surface and production holes, unless the hole conditions warrant otherwise. In such cases of unstable hole conditions, Operator will seek a waiver on open hole logging from the BLM authorized office.

<u>Open Hole</u>	<u>Logging Interval</u>
PEX (Optional)	AIT-GR-Neutron/Litho-Density From TD to surface casing

<u>Cased Hole</u>	<u>Logging interval</u>
CBL/CCL/GR/VDL RST	As needed for perforating control In lieu of PEX

9. Air/Mist Drilling

The following equipment will be in place and operational during air/gas drilling:

- Properly lubricated and maintained rotating head
- Spark arrestor on engines or water cooled exhaust
- Blooie line discharge 100 feet from well bore and securely anchored
- Straight run on blooie line
- De-duster equipment
- All cuttings and circulating medium shall be directed into a reserve or blooie pit
- Float valve above bit
- Automatic igniter or continuous pilot light on the blooie line
- Compressors will be located in the opposite direction from the blooie line a minimum of 100 feet from the wellbore
- Mud circulating equipment, water, and mud materials sufficient to maintain the capacity of the hole and circulating tanks or pits

10. Abnormal Pressures or Temperature

- a. The Gant Gulch GAP area is generally normal to slightly over-pressured. Lost circulation is most commonly experienced while drilling the normally pressured Wasatch hole section. Barite and a selection of “sized” lost circulation materials will be kept on location during drilling operations.

MASP Calculation: Will be performed as follows for individual well depths and as determined by offset well control. Example for 8500' TVD well:

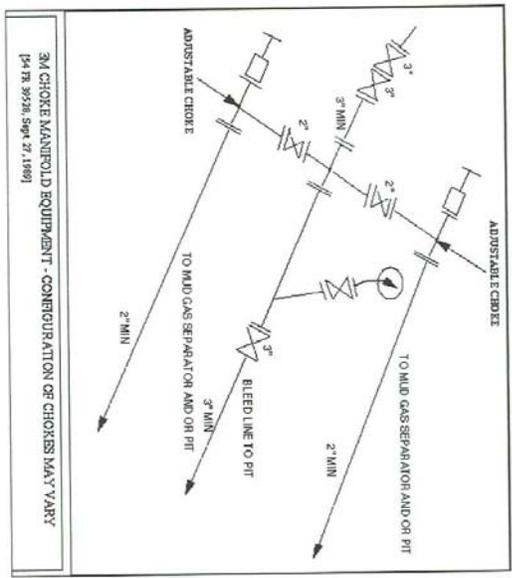
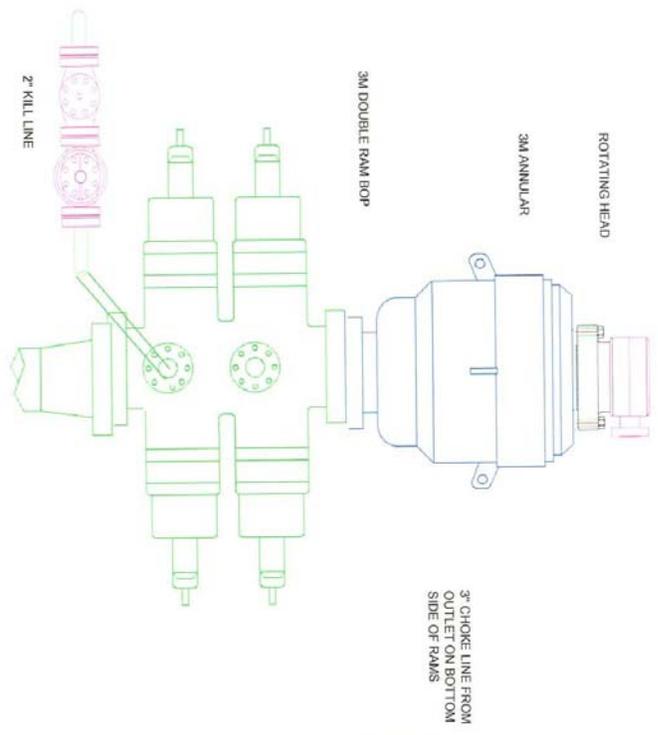
The anticipated bottom hole pressure is $8500 * 0.494 \text{ psi/ft} = 4199 \text{ psi}$

The maximum anticipated surface pressure is $8500 * (0.494 - 0.22) \text{ psi/ft} = 2329 \text{ psi}$

b. No hydrogen sulfide has been encountered or is known to exist from previous drilling in the area at this depth.

11. Anticipated Start Date and Duration of Operations

Drilling operations are expected to require ± 18 days on each well. Completion operations are anticipated to begin within 15 days of finishing the drilling portion of the last well on each pad. Completion operations will require approximately 30 days. Total time on a typical 4-well pad would therefore be ± 120 days.



3M BOP w/ Red Head kit

ATTACHMENT B

Table 1-1. Bottom-hole Locations of Wells in Gant Gulch GAP.

Surface Lease Number	Sec-Twp-Rge Surface Location	Pad & Surface Location	Well Number: Bottom Hole Location	Bottom Hole Lease Number	Surf Owner/ Min Owner
FEE	1-T8S-R93W	C36W	1-2: 660' FNL & 1980' FEL	C-55605	FEE/FED
			1-3: 660' FNL & 1980' FWL	C-55605	FEE/FED
			1-4: 660' FNL & 660' FWL	C-55605	FEE/FED
			36-13C: 10' FSL & 4620' FEL	C-52889	FEE/FED
			36-14C: 10' FSL & 3300' FEL	C-52889	FEE/FED
			36-15C: 10' FSL & 1980' FEL	C-52889	FEE/FED
			36-13: 660' FSL & 4620' FEL	C-52889	FEE/FED
			36-14: 660' FSL & 3300' FEL	C-52889	FEE/FED
			36-15: 660' FSL & 1980' FEL	C-52889	FEE/FED
			25-15C: 100' FSL & 1980' FEL	FEE	FEE/FEE
			25-14C: 100' FSL & 3300' FEL	FEE	FEE/FEE
			36-10C: 1320' FSL & 1980' FEL	FEE	FEE/FEE
			36-11C: 1320' FSL & 3300' FEL	FEE	FEE/FEE
C-54738	25-T7S-R93W	D25W	25-3: 660' FNL & 1980' FWL	C-54738	FED/FED
			25-3B: 1320' FNL & 1980' FWL	C-54738	FED/FED
			24-4: 660' FNL & 660' FWL	C-54738	FED/FED
			25-4C: 1320' FNL & 660' FWL	C-54738	FED/FED
			25-5: 1980' FNL & 660' FWL	C-54738	FED/FED
			26-1: 660' FNL & 660' FEL	C-54738	FED/FED
			26-8: 1980' FNL & 660' FEL	C-54738	FED/FED
			26-1C: 1320' FNL & 660' FEL	C-54738	FED/FED
			23-16: 660' FSL & 660' FEL	FEE	FEE/FEE
			23-16C: 100' FSL & 660' FEL	FEE	FEE/FEE
C-55605	2-T8S-R93W	D2SW	2-2: 660' FNL & 1980' FEL	C-55605	FED/FED
			2-3: 660' FNL & 1980' FWL	C-55605	FED/FED
			2-4: 660' FNL & 660' FWL	C-55605	FED/FED
C-54738	26-T7S-R93W	F26W	26-7: 1980' FNL & 1980' FEL	C-54738	FED/FED
			26-6: 1980' FNL & 1980' FWL	C-54738	FED/FED
			26-10: 1980' FSL & 1980' FEL	C-54738	FED/FED
FEE	1-T8S-R93W	G1SW – EXISTING PAD	1-1: 660' FNL & 660' FEL	FEE	FEE/FEE
			1-1C: 1320' FNL & 660' FEL	FEE	FEE/FEE
			1-2C: 1320' FNL & 1980' FEL	C-55605	FED/FED
			1-3C: 1320' FNL & 3300' FEL	C-55605	FED/FED
			1-8: 1980' FNL & 660' FEL	FEE	FEE/FEE
			1-8C: 2640' FNL & 660' FEL	FEE	FEE/FEE
			1-9: 3300' FNL & 660' FEL	FEE	FEE/FEE
			1-10B: 2640' FNL & 1980' FEL	FEE	FEE/FEE
			1-10: 3300' FNL & 1980' FEL	FEE	FEE/FEE
			1-4C: 1320' FNL & 660' FWL	C-55605	FED/FED
C-55605	2-T8S-R93W	H2SW	1-5C: 2640' FNL & 660' FWL	C-55605	FED/FED
			2-8C: 2640' FNL & 660' FEL	C-55605	FED/FED
			2-7: 1980' FNL & 1980' FEL	C-55605	FED/FED
C-54738	27-T8S-R93W	I27W	26-5: 1980' FNL & 660' FWL	C-54738	FED/FED
			26-12: 1980' FSL & 660' FWL	C-54738	FED/FED
C-55605	2-T8S-R93W	I2SW	1-11: 3300' FNL & 1980' FWL	C-55605	FED/FED
			1-12C: 3300' FSL & 660' FWL	C-55605	FED/FED
C-51156	6-T8S-R92W	J6SE	6-11: 1980' FSL & 3300' FEL	C-51156	FED/FED
			6-10: 1980' FSL & 1980' FEL	C-51156	FED/FED
			6-6: 3300' FSL & 3300' FEL	C-51156	FED/FED
			6-6C: 2640' FSL & 3300' FEL	C-51156	FED/FED
FEE	19-T7S-R92W	K19E	24-8: 1320' FNL & 660' FEL	FEE	FEE/FEE
			24-8C: 1980' FNL & 660' FEL	FEE	FEE/FEE
			24-9: 1980' FSL & 660' FEL	FEE	FEE/FEE
			24-9C: 1320' FSL & 660' FEL	FEE	FEE/FEE
			24-16: 660' FSL & 660' FEL	FEE	FEE/FEE
			24-16D: 50' FSL & 50' FEL	FEE	FEE/FEE
			19-11: 1980' FSL & 660' FWL	C-56258	SPLIT
			19-11D: 1320' FSL & 660' FWL	C-56258	SPLIT
19-14: 660' FSL & 660' FWL	C-56258	SPLIT			

Surface Lease Number	Sec-Twp-Rge Surface Location	Pad & Surface Location	Well Number: Bottom Hole Location	Bottom Hole Lease Number	Surf Owner/ Min Owner			
			19-14C: 50' FSL & 660' FWL	C-56258	SPLIT			
C-55605	2-T8S-R93W	K2SW	2-10C: 2940' FSL & 1980' FEL	C-55605	FED/FED			
			2-11: 3300' FNL & 1980' FWL	C-55605	FED/FED			
			2-12C: 2940' FSL & 660' FWL	C-55605	FED/FED			
C-52889	23-T7S-R93W	M23W	23-13: 660' FSL & 660' FWL	C-52889	FED/FED			
			26-4: 660' FNL & 660' FWL	C-52889	FED/FED			
C-54738	24-T7S-R93W	M24W	24-11C: 1320' FSL & 1980' FWL	C-54738	FED/FED			
			24-15: 660' FSL & 1980' FEL	FEE	FED/FEE			
			24-10C: 1320' FSL & 1980' FEL	FEE	FED/FEE			
			24-12: 1980' FSL & 660' FWL	FEE	FED/FEE			
			24-12C: 1320' FSL & 660' FWL	C-54738	FED/FED			
			24-13: 660' FSL & 660' FWL	C-54738	FED/FED			
			24-13C: 10' FSL & 660' FWL	C-54738	FED/FED			
			24-14: 660' FSL & 1980' FWL	C-54738	FED/FED			
			24-14C: 10' FSL & 1980' FWL	C-54738	FED/FED			
			C-52889	23-T7S-R93W	N23W	23-15: 660' FSL & 1980' FEL	C-52889	FED/FED
23-10: 1980' FSL & 1980' FEL	C-52889	FED/FED						
23-11A: 1980' FSL & 1980' FWL	C-52889	FED/FED						
23-11D: 1320' FSL & 1980' FWL	C-52889	FED/FED						
23-10C: 1320' FSL & 1980' FEL	C-52889	FED/FED						
23-14: 660' FSL & 1980' FWL	C-52889	FED/FED						
26-2: 660' FNL & 1980' FEL	C-54738	FED/FED						
26-3: 660' FNL & 1980' FWL	C-54738	FED/FED						
C-54738	26-T7S-R93W	N26W				26-14: 660' FSL & 1980' FWL	C-54738	FED/FED
						26-15: 660' FSL & 1980' FEL	C-54738	FED/FED
			35-10C: 1320' FSL & 1980' FEL	C-52889	FED/FED			
FEE	31-T8S-R92W	O31E	6-3C: 3960' FSL & 3300' FEL	C-51156	FEE/FED			
			31-14: 800' FSL & 3300' FEL	FEE	FEE/FEE			
			31-15: 800' FSL & 1980' FEL	FEE	FEE/FEE			
			6-3C: 4620' FSL & 3300' FEL	C-51156	FEE/FED			
FEE	26-T7S-R93W	P26W	25-13C: 10' FSL & 660' FWL	C-52889	FEE/FED			
			26-9: 1980' FSL & 660' FEL	FEE	FEE/FEE			
			26-16: 660' FSL & 660' FEL	FEE	FEE/FEE			
			35-9C: 1320' FSL & 660' FEL	C-53889	FEE/FED			
			36-12C: 1320' FSL & 4620' FEL	C-52889	FEE/FED			
C-54738	27-T7S-R93W	P27W	26-13: 660' FSL & 660' FWL	C-54738	FED/FED			
			27-16: 660' FSL & 660' FEL	C-54738	FED/FED			
			35-12C: 1320' FSL & 4620' FEL	C-54738	FED/FED			

APPENDIX B

**STANDARD CONDITIONS OF APPROVAL (COA)
GANT GULCH GAP**

STANDARD CONDITIONS OF APPROVAL FOR THE GANT GULCH GAP

Air Quality:

The operator is responsible for applying dust abatement measures as needed or directed by the Authorized Officer to reduce the emissions of fugitive dust from access roads. 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.

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

Cultural Resource Inventory:

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

Cultural Resource Education/Discovery:

All persons in the area who are associated with this project must be informed that if anyone is found disturbing historic, archaeological, or scientific resources, including collecting artifacts, the person or persons will be subject to prosecution.

Pursuant to 43CFR10.4(g), the BLM authorized officer must be notified, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43CFR10.4 (c) and (d), activities must stop in the vicinity of the discovery and the discovery must be protected for 30 days or until notified to proceed by the authorized officer.

If in connection with operations under this contract the project proponent, his contractors, subcontractors, or the employees of any of them, discovers, encounters or becomes aware of any objects or sites of cultural or paleontological value or scientific interest such as historic or prehistoric ruins, graves or grave markers, fossils, or artifacts, the proponent shall immediately suspend all operations in the vicinity of the cultural or paleontological resource and shall notify the BLM authorized officer of the findings (16 U.S.C. 470h-3, 36CFR800.112). Operations may resume at the discovery site upon receipt of written instructions and authorization by the authorized officer. Approval to proceed will be based upon evaluation of the resource. Evaluation shall be by a qualified professional selected by the authorized officer from a federal agency insofar as practicable. When not practicable, the holder shall bear the cost of the services of a non-federal professional.

Within five working days the authorized officer will inform the holder as to:

- whether the materials appear eligible for the National Register of Historic Places;
- the mitigation measures the holder will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and,

- a time frame for the authorized officer to complete an expedited review under 36 CFR 800.11, or any agreements in lieu thereof, to confirm through the State Historic Preservation Officer that the findings of the authorized officer are correct and the mitigation is appropriate.

The proponent may relocate activities to avoid the expense of mitigation and/or the 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 proponent will be responsible for mitigation costs. The authorized officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the authorized officer that the required mitigation has been completed, the proponent will then be allowed to resume construction.

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

Antiquities, historic, prehistoric ruins, or objects of scientific interest, identified or unidentified, that are outside of the authorization and not associated with the resource within the authorization will also be protected. Impacts that occur to such resources, which are related to the authorizations activities, will be mitigated at the proponent's cost including Native American consultation cost.

In situations where federal action is required for wells directionally drilled into federal minerals from fee 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 will be followed.

Geology:

Mitigation measures for protection of geologic resources are detailed in the GGGAP. 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. The GGGAP also describes methods for minimizing the potential for slope instability and erosion, and for interim and final reclamation of disturbed surfaces.

Ground Water / Soils:

EnCana will implement aggressive reclamation and re-vegetation of disturbed areas not needed for operational activities. These measures will help prevent erosion and sedimentation to drainages. In addition EnCana will implement multiple BMPs including the following:

New access roads would be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity.

Relief ditches or corrugated metal pipes would be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

Ditches would be allowed to vegetate and/or would include large 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 would be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out.

Straw cover would be placed on excess material piles to help limit heavy dust emissions into the air during weather-created wind events.

EnCana's road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

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 COGCC.

After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.

In order to isolate the Mesa Verde -Wasatch contact, production casing on Federal wells will have a cement top a minimum of 200 feet above the top of Mesa Verde formation.

In accordance with EnCana's standard policy, all pits will utilize impermeable liners to contain drilling fluids. Following completion activities, pit liners would be removed at the respective landowners request.

For pads where a reserve pit is planned, EnCana would construct a lined reserve pit to receive the drill cuttings from the wellbore (mainly shale, sand, and miscellaneous rock minerals) and to contain drilling fluids carried over with the cuttings. No hazardous substances would be placed in this pit.

Frac pits to contain water used in completion process will be planned for each new pad location in GAP. Frac pits will also be lined. Compliance with Onshore Order #1 would determine the timing and closure of frac pits. In instances where well drilling would occur in more than 1 drilling season on a pad, the frac pit will be drained dry prior to winter shutdown period or expiration of 90 day period, whichever occurs first. The liner in drained frac pits will be retained until frac pit use is completed.

Invasive Non-Native Species:

EnCana would implement an intensive reclamation and weed control program beginning the first growing season after well completion. All disturbed areas not needed for immediate operation of the wells will be seeded with a mixture of native grasses and shrubs. Site specific seed mixes designed to reclaim the sites and deter establishment of noxious weeds are presented in the vegetation section. The seed shall be certified free of primary or secondary noxious weeds. The operator shall adhere to the specified seed mix and will continue with reclamation activities, including additional reseeding if necessary, until BLM's interim reclamation objectives are achieved.

The operator shall be required to monitor for the presence of noxious weeds, which are included on the State or County noxious weed lists at least once each year during the growing season. The operator shall be responsible for promptly controlling any noxious weed infestations, which have resulted from the operator's construction, operation, or maintenance activities within the Project

Area. A Pesticide Use Proposal must be approved by the Authorized Officer prior to the use of any herbicides.

Given that cheatgrass is common in portions of the Project Area, it may not be possible to totally eliminate this noxious weed from the reclaimed area. In the case of cheatgrass, interim reclamation will be considered acceptable if cheatgrass and other undesirable vegetation are less than five percent cover, if the adjacent vegetation is less than 50 percent undesirables. Cheatgrass will be less than 50 percent cover, if the adjacent vegetation is more than 50 percent undesirables (1999 GSRA Oil and Gas FSEIS).

Migratory Birds:

In order to protect nesting raptors, an annual raptor survey would be conducted prior to any new construction, drilling, or completion activities scheduled between February 1 and August 15. If an active raptor nest is documented within ¼ mile of proposed construction, drilling or completion, the activity could be delayed until the young have fledged or the nest is no longer active, as determined by a qualified wildlife biologist. If lease stipulation does not exist to protect nesting raptors, a 60 day timing limitation or relocation of the well pad/road up to 200 meters would be applied to a ¼ mile buffer around the nest site to minimize disturbance during a portion of the critical nesting period.

Native American Consultation:

The Ute Tribe of the Uinta and Ouray Bands have visited other culturally sensitive sites in the Glenwood Springs Field Office area and have provided written and verbal indication to protect these sites. The following mitigation is based upon this information. If new data are disclosed after the Native Americans visit the Grass Mesa GAP, new terms and conditions may have to be negotiated to accommodate their concerns.

- Site-specific Native American mitigation measures suggested during consultation will be considered during the implementation phase of the proposed action(s).
- Strict adherence to the confidentiality of information concerning the nature and location of archaeological resources will be required of EnCana and their subcontractors (Archaeological Resource Protection Act 16 U.S.C. 470hh).
- Periodic monitoring of these sensitive areas will be required.
- Inadvertent Discovery: The National Historic Preservation Act (NHPA) as amended requires that if newly discovered cultural resources are identified during project implementation, work in that area must stop and the agency Authorized Officer notified immediately (36 CFR 800.13). The Native American Graves Protection and Repatriation Act (NAGPRA), requires that if inadvertent discovery of Native American Remains or Objects occurs, activity must cease in the area of discovery, a reasonable effort made to protect the item(s) discovered, and immediate notice made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).

Further actions also require compliance under the provisions of NHPA and the Archaeological Resource Protection Act (16 U.S.C. 470hh).

- On private lands, Colorado State Statues (CRS 24-80-401 and CRS 24-80-1301) for Historic, Prehistoric, and Archaeological Resources, and for Unmarked Human Graves will have to be adhered to by EnCana and their subcontractors. 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.

Noise:

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

Paleontological Resource Education/Discovery:

All persons associated with operations under this authorization must 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 proponent shall immediately suspend all activities in the immediate vicinity of the discovery that might further disturb such materials and notify the BLM authorized officer of the findings. The discovery must be protected until notified to proceed by the authorized officer.

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.

Paleontological Resource Monitoring:

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.

Range Management:

EnCana would fence newly reclaimed well pads to exclude livestock and big game grazing pressure on seeded sites.

Range improvements (fences, gates, reservoirs, pipelines, etc.) will be avoided during development of natural gas resources to the maximum extent possible. If range improvements are damaged during exploration and development, the operator will be responsible for repairing or replacing the damaged range improvements.

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.

Transportation/ Road Maintenance:

Commuting construction and drilling crews would be encouraged to car pool to reduce the number of vehicle trips on local area roads and associated wear and tear.

The operator would encourage commuting construction and drilling crews to comply with posted speed limits on public roads and limit driving speeds to 20 mph on more primitive access roads to reduce the potential for vehicle collisions. By complying with posted speed limit along County Roads, traffic-related noise would also be reduced at nearby residences

Road maintenance standards listed in GAP EA , Proposed Action will be used and implemented on BLM land and related road easements.

Terrestrial Wildlife:

As required by lease stipulation, EnCana will avoid construction or drilling activities within their federal leases from December 1 to April 30 in order to minimize impacts to wintering big game animals. Exceptions to this lease stipulation could be granted for federal surface locations during the last 60-days (i.e., March 1 – April 30) of the timing limitation under mild winter conditions. Severity of winter conditions will be determined on the basis of snow depth, snow crusting, daily mean temperatures, and whether big game were concentrated on winter range within the area during the winter months.

For the pad and access road locations that do not have an identified Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

EnCana will notify all employees that conviction of a major game violation within the GAP area could result in disciplinary action or dismissal (of contractors).

EnCana will not permit hunting and dogs within the Project Area during working hours by employees or contractors.

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

Remote monitoring will be conducted during the winter months to minimize site visits to pad locations and reduce traffic impacts to wintering big game wildlife. In addition, scheduled winter visits (those other than for emergency purposes), should be scheduled between 10 a.m. and 3 p.m. to further minimize disturbance to wintering big game wildlife.

Threatened, Endangered and Sensitive Species:

Any discoveries of previously unknown bald eagle nesting or roosting sites would be addressed by application of the appropriate stipulations and consultation with the USFWS prior to commencement of development activities.

Biological inventories (surveys) for sensitive plant species will be conducted in potential new disturbance areas not covered in the GAP EA.

Mitigation of impacts to special status plants would include 1) relocating gas activities and facilities to minimize direct impacts; 2) requiring EnCana to seed the well pads with native species, including species that provide direct competition with cheatgrass, such as bottlebrush squirreltail, and/or Sandberg bluegrass; 3) ensuring that seeding occurs at the appropriate time of

year to optimize the potential for seeding success; and 4) requiring EnCana to control all noxious weeds within the disturbed areas.

Vegetation:

Where road, pipeline or pad construction requires the removal of pinyon pine trees between late March to early November, the trees will be disposed of within 24 hours of disturbance in the following manner to avoid attracting pinyon *Ips* beetles into live standing trees and mitigate effects of ongoing *Ips* beetle infestation in the local area: (1) broken down with earthmoving equipment and buried in excess material pile or at toe of fillslopes; (2) cut down, sectioned and chipped with Hydroaxe-type equipment capable of chipping large pinyon trees; or (3) cut and removed trees from BLM land and hauled to Colorado State Forest Service-approved disposal site.

Visual Resources:

To help mitigate the contrast of bare, re-contoured slopes, reclamation will 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 will not be placed in visually exposed locations (i.e., they will be located against backdrops or cut side of pad) and will be placed to allow the maximum re-shaping of cut and fill slopes. Furthermore, all above ground facilities will be painted Shale Green (Munsell 5Y 4/2) to blend with the existing landscape.

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.

Wastes, Hazardous or Solid:

Any release (leaks or spills) of hazardous substances in excess of the reportable quantity, as established by 40 CFR, Part 117, would 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 would be furnished to the BLM and all other appropriate federal and state agencies. In addition, all releases to soil or water of 10 gallons or more of any substance would be immediately reported verbally to the BLM and COGCC compliance officers and proof of cleanup provided for the project record. This mitigation would be applied at all stages of the project including drilling, completion, operation, and abandonment of the wells.

Water Quality, Surface and Ground:

EnCana will implement aggressive reclamation and re-vegetation of disturbed areas not needed for operational activities. In addition EnCana will implement multiple BMPs including the following: New access roads will be crowned and ditched to allow water to flow off the road surface to reduce volume and velocity. Relief ditches will be installed at regular intervals to direct drainage off of the road grade and into vegetated areas, where it would infiltrate into the ground and/or sediment would settle out on the surface.

Ditches will be allowed to vegetate and/or will include large 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 will be installed nearly perpendicular to the flow direction of the ditch to reduce runoff velocity and settle out. EnCana's

road construction plans will identify specific locations of drainage features and BMPs for approval by the BLM prior to construction.

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 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 would 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 would be cemented off as required in the Master APD. For these zones, cementing would be used from 50 feet above to 50 feet below each water-bearing zone.

After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD.

All vehicles would be refueled at least 100 feet from stream channels.

EnCana would consult with the Army Corps of Engineers (for Section 404 permits) and with the State of Colorado Water Quality Control Division (for stormwater permits) prior to commencing construction activities within the OUGA. Written documentation to the BLM would be required to indicate that appropriate permits have been obtained or are not required by the authorizing agency.

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

In accordance with EnCana'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 will 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 will be maintained between the road and the drainage to filter runoff from the road before it reaches the creek, wherever possible.

Reclamation Plan.

Refer to Appendix I. Surface Reclamation of the 6/98 GSFO's Draft Supplemental EIS for Oil & Gas Leasing Development (pages I-1 through I-8) for specific reclamation goals, objectives, timelines, measures and monitoring methods. These guidelines will be followed in completing the reclamation of disturbed surfaces on well pads, access roads and pipelines.

Some effective practices that will be implemented during reclamation include, but are not limited to: proper siting of the well pad to minimize impacts, the immediate seeding of disturbed areas after construction, proper storage and redistribution of topsoil, reshaping cut and fill slopes, seeding with specified seed mix within the first available growing season after disturbance, deep ripping (>18 inches on 2 foot centers), fencing reclaimed areas to protect from livestock use, and the use of riprap, slash or other erosion control structures to help control sediment loss.

The 4 Reclamation Categories defined on Page I-8 of Appendix I (6/98 GSFO’s Draft Supplemental EIS for Oil & Gas Leasing Development) will be used in gauging the progress of reclamation monitoring.

Seed Mix Application Practices

The specified seed mix designed to meet interim reclamation standards while providing forage and browse for wintering elk and deer using a mixture of shrub, grass and forb species shall be applied. The following seed mix and rates will be used on all disturbed surfaces, including pipelines unless otherwise noted in the specific APD:

Species of Seed	Variety	Application Rate (PLS lbs/ac)
Mountain big sagebrush		0.5
True Mountain mahogany		2.0
Western wheatgrass	Arriba	3.0
Bottlebrush squirreltail		2.0
Indian ricegrass	Paloma	1.5
Prairie junegrass		1.5
Arrowleaf balsamroot		0.5
American vetch		1.0
Total		12.0

The seed mix may be modified with approval from the BLM based on site-specific conditions, the identification of additional useful species for site stabilization, cheatgrass competition, and winter wildlife habitat needs, species success in past revegetation efforts, and seed availability and cost. Native species will be used unless they are proven unsuitable for meeting BLM’s reclamation objectives.) Reclamation would be considered successful when the objectives described in the Glenwood Springs Resource Area Reclamation Policy are achieved.

The above rate of application is listed in pounds of pure live seed (PLS)/acre. The seed will be certified and there will be no primary or secondary noxious weeds in the seed mixture. The operator shall notify the Authorized Officer 24 hours prior to seeding and shall provide evidence of certification of the seed mix to the Authorized Officer within 30 days of completion of the seed application.

Upon completion of backfilling, leveling, ripping to minimum 18-inch depth on 2-foot centers, and recontouring, the stockpiled topsoil will be evenly spread over the reclaimed areas(s). Prior to reseeding, all disturbed surfaces will be scarified and left with a rough surface. No depressions will be left that would trap water and form ponds.

The prepared seedbed will be seeded within 24 hours after completing dirt work unless a change is requested by the operator and approved by the Authorized Officer. Prepare the seedbed by contour cultivating 4-6 inches deep. Drill seed ¼ to ½ inch deep following the contour. In areas that cannot be drilled, broadcast seed at 1½ times the application rate and cover ½ to 1 inch deep with a harrow or drag bar. All seeding will be conducted after September 1 and prior to ground frost. Spring seeding will be done after the frost leaves the ground and no later than May 15th. If the seeding is unsuccessful, operator will be required to make subsequent seedings until the reclamation objectives identified in Appendix I. Surface Reclamation of the 6/98 GSFO’s Draft Supplemental EIS for Oil & Gas Leasing Development are met.

The reclamation contractor will utilize a seed drill capable of correctly planting the various types of seeds included in the specified seed mixes.

For seed planted using broadcast methods (e.g., sagebrush), raking or harrowing immediately before and after seeding will be necessary to ensure adequate seed/soil contact. For best success, broadcast seeding of sagebrush in strips is recommended.

Areas being reclaimed will be fenced (using fence type approved by Authorized Officer) to exclude livestock for the first two growing seasons or until the seeded species have established. Species will be considered established when 50 percent of the seeded species are producing seed.

Erosion Control Practices

The cut and fill slopes will be protected against rilling and erosion with measures such as water bars, lateral furrows, or other measures approved by the Authorized Officer. Weed free straw bales, straw “wattles”, straw matting or a well-anchored fabric silt fence will be used on cuts and fill slopes to protect against soil erosion.

Topsoil Practices

During well pad, road and/or pipeline construction, topsoil will be stripped to a minimum depth of 6 inches and segregated from other subsurface material piles, i.e. excess material from reserve pit construction. If topsoil is less than 6 inches, the top 6 inches of surface material will be stripped and piled. The topsoil piles will be seeded within 48 hours of stockpiling.

Site Protection Practices

Reclaimed areas will be fenced to exclude livestock until seeded species have established. The Authorized Officer will approve the type of fencing. Fencing shall be to BLM standards

The operator will submit an annual reclamation report by December 31 to the Authorized Officer. The report will document compliance with all aspects of the reclamation objectives. The report will specify if the reclamation objectives are likely to be achieved and actions needed to meet these objectives.

Down Hole - Standard Conditions of Approval

NOTIFICATION REQUIREMENTS

Location Construction-		at least forty-eight (48) hours prior to construction of location and access roads.
Spud Notice	-	at least twenty-four (24) hours prior to spudding the well.
Casing String and Cementing	-	at least twenty-four (24) hours prior to running casing and cementing all casing strings.
BOP and Related Equipment Tests	-	at least twenty-four (24) hours prior to initiating pressure tests.
First Production Notice-		within five (5) business days after new well begins, or production resumes after well has been off production for more than ninety (90) days.
Reclamation		At least (24) hours prior to re-shaping the well pad.

For more specific details on notification requirements, please check the Conditions of Approval for Notice to Drill and Surface Use Program.

REGULATORY REMINDERS

Approval of this application does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease, which would entitle the applicant to conduct operations thereon.

All lease and/or unit operations will be conducted in such a manner that full compliance is made with applicable laws, regulations (43 CFR 3100), Onshore Oil and Gas Orders, and the approved plan of operations. The operator is fully responsible for the actions of his subcontractors.

A copy of the approved application for permit to drill (APD), including the conditions of approval and accompanying surface use plan will be furnished to the field representative by the operator to insure compliance and will be available to authorized personnel at the drill site whenever active construction or drilling operations are underway.

Fire restrictions may be in effect when location is being constructed and/or when well is being drilled. Contact the appropriate Surface Management Agency for information.

A. DRILLING PROGRAM

All operations, unless otherwise specifically approved in the APD, must be conducted in accordance with Onshore Oil and Gas Order No. 2.

1. Estimated Depth at Which Oil, Gas, Water, or Other Mineral Bearing Zones are Expected to be Encountered

Any usable water zones encountered below the surface casing shall be isolated and or protected by cementing across the zone. The minimum requirement is to cement from 50 feet above to 50 feet below each usable water zone encountered.

If gas is found to be present in the Wasatch formation, then the zone will need to be isolated either by the primary cement job or remedial cementing.

2. Pressure Control Equipment

The BOP and related equipment shall meet the minimum requirements of Onshore Oil and Gas Order No. 2 for equipment and testing requirements, procedures, etc., for a 3M system and individual components shall be operable as designed. Chart recorders shall be used for all pressure tests.

3. Casing Program and Auxiliary Equipment

The surface casing **shall** be cemented back to surface either during the primary cement job or by remedial cementing. Leak-off tests of the casing shoe will be performed and recorded for all wells.

4. Mud Program and Circulating Medium

Hazardous substances specifically listed by the EPA as a hazardous waste or demonstrating a characteristic of a hazardous waste will not be used in drilling, testing, or completion operations.

No chromate additives will be used in the mud system on Federal and Indian lands without prior BLM approval to ensure adequate protection of fresh water aquifers.

5. Coring, Logging and Testing Program

Daily drilling and completion progress reports shall be submitted to this office on a weekly basis.

All Drill Stem tests (DST) shall be accomplished during daylight hours, unless specific approval to start during other hours is obtained from the AO. However, DSTs may be allowed to continue at night if the test was initiated during daylight

hours and the rate of flow is stabilized and if adequate lighting is available (i.e., lighting which is adequate for visibility and vapor proof for safe operations). Packers can be released, but tripping should not begin before daylight unless prior approval is obtained from the AO.

A cement bond log (CBL) will be run from the production casing shoe to **TOC** and shall be utilized to determine the bond quality for the production casing.

Whether the well is completed as a dry hole or as a producer, "Well Completion and Recompletion Report and Log" (Form 3160-4) will be submitted not later than 30 days after completion of the well or after completion of operations being performed, in accordance with 43 CFR 3164. **One** copy of all logs, core descriptions, core analyses, well-test data, geologic summaries, sample description, 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 AO.

6. Notifications of Operations

No location will be constructed or moved, no well will be plugged, and no drilling or workover equipment will be removed from a well to be placed in a suspended status without prior approval of the AO. If operations are to be suspended, prior approval of the AO will be obtained and notification given before resumption of operations.

The Glenwood Springs Field Office shall be notified, during regular work hours (7:45 a.m.-4:30 p.m., Monday through Friday except holidays), at least 24 hours **prior** to spudding the well.

Operator shall report production data to MMS pursuant to 30 CFR 216.5 using form MMS/3160.

The date on which production is commenced or resumed will be construed for oil wells as the date on which liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank, and for which a run ticket is required to be generated or, the date on which liquid hydrocarbons are first produced into a permanent storage facility, whichever first occurs; and, for gas wells as the date on which associated liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank, and for which a run ticket is required to be generated or, the date on which gas is first measured through permanent metering facilities, whichever first occurs.

Should the well be successfully completed for production, the AO will be notified when the well is placed in a producing status. Such notification will be sent by

telegram or other written communication, not later than five (5) days following the date on which the well is placed on production.

A schematic facilities diagram as required by 43 CFR 3162.7-5 (b.9. d.), and shall be submitted to the appropriate District Office within sixty (60) days of installation or first production, whichever occurs first. All site security regulations as specified in Onshore Oil & Gas Order No. 3 shall be adhered to. All product lines entering and leaving hydrocarbon storage tanks will be effectively sealed in accordance with 43 CFR 3162.7-5 (b. 4).

No well abandonment operations will be commenced without the prior approval of the AO. In the case of newly drilled dry holes or failures, and in emergency situations, oral approval will be obtained from the AO. A "Subsequent Report of Abandonment" Form 3160-5, will be filed with the AO within thirty (30) days following completion of the well for abandonment. This report will indicate where plugs were placed and the current status of surface restoration. Final abandonment will not be approved until the surface reclamation work required by the approved APD or approved abandonment notice has been completed to the satisfaction of the AO or his representative, or the appropriate Surface Managing Agency.

7. Other Information

All loading lines will be placed inside the berm surrounding the tank battery.

All off-lease storage, off-lease measurement, or commingling on-lease or off-lease will have prior written approval from the AO.

All open-vent exhaust stacks associated with heater-treater, separator, and dehydrator units must be constructed to prevent birds and bats from entering them and to the extent practical to discourage perching and nesting.

The oil and gas measurement facilities will be installed on the well location. The oil and gas meters will be calibrated in place prior to any deliveries. Tests for meter accuracy will be conducted following initial installation and at least quarterly thereafter. The AO will be provided with a date and time for the initial meter calibration and all future meter-proving schedules. A copy of the meter calibration reports will be submitted to the Grand Junction Field Office. All meter measurement facilities will conform to Onshore Oil & Gas Order No. 4 for liquid hydrocarbons and Onshore Oil & Gas Order No. 5 for natural gas measurement.

The use of materials under BLM jurisdiction will conform to 43 CFR 3610.2-3.

There will be no deviation from the proposed drilling and/or workover program without prior approval from the AO. Safe drilling and operating practices must be observed. All

wells, whether drilling, producing, suspended, or abandoned will be identified in accordance with 43 CFR 3162.

"Sundry Notice and Report on Wells" (Form 3160-5) will be filed for approval for all changes of plans and other operations in accordance with 43 CFR 3162.3-2.

Section 102(b)(3) of the Federal Oil and Gas Royalty Management Act of 1982, as implemented by the applicable provisions of the operating regulations at Title 43 CFR 3162.4-1(c), requires that "not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in the case of a well which has been off production for more than 90 days, the operator shall notify the authorized officer by letter or sundry notice, Form 3160-5, or orally to be followed by a letter or sundry notice, of the date on which such production has begun or resumed."

If you fail to comply with this requirement in the manner and time allowed, you shall be liable for a civil penalty of up to \$10,000 per violation for each day such violation continues, not to exceed a maximum of 20 days. See Section 109(c)(3) of the Federal Oil and Gas Royalty Management Act of 1982 and the implementing regulations at Title 43 CFR 3162.4-1(b)(5)(ii).

In the event after-hours approval or notification is necessary, please contact one of the following individuals:

Marty O'Mara Petroleum Engineer		C: 970.319.5837 W: 970.947.2825
Jerry Francis Petroleum Engineering Tech.	H: 970.242.8410	W: 970.244.3043 C: 970.250.5735
Carol Snyder Petroleum Engineering Tech.	H: 970.255.9339	W: 970.244.3033 C: 970.216.6146
Jim Byers Natural Resource Specialist		W: 970.947.2804
BLM Fax: 970.947.2829		

APPENDIX C

**SITE-SPECIFIC CONDITIONS OF APPROVAL
for the GANT GULCH GAP**

C36W Pad

New wells:	1-2	1-3	1-4
	36-13C	36-14C	36-15C
	36-13	36-14	36-15
	25-15C	25-14C	36-10C
	36-11C		

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.

D2SW Pad

New wells: 2-2 2-3 2-4

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping, which clearly identifies the well location and access road within these crucial winter ranges.
3. This well is on Federal surface with rating of VRM Class III. To reduce visual impacts, relocate/shift pad 100-150 feet east and downhill. Delete the planned switchback for access road and swing road into pad from NE. In order to mitigate long term contrasts within the landscape and enhance reclamation efforts, move all facilities for this pad north 2500 feet to the N26W pad. Matting and/or hydro-seeding may also be necessary to reduce a high degree of color contrast.
4. Maintain usable access route for existing 2-track that bisects the proposed pad.

D25W Pad

New wells:	25-3	24-4	25-4
	25-4C	25-5	26-1
	26-1	26-8	26-1C
	23-16	23-16C	

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The Controlled Surface Use stipulation is in effect for the wells on this lease to protect VRM Class II visual resource management areas.
3. The Controlled Surface Use stipulation is in effect on this lease to protect fragile soils.
4. The stipulation for lease # C-54738 for protecting big game winter habitat is the timing limitation from December 1 to April 30. Exception may be allowed for the last 60 days, if mild winter conditions exist.
5. This well pad is on Federal surface and is rated as VRM Class III. To minimize visual impact, reduce excess spoil material from SE edge of the pile (30,000 cu yd) down to 13,000 cu yd pile SW of pad near access road if too much excess is piled between D25W and M24W. Create enough room on D25W to set all tanks for both pads on D25W. This will increase reclamation potential on M24W and reduce overall total disturbed area.

Efforts should be made to minimize disturbance to the trees on the Eastern, Northern and Western sides of pads M24W and D25W. In order to minimize long term contrasts and possible visibility from KOPs below, the facilities for these two pads should be co-located and carefully placed at a location that will not be visible from valley floor (location to be determined after pad construction).

6. For the Fall 2005 drilling work, a steel frame gate will be installed and gatekeeper will also be positioned at the proposed gate location along the D25W/M24W access road near the boundaries of Pitman, Couey 1 and Shideler Ind allotments. To mitigate potential trespass problems between livestock allotments, EnCana will install and test an automatic opening/closing gate along the D25W/M24W access road near the boundaries of Pitman, Couey 1 and Shideler Ind allotments. The “automatic” gate will be installed prior the Spring 2006 drilling operations.

Prior to Spring 2006 livestock turnout (provided construction work is allowed outside winter timing limitation period), EnCana will construct and maintain livestock fence (final location to be determined by field review with livestock permittees, EnCana and BLM personnel) that would separate Pitman and Couey 1 allotments.

F26W Pad

New wells: 26-7 26-6 26-10

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The Controlled Surface Use Stipulation for lease # C-54738 would protect Class II visual resource management areas.
3. The Controlled Surface Use stipulation is in effect on this lease to protect fragile soils.
4. The stipulation for lease # C-54738 for protecting big game winter habitat is the timing limitation from December 1 to April 30. Exception may be allowed for the last 60 days, if mild winter conditions exist.
5. The stock pond southwest of the pad below access road will need protection – use soil BMPs to protect pond from siltation.
6. EnCana will construct and maintain livestock fence (final location to be determined by field review with livestock permittees, EnCana and BLM personnel) that would separate Pitman and Couey 1 allotments.

G1SW Pad
(Existing location)

New wells:	1-1	1-1C	1-2C
	1-3C	1-8	1-8C
	1-9	1-10B	1-10

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.

I27W Pad

New wells: 26-5 26-12

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The stipulation for lease # COC-55605 is Controlled Surface Use to protect fragile soils.
3. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
4. Additional cultural inventory would be required if the pipeline/access roads to the C2SW, N26W, I27W, P27W, and K2SW are constructed to a width that exceeds 75 feet. These routes were inventoried to cover corridors 100 feet wide, so that the current level of inventory will probably only accommodate an access road or pipeline right-of-way, but not both, along these segments of the proposed APE.
5. Sheet 7 shows storage tanks placed at edge of fill. Move tank settings so they are further south toward road access onto pad and away from fill slope. This will allow for optimal interim reclamation opportunities and mitigate visual concerns.

I2SW Pad

New wells: 1-11 1-12C

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
3. On the H2SW and I2SW well pads, the Timing Limitation listed on Lease #COC-55605 will apply to protect an active red-tailed hawk nest identified during the raptor survey. The TL will apply until young have been documented, by a qualified biologist, as having fledged and dispersed from the nest, or August 15th – whichever occurs first.
4. Protect existing range fence south of the well pad. Maintain accessibility to the 2-track road south of pad.

J6SE Pad

**New wells: 6-11 6-10 6-6
6-6C**

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The timing limitation for Game Species for lease # C-51156 specifies that no surface use would be allowed between January 16 through April 29 to protect critical deer and elk winter range.
3. In order to reduce the impacts of a linear line within the landscape, the access road (on federal surface) associated with J6SE should be moved to the south and east to follow the contours of the existing vegetation/tree line.
4. Move the tank setting north towards road access onto the pad. Avoid tank placement on fill to optimize reclamation potentials. Pinyon pines within proposed pad disturbance will be chipped within 24 hours of grubbing or cutting, or buried in the excess material pile.

K19E Pad

New wells:	24-8	24-8C	24-9
	24-9C	24-16	24-16D
	19-11	19-11D	19-14
	19-14C		

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The timing limitation for Game Species for lease # C-56258 specifies that no surface use would be allowed between January 16 through April 29 to protect critical deer and elk winter range.
3. Matting and/or hydro-seeding will be used during interim reclamation work to stabilize the tall cutslopes, ensure suitable seed establishment and mitigate visual concerns from County Road 316.
4. Install adequately sized culvert (based on ACE consultation) in dry gulch for proposed road. Push up berm near top of cutslope during topsoil clearing to create barrier that directs off-site run-off away from pad.
5. To reduce height of proposed cutslopes and overall width of pad, cutslope along south end of pad will run from PT 7 to PT 6, then east to midpoint between PIT A and PIT B corners effectively deleting PT 4 and PT 5. Wells on pad would be drilled with closed-loop system, foregoing need for reserve pit. If reserve pit is deemed necessary, it would be narrowed and lengthened to fit into changed pad layout as described herein. Frac pit could be constructed on pad at SW corner after drilling is completed. A temporary surface water line could also be run to nearby F19 pad where frac tanks could be staged in support of completion work on K19E wells.

K2SW Pad

New wells: 2-10C 2-11 2-12C

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
3. Additional cultural inventory will be required if the pipeline/access roads to the C2SW, N26W, I27W, P27W, and K2SW are construction to a width that exceeds 75 feet. As stated earlier these routes were inventoried to cover corridors 100 feet wide, so that the current level of inventory will probably only accommodate an access road or pipeline right-of-way, but not both, along these segments of the proposed APE.
4. On the K2SW pad, a 60-day timing limitation will be enforced (between February 1 and August 15) to protect the above-mentioned active red-tailed hawk nest identified during the raptor survey. The TL will apply until young have been documented by a qualified biologist as having fledged and dispersed from the nest, or August 15th – whichever occurs first.
5. Monitoring by qualified paleontologist will be required within 200 feet of the known fossil localities (5GF3715 and 5GF3716) which fall generally within vicinity of the H2SW well pad and access road and the access road to the K2SW pad. This supports recommendations by Uinta Paleontological Associates, Inc. outlined in Field Survey Reports for I2SW and K2SW pads. If significant fossil resources are found during the monitoring, they will be collected and curated at the University of Colorado Museum.
6. Construct low water crossing along existing road from H2SW instead of culvert installations. Install adequately-sized culvert (based on ACE consultation) in the deep gully located just south of proposed pad. Reduce the reserve pit width (by 30-40 feet) at the north side between PIT B and PIT C to maintain adequate space between existing drainage directly north of pad. Construct adequate berm against south edge of creek with overburden to deflect any creek flows away from reserve pit.

M23W Pad

New wells: 23-13 26-4

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The road and pad are visible from CR319 and lie within the VRM Class II area. The current Proposed Action for the M23W and N23W and associated access road does not meet VRM Class II objectives. No mitigation has yet been developed that will bring the M23W and N23W wells or access road into conformance. Adopt recommendations for visual mitigation being developed by Otak.
3. The wells in lease #C-52889 have a Controlled Surface Use provision to protect fragile soils.
4. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
5. Install adequately –sized culvert (based on ACE consultation) in the dry gulch for the proposed road.
6. Push up berm near top of cut-slope during topsoil clearing to create barrier that directs off-site run-off away from pad.

M24W Pad

New wells:	24-11C	24-15	24-10C
	24-12	24-12C	24-13
	24-13C	24-14	24-14C

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The stipulation on lease # C-54738 for protecting big game winter habitat is the timing limitation from December 1 to April 30. Exception may be allowed for the last 60 days, if mild winter conditions exist.
3. The wells on lease #C-54738 include a Controlled Surface Use stipulation to protect Class II visual resource management areas.
4. The wells on lease #C-54738 include a Controlled Surface Use stipulation to protect fragile soils.
5. Efforts should be made to minimize disturbance to the trees on the Eastern, Northern and Western sides of pads M24W and D25W. In order to minimize long term contrasts and possible visibility from KOPs below, the facilities for these two pads should be co-located and carefully placed at a location that will not be visible from valley floor (location to be determined after pad construction).
6. Chip or bury pinyon pines within proposed pad disturbance area within 24 hours of grubbing or cutting. Relocate excess material pile (6,000 cy) proposed for SE side of pad to an area directly north of reserve pit – minimize disturbance of standing trees on east, north and west side of pad.
7. To mitigate potential livestock trespass problems between livestock allotments, EnCana will install and test a solar powered gate along the D25W/M24W access road near the boundaries of Pitman, Couey 1 and Shideler Ind allotments. A gatekeeper will also be positioned at this gate location during any drilling work on the D25W or M24W pads to ensure gate security.
8. EnCana will construct and maintain livestock fence (final location to be determined by field review with livestock permittees, EnCana and BLM personnel) that would separate Pitman and Couey 1 allotments.

N23W Pad

New wells:	23-15	23-10	23-11A
	23-11D	23-10C	23-14
	26-2	26-2	

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The stipulation on lease # C-54738 for protecting big game winter habitat is a timing limitation from December 1 to April 30. Exception may be allowed for the last 60 days, if mild winter conditions exist.
3. The current proposed action for the M23W and N23W and associated access road does not meet VRM Class II objectives. No mitigation has yet been developed that will bring the M23W and N23W wells or access road into conformance. Re-locate facilities to M23W pad. Adopt recommendations for visual mitigation being developed by Otak.
4. The wells in lease #C-52889 have a Controlled Surface Use provision to protect fragile soils.

N26W Pad

New wells: 26-14

26-15

35-10C

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. The wells on lease #C-52889 include a Controlled Surface Use stipulation to protect Class II visual resource management areas. To reduce the visibility of production facilities from visibility corridors, facilities will not be placed in visually exposed locations. Rather, facilities will be placed against backdrops or cut sides of pads and will be placed to allow the maximum re-shaping of cut and fill slopes.
3. The wells on lease #C-52889 include a Controlled Surface Use stipulation to protect fragile soils.
4. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
5. Additional cultural inventory will be required if the pipeline/access roads to the C2SW, N26W, I27W, P27W, and K2SW are construction to a width that exceeds 75 feet. As stated earlier these routes were inventoried to cover corridors 100 feet wide, so that the current level of inventory will probably only accommodate an access road or pipeline right-of-way, but not both, along these segments of the proposed APE.
6. Install steel frame gate (based on input from livestock permittees) where proposed road bisects grazing allotment fence just east of pad.
7. During pad construction, room will be provided for additional tanks and production pack settings supporting the wells on D2SW pad (facilities for D2SW wells will be co-located on N26W pad to mitigate visual concerns with D2SW pad).

O31E Pad

New wells: **6-3C (3960' FSL)** **6-3C (4620' FSL)**
 34-14 **31-15**

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.

P26W Pad

**New wells: 25-13C 26-9 26-16
35-9C 36-12C**

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.

2. If any portion of the P26W pad falls onto BLM surface, the following winter timing limitation will be invoked:
Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.

3. Since an active Cooper’s hawk nest is located adjacent (within 1/8 mile) to the proposed P26W pad, a survey will be conducted by May 15 to determine the status and use of the nest. Unless this nest is not active next breeding/nesting season by May 15, or unless evidence is presented that shows how the geographical relationship to the nest site of topographic barriers and vegetative screening sufficiently hides/protects the nest, this pad will have to be moved 200 meters and/or the implementation of a 60 day timing limitation (if pad lies within ¼ mile of nest) to mitigate the proximity of proposed pad to the nest.

P27W Pad

New wells: 26-13

27-16

35-12C

1. Standard Conditions of Approval outlined in Appendix B of the Gant Gulch GAP will apply and remain in full force and effect.
2. Although there is no specific Timing Limitation for Big Game Winter Habitats listed in the Lease, the 60 day Condition of Approval for Big Game Habitat identified in Appendix D-1 in the GSRA Oil & Gas Final SEIS (approved March 24, 1999) will be invoked. This COA states: “To protect crucial big game winter range on leases without timing restrictions, construction and drilling activities are prohibited from January 15 through March 15.” The rationale for invoking this COA is based on field review and the updated Colorado Division of Wildlife Big Game Winter Habitat mapping which clearly identifies the well location and access road within these crucial winter ranges.
3. Additional cultural inventory will be required if the pipeline/access roads to the C2SW, N26W, I27W, P27W, and K2SW are construction to a width that exceeds 75 feet. As stated earlier these routes were inventoried to cover corridors 100 feet wide, so that the current level of inventory will probably only accommodate an access road or pipeline right-of-way, but not both, along these segments of the proposed APE.
4. To reduce the visibility of production facilities from visibility corridors, facilities will not be placed in visually exposed locations. Rather, facilities will be placed against backdrops or cut sides of pads and will be placed to allow the maximum re-shaping of cut and fill slopes.

APPENDIX D

**SURVEY PLAT INFORMATION
for the GANT GULCH GAP**

Detailed survey plat information for the new well pads and associated wells requiring federal authorization is available for review from the BLM Glenwood Springs Field Office upon request.

APPENDIX E

**WILDLIFE THRESHOLD CALCULATIONS
for the
GANT GULCH GAP**

WILDLIFE THRESHOLD CALCULATIONS for the GANT GULCH GAP

ACREAGE:

Total BLM surface ac = 2612 ac

Total split estate involving federal minerals = 132 ac

Total FEDERAL acres in GAP area: **2,744 ac**

Total federal (2,744) and fee (285) ac within GAP boundary: **3,029 ac**

PROPOSED PADS:

13 BLM surface locations

4 Split Estate Locations = **17 proposed pads with BLM involvement**

PAD THRESHOLD

FEDERAL LANDS:

2,744 ac/640 ac per section = 4.29 'sections' x 4 pads/section = **17.16 pads allowed under threshold.**

13 proposed federal pads + 0 existing federal pads = 13 BLM pads in GAP boundary.

ALL LANDS: (Cumulative effects)

3029 ac/640 ac = 4.73 'sections' x 4 pads/section = **18.92 pads allowed under threshold figure.**

13 proposed federal pads + 0 existing federal pads + 1 existing and 4 proposed fee pads = **18**

ROAD THRESHOLD

FEDERAL LANDS:

4.29 'sections' x 3.0 miles of new roads/section = **12.87 road miles allowed under the threshold.**

5.53 miles of proposed roads and 0.33 miles of existing roads attributed to oil & gas development on federal surface or split estate lands = **5.86 miles of roads within GAP boundary.**

ALL LANDS: (Cumulative Effects)

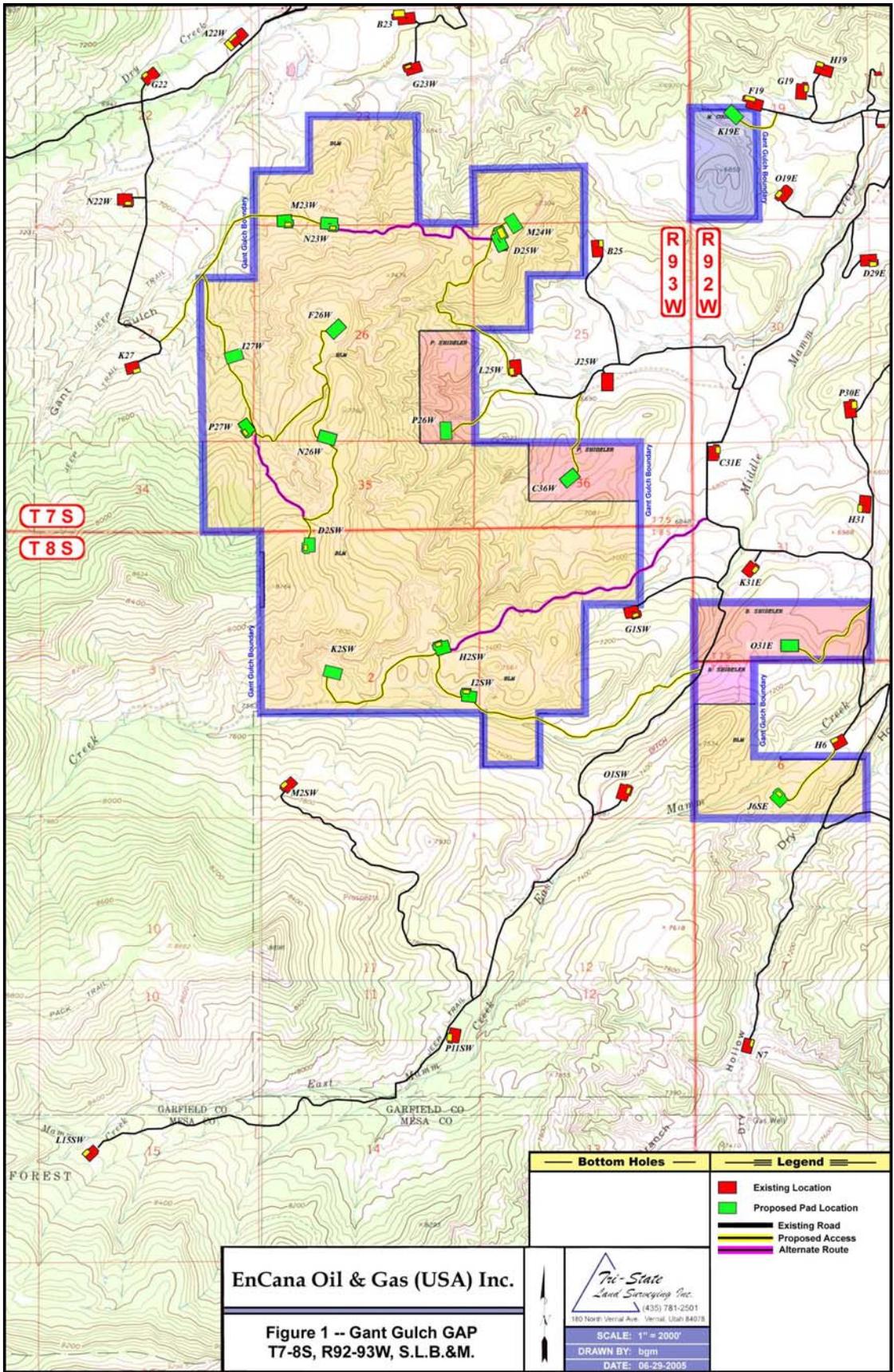
4.73 'sections' x 3.0 miles/section = **14.19 miles allowed under the threshold.**

0.58 miles of existing and 6.38 miles of proposed roads attributed to oil & gas development regardless of land ownership = **6.96 miles of roads within GAP boundary.**

From BLM "Oil and Gas Leasing and Development Final Supplemental Environmental Impact Statement, January 1999, Record of Decision Appendix B, Management of Lease Development - #5. Impacts on Wildlife Habitat. "It is not BLM's intent that O&G operators be held accountable for mitigation of habitat impacts due to residential, agriculture or other commercial users, including impacts associated with highways and county roads.

APPENDIX F

**ORIGINAL GAP MAP (JUNE 2005)
for the
GANT GULCH GAP**



EnCana Oil & Gas (USA) Inc.

**Figure 1 -- Gant Gulch GAP
T7-8S, R92-93W, S.L.B.&M.**

Bottom Holes		Legend	
		■	Existing Location
		■	Proposed Pad Location
			Existing Road
			Proposed Access
			Alternate Route

 Tri-State Land Surveying Inc. (435) 781-2501 180 North Verbal Ave. Vernal, Utah 84078
SCALE: 1" = 2000' DRAWN BY: bgm DATE: 06-29-2005

APPENDIX G
VIEWSHED ANALYSIS
for the
GANT GULCH GAP
(prepared by Otak)