United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Rock Springs Field Office
280 Highway 191 North
Rock Springs, Wyoming 82901

ENVIRONMENTAL ASSESSMENT

BAXTER NATURAL GAS EXPLORATORY PROPOSAL

SWEETWATER COUNTY, WYOMING

#WYW040EA08171

June 10, 2008

The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long-term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness, and natural, scenic, scientific, and cultural values.

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1.0 PURPOSE AND NEED

This Environmental Assessment (EA) for the Baxter Natural Gas Exploratory Proposal (Baxter) has been prepared in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. The EA is tiered to the Bureau of Land Management (BLM) Record of Decision and Green River Resource Management Plan (RMP) (BLM 1997), and the additional documents associated with the RMP. Prior to authorizing gas exploration and well development on BLM-administered lands, the environmental and social effects of those actions must be evaluated on all federal and nonfederal lands within the potentially affected areas. The purpose of this EA is to disclose the potential direct, indirect, and cumulative effects of the Proposed Action and No Action alternative. This EA would be used for evaluation of the alternatives and to make a determination of the need to prepare an Environmental Impact Statement (EIS). The BLM would make its decision based on consideration of the purpose and need for the proposal, the significance of the effects of alternatives, and the public concerns (based on public comments). If impacts are not significant, as defined in 40 Code of Federal Regulations (CFR) 1508.27, a Decision Record (DR) and Finding of No Significant Impact (FONSI) would be prepared. The DR and FONSI along with the final EA would be made available to the public, and a Notice of Availability (NOA) would be published in the local newspaper. If impacts are determined to be significant, the EIS process would be initiated. For this proposal, the responsible official is:

Lance Porter, BLM Field Manager
Bureau of Land Management
Rock Springs Field Office
280 Highway 191 North
Rock Springs, Wyoming 82901

1.1 NEED FOR PROPOSED ACTION

Exploration and development of federal mineral resources by private entities is an integral part of the BLM national energy policy. BLM is authorized to lease the federal lands for oil and gas development under the authority of the Mineral Leasing Act of 1920 (MLA), as amended; the Mining and Minerals Policy Act of 1970 (MMPA); the Federal Land Policy and Management Act of 1976 (FLPMA); the National Materials and Minerals Policy, Research and Development Act of 1980 (NMMPRDA); and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA).

The Proposed Action allows Devon Energy Production Company, L.P. (Devon) to construct, drill, and develop the federally administered minerals located on lease numbers WYW-153235 and WYW-173891. Once the BLM has issued a federal oil and gas lease, which does not have a No Surface Occupancy (NSO) stipulation, and in the absence of a nondiscretionary statutory prohibition against development, the BLM cannot completely deny development on the leasehold. Only Congress has the right to completely prohibit development once a lease has been issued. In order to exercise its lease rights, Devon submitted two Applications for Permit to Drill (APDs) to the BLM Rock Springs Field Office (RSFO) in November, 2007 for exploratory wells in Section 28, Township 13 North, Range 106 West, and in Section 5, Township 14 North, Range 105 West, 6th Principal Meridian (see Figure 1-1). The proposed location of North Well is within the Sage Creek portion of the Greater Red Creek Area of Critical Environmental

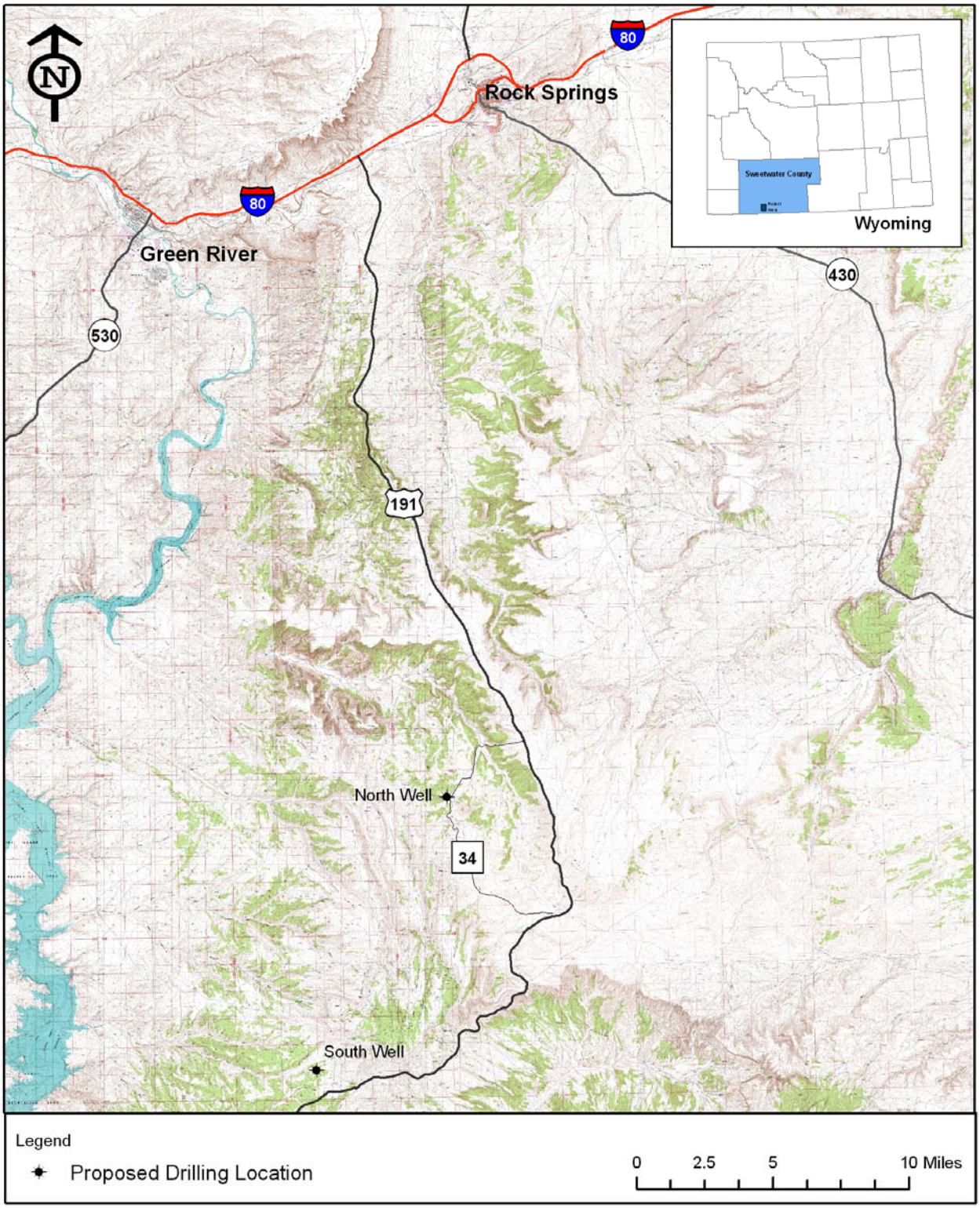

Figure 1-1. Baxter Natural Gas Exploratory Proposal - Vicinity Map and Proposed Well Locations.

Concern (ACEC). The South Well is in the Sugarloaf Basin Special Management Area (SMA). The proposed Baxter exploration wells are needed to effectively evaluate natural gas reserves underlying the leases to determine development potential of the natural gas resources.

This EA is in accordance with NEPA and complies with all statutes and regulations associated with oil and gas exploration and development.

1.2 CONFORMANCE WITH LAND USE PLANS

The RSFO, as required by 43 CFR 1610.5, has determined that the Baxter Proposal conforms to the decisions, guidelines, and terms and conditions in the Record of Decision of the Green River Resource Management Plan (BLM 1997). In addition, the RSFO has determined that the oil and gas exploration under the Proposal meets the management conditions for the Sage Creek portion of the Greater Red Creek ACEC and the Sugarloaf Basin SMA, given the required restrictions and stipulations in the RMP.

1.3 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS

Development of Federal oil and gas leases is an integral part of the BLM oil and gas leasing program under the authority of the MLA of 1920 (30 USC 181 et seq.), the FLPMA of 1976 (43 U.S.C. 1701), the FOOGLRA of 1982 (30 USC 1732 and 1755), and the *FOOGLRA of 1987* (P.L. No. 100-203). The BLM oil and gas leasing program is intended to encourage the development of domestic oil and gas resources, thereby reducing national dependence on foreign energy supplies.

This EA has been prepared in accordance with the NEPA (42 U.S.C. 4321-4347), as amended. The regulatory framework that governs oil and gas drilling, production and abandonment involves a number of policies, legislation, and regulations. The Baxter Proposal has been evaluated in accordance with requirements of *Onshore Oil and Gas Operations* (43 CFR 3160), BLM *Onshore Oil and Gas Order Nos. 1 through 7* (43 CFR 3164), NEPA and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), *BLM Handbook H-1790-1* (BLM 2008), Department of the Interior DM-516 (2004)), and BLM *NEPA Process Desktop Reference* (BLM 1999).

1.4 SCOPING

Due to public interest in this proposal, the scoping process was extended beyond the customary time frame. The scoping process included two public comment periods. The first was a 10-day scoping period from December 5 to December 15, 2007. The second was a 30-day public comment period from January 10, 2008 to February 10, 2008. During the two comment periods 49 letters were received, which included a total of 353 comments. The comments covered a wide range of issues and concerns. Many of the responses expressed concerns about potential impacts from future gas development to wildlife and recreation. The scoping report summary is included as Appendix C to this EA. In addition to written comments, one site visit were held for the public on December 5, 2007, with representatives from Devon, BLM, Wyoming Game and Fish Department, Wyoming Oil and Gas Conservation Commission, and several environmental organizations and interested members of the public in attendance.

1.5 ISSUES

During the scoping process, a BLM interdisciplinary team considered the potential consequences and issues of the Proposal and the No Action alternative on various natural resources. Chapter 3 of this EA

contains a checklist of resources considered, as set out in the Wyoming BLM NEPA Handbook (H-1790). The following are the key issues identified during the scoping process:

- Potential impacts to water quality in streams inhabited the Colorado River cutthroat trout, an important recreational species.
- Well sites may not be accessible in the winter due to closure of U.S. Highway 191 and County Roads (CR) 34 and 36.
- Potential impacts to livestock.
- Potential weed infestation as a result of ground disturbance.
- Air emissions from vehicles, rigs, and flare stacks during drilling.
- Potential for contamination of groundwater aquifers.
- Potential for contamination in important groundwater recharge areas.
- Potential for increased erosion and slope stability impacts.
- Potential visual impact to the historic Cherokee Trail.
- Potential visual impacts of the wells to the public.
- Potential disruption of deer and elk hunting season.
- Potential loss of revenues from hunting, fishing, and dispersed recreation.
- Potential soil erosion and sediment loading to nearby streams.
- Potential loss of pristine backcountry recreational experience.
- Potential impacts to large game species from noise during construction and drilling.
- Concern about reclamation success in areas disturbed during construction and drilling.
- Potential impacts to the Greater Red Creek Area of Critical Environmental Concern (ACEC)
- Potential for impacts to management objectives and decisions for the Sugarloaf Basin Management Area.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and No Action Alternative that are being analyzed as part of the Baxter Proposal.

2.1 PROPOSED ACTION

Devon is proposing to drill two exploratory gas wells on BLM-administered public lands within Sweetwater County, Wyoming (see Figure 2-1in Appendix A). The proposal includes the following actions:

- Construction of well pads;
- Construction of access roads;
- Drilling, completion, and testing of the wells;
- After testing, the wells would be either shut in pending further action or plugged, abandoned, and reclaimed.

Below is a summary of the proposed action:

Table 2-1. Devon's Baxter Proposal

	North Well	South Well
Well Number	Rubicon #16-5-14-105	Rubicon #16-28-13-106
Location (6th P.M.)	Section 5, T14N, R105W	Section 28, T13N, R106W
Qtr Qtr Sec	SESE	SESE
Production	Natural Gas	Natural Gas
New Access Road	1,000 feet/0.77 acres	3,700 feet/2.55 acres
Well pad Size	3.97 acres	3.68 acres
Total Disturbance	4.74 acres	6.23 acres
Well Depth	10,550 feet	16,000 feet
Surface Ownership	Federal – BLM managed	Federal – BLM managed
Mineral Ownership	Federal	Federal
Management Area	Sage Creek portion, Greater Red Creek ACEC	Sugarloaf Basin SMA

Total combined potential disturbance for both well sites is estimated at 10.97 acres.

The Baxter Proposal is defined as a federal undertaking and federal requirements will be applied to ensure protection of the environment. The proposal impacts are primarily on federally administered lands. The proposed access road to the North Well will cross a small portion of private land.

2.1.1 Pre-Proposal Mitigation

Prior to the initiating the Baxter EA, Devon and the BLM examined the location of the well pads and roads with regard to potential impacts to resources of concern. Based on these pre-proposal analyses, changes to the well pad and road locations were made to mitigate for potential impacts to critical resources. Resource considerations and corresponding changes are summarized below.

2.1.1.1 North Well

- Moved the well pad to another location to protect from visual impacts to the Cherokee Trail.
- Based on onsite visual observations, placed the well pad in a draw to avoid any visual impacts to the Cherokee Trail.
- Modified location of well pad and road to avoid crossing any streams or other water courses.
- Moved well pad location to avoid impacting native vegetation.
- Placed location of well pad and road to avoid wildlife stipulations.

2.1.1.2 South Well

- Placed location of well pad and road to avoid wildlife stipulations, except big game crucial winter range timing stipulation.
- Modified location of well pad and road to avoid crossing any streams.
- Moved road location to avoid impacting juniper trees.

- Placed location to minimize impacts to Visual Resource Management stipulation.

2.1.2 Management Objectives

The lands where the proposed wells will be located have been leased under the Green River RMP. The management objective for minerals management of BLM-administered Federal minerals is "*to maintain or enhance opportunities for mineral exploration and development, while protecting other resource values*." According to the RMP oil and gas "*actions to be conducted in the area will be considered and analyzed on a case-by-case basis. Controls may be placed on the amount, sequence, timing, or level of activity or development that may occur to assure that the actions will be consistent with or help to meet the management objectives for the area. This may result in limiting the number of roads and other surface disturbing activities*" (BLM 1997).

2.1.2.1 North Well

The proposed North Well would be located in the Sage Creek portion of the Greater Red Creek Area of Critical Environmental Concern (ACEC). The Green River RMP (BLM 1997) identifies relevance criteria and important values of the Greater Red Creek ACEC. These criteria are described in Section 3.20 and include unstable fragile soils, unique ecological features, watershed and cultural values, and sensitive species of regional, national, and international importance.

2.1.2.2 South Well

The management objectives for the South Well containing Sugarloaf Basin SMA include: 1) improve watershed condition and enhance watershed values; 2) improve riparian areas to proper functioning condition, as a minimum; 3) provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives; and 4) maintain and protect important wildlife habitat (BLM 1997). In addition, this is a right-of-way avoidance area (BLM 1997).

2.1.3 Lease Stipulations

Both proposed well sites are subject to BLM lease stipulations. The lease stipulations include Controlled Surface Use (CSU), Timing Limitation Stipulation (TLS), and a special lease stipulation. Controlled surface use refers to an oil and gas stipulation that allows use and occupancy (unless restricted by another stipulation), but that requires special operational constraints that may modify the lease rights, for identified resource values. Controlled surface use serves as operating guidance, not as a substitute for the NSO or timing limitation stipulations. This term is also applied to surface use activities other than oil and gas. It is the definition of controlled surface use that supports the No Action Alternative and the option of denying the proposed action.

Below is a summary of the lease stipulations for the proposed wells. The lease stipulations, as written in the leases, are provided in Appendix D.

2.1.3.1 North Well

1. Surface occupancy may be restricted within ¼ mile of or in the visual horizon of the Cherokee Trail (whichever is closer) in order to protect cultural and scenic values. The

operator must arrive at an acceptable mitigation plan to offset the anticipated impacts with the RSFO prior to receiving BLM approval.

2. Surface occupancy may be restricted within the Sage Creek Management Area to protect wildlife, recreation, and watershed resources. The operator must develop an acceptable mitigation plan to offset the anticipated impacts with the RSFO prior to receiving BLM approval.

2.1.3.2 South Well

1. Lease area may contain protected historic properties and/or resources. The operator must complete its obligations under applicable regulations prior to receiving BLM approval. The BLM may require modifications to protect such properties.
2. There is a no surface disturbance stipulation from November 15 to April 30 for big game critical winter range.
3. Surface occupancy may be restricted within the Sugarloaf Basin area to protect steep slopes, visual resources, recreation, watershed, cultural, and wildlife values. The operator must arrive at an acceptable mitigation plan to offset the anticipated impacts with the RSFO prior to receiving BLM approval.
4. This lease area may contain threatened, endangered, or other special status species or their habitats. BLM may modify or reject activities in order to further conservation and management objectives and to avoid activities that will contribute to a listing of species or their habitat. Also the BLM must complete its obligations under the Federal Endangered Species Act and State regulations prior to approving any ground disturbing activities that may impact the sage sparrow, Ownbey's thistle, pygmy rabbit, loggerhead shrike, sage thrasher, Ute ladies'-tresses, and swift fox.

2.1.4 Access Road Construction

To the extent practicable, existing roads will be used to gain access to the proposed well sites. Construction of new roads will occur only when necessary. All construction activities are expected to begin after approval of the APDs.

The new access road sections will be constructed to BLM standards as a resource road in accordance with the *Surface Operating Standards for Oil and Gas Exploration and Development Gold Book* (Gold Book) (BLM and USFS 2007, Revised). The road will be completed, compacted, and surfaced prior to moving drilling equipment to the location. The road will be a crowned and ditched single lane 16-foot subgrade road with ditches designed to carry away water and prevent saturation of the subgrade and surfacing materials. Runoff and erosion control measures, such as water bars, berms, and interceptor ditches, would be installed as specified in Chapter 4 of the Gold Book and at the direction of the BLM Authorized Officer. Eighteen inch culverts with minimum 24" extension beyond the fill slopes will be added, as needed. The road grade will not exceed 8 percent. No turnouts, major cuts, fills, or bridges are planned along the proposed access roads. No gates, fence cuts, cattleguards, or modification to existing facilities will be required along the proposed access routes. If the access road requires water, water will be applied to help facilitate road compaction. If the access road is dry during drilling and/or completion activities,

water may be applied to minimize soil loss as a result of wind erosion. The source of water will be the Town of Rock Springs municipal water supply.

During construction, the topsoil and vegetation will be windrowed to the edge of the disturbance and will be reclaimed by redistribution along the back slope of the ditch. Reclamation and seeding will be accomplished in accordance with the Surface Reclamation Plan.

North Well

Access to the North Well will be from the north via State Highway 191 to County Road 36 and then to County Road 34 (Ramsey Ranch Road). Some upgrade and maintenance of the county roads may be necessary. Devon will receive a permit from the County prior to proposal commencement. A 1,000-foot long by 30-foot wide access road will be constructed from County Road 34 to the well pad location.

South Well

Access to the South Well will be from the north via State Highway 191 to an existing dirt road (approximately 47.7 miles from Rock Springs). To get to the well site, travel north along the existing BLM dirt access road for 0.3 miles, and then turn west onto another existing BLM dirt road. Proceed 0.3 miles and turn north onto the proposed operator-constructed road and travel approximately 3,700 feet to reach the proposed well pad location. The second BLM dirt road ends at a power substation.

2.1.5 Well Pad Construction

Construction of each well pad and access road will use approximately the following heavy equipment: D8 crawler tractor; two Class 12 motor grader; 160G motor grader, mid-sized backhoe; and 20-yard belly-dump trucks. Approximately 10 vehicle trips would be needed to move equipment to and from each site during the five-day construction period.

Best Management Practices (BMP) for erosion control, soil viability and maintenance would be followed during construction and drilling operations. In order to clear surfaces for well pad construction, a crawler tractor would strip existing topsoil and brush, and would stockpile the topsoil along the uphill side of the well pad to prevent any possible contamination and soil loss. All cut and fill slopes needed for the well pad would be constructed so that stability would be maintained. Diversion ditches and berms would be constructed to achieve a zero runoff from the well pad area. Energy dissipaters such as straw bales and silt fences may be used in areas where the possibility of erosion or down-cutting exists. No stream or wetland crossings are anticipated. The equipment would be on site for about five days to complete the well pad and access road construction for each site. The approximate well pad size for the North Well is 3.97 acres and for the South Well is 3.68 acres.

2.1.6 Drilling Operations

Drilling operations will be conducted in compliance with Federal Oil and Gas Onshore Orders, and other applicable rules and regulations. Once construction of the well pad and access road is complete, drilling equipment would be moved to the drilling site. Total rig-up activities and installation of ancillary facilities would take approximately five days to complete. Drilling each well would require transport to and from the site of approximately 50 to 70 truckloads of drilling-related equipment and materials. The extent of additional traffic would depend on the phase of the drilling operation, but worker traffic is not expected to exceed seven vehicles per day per drill site throughout the drilling operation. A water truck

and other support trucks, such as a mud truck, could make three to five trips per day during the drilling phase.

Early in the drilling operations, surface casing would be installed in the well. Surface casing would be set and cemented to the surface to protect freshwater aquifers. Completion operations would commence as soon as possible after the drilling rig moves off location. All potentially productive hydrocarbon zones would be cemented. Site-specific descriptions of drilling procedures and equipment are included in the APD for the wells.

2.1.6.1 North Well

The vertical depth of the North Well is expected to be approximately 10,550 below ground surface. A 750 horsepower diesel-powered drill rig would be used to drill the North Well. The exact type and size of rig would be dependent upon rig availability at the time of drilling operations and the depth of the proposed well. It is expected to take about 45 days to complete drilling operations.

2.1.6.2 South Well

The vertical depth of the South Well is expected to be approximately 16,000 below ground surface. A 1,500 horsepower diesel-powered drill rig would be used to drill the South Well. The exact type and size of rig would be dependent upon rig availability at the time of drilling operations and the depth of the proposed well. It is expected to take about 65 days to complete drilling operations.

2.1.6.3 Closed-loop drilling fluid system

Pursuant to the BLM recommendation to protect groundwater recharge areas; Devon has agreed to utilize a closed-loop drilling fluid system for the two exploratory wells, in order to reduce the potential for impact to the recharge areas. The closed loop drilling system reduces the risk of uncontrolled spills. This also allows for a reduction in the amount of drilling fluids needed. The process results in de-watered cuttings and muds which allows for ease of disposal. Because no reserve pit is needed, the overall disturbance is also reduced.

The closed-loop system utilizes a chemically enhanced centrifuge de-watering system for removing water and fine particles from water-based drilling fluid. The process results in a relatively low retention of fluids and separation of the cuttings. Recovered fluids are stored in onsite tanks. The de-watered cuttings are stored in a lined pit for later on-site burial.

2.1.6.4 Cuttings Pit and Disposal

Once drilling operations are complete the drill cuttings are buried on site, in accordance with BLM and State of Wyoming requirements. A cuttings pit approximately 70 feet by 70 feet by 10 feet deep will be constructed at each of the well sites for the permanent disposal of the cuttings. Each pit will be lined with a 12-mil liner. The pits will be designed to minimize accumulation of surface runoff. Devon has received approval from the BLM authorized officer for on-site cuttings disposal.

2.1.7 Well Completion

Once the well is drilled, completion operations would commence. Completion operations would involve setting casing to total depth and perforating the casing in target production zones, followed by hydraulically fracturing (fracing) the formation under high pressure. The fracing material would likely contain sand or other material to keep the fractures from closing, thereby allowing hydrocarbons to be produced from the formation. The next phase would be to flow and test the well. Approximately four weeks would be needed to complete each well depending on test results. If the well is determined to be productive, the well will be shut in pending further actions. If the well is not productive, then the site will be reclaimed as per the APD Conditions of Approval considering wildlife stimulations and weather. No pipelines or other production facilities are planned under this exploratory drilling proposal. If pipelines, facilities and other development is proposed by Devon, additional site-specific NEPA review would be initiated by the BLM.

Fracing fluids would be stored in onsite tanks. Used fracing fluids would be disposed of at a State-approved commercial disposal facility. Vehicle traffic would increase during fracing operations with 10 to 20 trucks needed to mobilize the equipment on site, including supports vehicle such a water trucks. Additional vehicles are needed for worker access. Otherwise vehicle traffic would be limited during testing.

A flare stack with a minimum height of 40 feet is expected to be used during testing and completion operations. The flare stack will be located a minimum of 100 feet from the wellhead. Because no pipelines are planned, flaring is the only practical means of burning off natural gas that is produced during testing operations.

2.1.8 Water Use

Water for drilling, completion, and dust abatement would be obtained from the Town of Rock Springs municipal water source and transported to the well site by an approved commercial water hauler. Approximately 20,000 barrels of water are needed to drill each wells, 20,000 barrels will be needed for completion activities and approximately 1,000 barrels of water is needed for dust abatement (depending on weather conditions). Together an estimated 41,000 barrels (or 3.96 acre-feet) of water per well may be used during the construction, drilling, and completion operations.

2.1.9 Solid Waste Management and Sanitation

Self-contained, chemical portable toilets would be provided for human waste disposal. The toilet holding tanks would be pumped out, as needed, and the contents disposed of in the nearest approved sewage disposal facility.

Garbage, trash, and other non-flammable waste materials would be collected in portable, self-contained, fully enclosed trash containers during operations. Accumulated trash would be disposed of at an approved sanitary landfill. Trash would not be burned or buried on location.

All debris and other waste materials not contained in the trash containers would be removed from the location promptly after removal of the completion rig (weather permitting). No potentially hazardous materials or substances will be left on the location.

2.1.10 Spill Response

If spills of oil, condensate, or other fluids occur during the construction, drilling, completion, or abandonment, Devon or their contractors would immediately begin cleanup operations and contact the BLM and any other regulatory agencies (e.g., EPA National Response Center, State of Wyoming) as required. Devon is preparing a Spill Prevention, Control, and Countermeasure (SPCC) Plan, which would remain on site during the drilling and completion operations.

2.1.11 Hazardous Materials

Devon will maintain on site Material Safety Data Sheets (MSDS) for all chemicals used during construction, drilling, completion operations, in accordance with 29 CFR 1910.1200(g). Hazardous materials, which may be found on site, include drilling mud and cementing products (primarily inhalation hazards); fuels (flammable and combustible materials); materials that may be necessary for well completion/testing (flammable or combustible materials), and acids/gels (corrosives). No Superfund Amendments and Reauthorization Act (SARA), listed Extremely Hazardous Substances (EHS), will be on site. Devon also maintains an Emergency Response Plan for its operations.

2.1.12 Reclamation

2.1.12.1 Interim Reclamation

The cuttings pit will be covered with no less than five feet of soil material, and mounded over to allow for soil settling. Facilities remaining after shut-in include the wellhead itself, and fencing and paneling around the wellhead. No other facilities or materials will be left on-site.

2.1.12.2 Well Abandonment and Final Reclamation

If a well is determined to be non-commercial, the well would be "abandoned" and the area returned to the condition that existed prior to the initiation of the gas development proposal. Upon abandonment, each borehole would be plugged, capped, and its related surface equipment would be removed. A Sundry Notice would be submitted to the BLM for approval that describes the engineering, technical, or environmental aspects of final plugging and abandonment. The notice would also describe final reclamation procedures and any mitigation measures associated with the final reclamation. The BLM standards for plugging and abandonment would be followed.

Earthwork will consist of re-contouring the well site, constructed access roads, and other disturbed areas to approximate the original ground contours, and final grading and replacement of top soil. All disturbed areas will be seeded with the seed mixtures as listed in the APD that are certified to be weed-free. Seeding will be repeated as necessary until approved by the BLM Authorized Officer. If necessary, the site will be fenced to limit livestock and wildlife access to ensure re-vegetation.

2.1.13 Applicant-Committed Environmental Protection Measures

The following list summarizes applicant-committed environmental protection measures that would be implemented by Devon to avoid or minimize environmental impacts.

2.1.13.1 Air Quality

- Members of the construction and drilling crew would be encouraged to car pool to and from surrounding towns to minimize vehicle-related emissions.
- Devon would comply with EPA and Wyoming Department of Environmental Quality standards for drill rig engines.

2.1.13.2 Cultural/Paleontological Resources

- If cultural or paleontological resources are discovered during construction and drilling activities, all activity within the immediate area of impact would cease. Devon would immediately notify BLM of the find. The BLM and Wyoming State Historic Preservation Office representatives would then determine how to avoid impacting the site or artifact.
- The North Well pad and associated equipment will be placed in an area where it is not visible from the Cherokee Trail.

2.1.13.3 Water Quality

- Devon has agreed to use a closed-loop system at the two proposed well locations, since the well sites are located in groundwater recharge areas.
- Drilling cuttings will be buried onsite, in accordance with all state and federal regulatory requirements.

2.1.13.4 Erosion and Sedimentation Control

- No cross-country travel would be allowed; and all vehicles would be restricted to permitted roads and approved ROWs.
- Employees and contractors would be instructed to travel at appropriate speeds to limit disturbance to soils and vegetation, and to minimize the potential for vehicle-wildlife and vehicle-vehicle collisions.
- Devon would apply water to access roads and well pads, as directed by the BLM Authorized Officer to reduce dust (Also applicable for air quality).
- At the end of the life of the project, all surface facilities would be removed and all disturbed areas would be re-contoured and reseeded.
- The operator will prepare and follow a Storm Water Pollution Prevention Plan. A copy of the approved plan would be available to the RSFO, and will be available on site. (Also applicable to water quality).

2.1.13.5 Vegetation Resources

- To reduce the spread/introduction of noxious and invasive weed species from vehicles and equipment to the well sites, employees and contractors would not be allowed to drive off-road (unless on approved ROWs).
- A noxious weed control management program would be implemented to prevent or control the spread of noxious weeds at the proposal site.

2.1.13.6 Wildlife Protection

- Devon would comply with all BLM decisions / approvals concerning the restriction of construction and drilling activities as designated by BLM stated wildlife stipulations.
- To reduce the potential for wildlife-vehicle collisions, Devon would require their employees and contractors to always drive at safe speeds.
- No dogs / pets will be allowed at the well site.
- No firearms will be allowed at the well sites.

2.1.13.7 Public/Crew Safety

- Devon would take all necessary precautions for the protection and safety of the public during construction of the proposal.
- To further facilitate coordination with local emergency services, Devon would provide mapped locations of the proposed drilling locations and times to the respective emergency services personnel, as applicable, in advance of any exploration drilling activities. In addition, Devon would have cell phones or radios onsite, as appropriate, to provide immediate communication to emergency services.
- Local emergency telephone numbers and GPS coordinates would be posted at drilling locations.
- Vehicle traffic would be limited to existing roads and trails and approved ROWs. Vehicles would travel at speeds within set speed limits of main access roads and at slower speeds appropriate for conditions on more remote roads and trails.
- At a minimum, all crew members would comply with the Occupational Safety and Health Administration (OSHA) rules and regulations.

2.1.13.8 Road Maintenance

- Devon will be responsible for road repair and/or improvements as needed on the existing BLM access roads per BLM road standards.

2.1.13.9 County Road Maintenance

- Devon will provide services regarding maintenance to County Road 34 and 36 in addition to those services already provided by the County as needed to prevent problems from developing associated with this project. There is currently no gravel on these roads which receive very little traffic. The time of year, weather conditions, and amount of associated traffic will determine if Devon will place gravel along portions of the county road to maintain access.
- Devon will maintain the condition of the road during construction, drilling, production or other associated activities as affected by this proposed activity. Devon will return the condition of the road to original or better condition with maintenance or repair.
- Devon will place erosion control features at key points along the road in order to prevent sediment movement into nearby streams as associated with this project, if road/weather

conditions require it during the project. Devon will provide dust control if needed during the project.

- Devon will be required to place signage along County Road 34 to alert local traffic to "Heavy Truck Traffic" near the entrance to the proposed access road for Rubicon 16-5-14-105 (North Well).
- Devon will provide snow removal as it relates to the proposed activity in addition to the regularly scheduled snow removal provided by the county.

All services provided by Devon will be coordinated with and approved by Sweetwater County with a permit. If requested, road maintenance services will be coordinated with Sweetwater County.

2.1.13.10 Fire Protection

- Vehicles with catalytic converters would be restricted to existing roads and trails. Parking or idling would not be permitted in portions of roads or trails with tall vegetation.
- The following operational procedures would be followed to prevent fires:
    - All brush build-up around mufflers, radiators, heater-treaters, and other engine parts would be avoided; periodic checks would be conducted to prevent this build-up.
    - All personnel would be advised that smoking is only allowed in company vehicles and/or designated smoking areas; and that all cigarette butts should be placed in appropriate containers and not thrown on the ground or out windows of vehicles.
    - All personnel would be advised that campfires or uncontained fires of any kind are prohibited.
    - The crew contingency plan would include a fire communications protocol for contacting fire-fighting personnel.

2.1.13.11 Noise

- All vehicles and construction equipment would be appropriately muffled to minimize construction- and drilling-related noise.

General Conditions of Approval are provided in Appendix F.

2.2 NO ACTION ALTERNATIVE

NEPA and its implementing regulations require that a No Action Alternative be evaluated for comparison with the Proposed Action. The No Action Alternative serves as a benchmark, enabling decision-makers to compare the magnitude of environmental effects resulting from the Proposed Action with a No Action Alternative. Under the No Action Alternative, the BLM would reject Devon's proposal to drill two exploratory wells to explore for natural gas, as described in the Proposed Action. As a result, there would be no new disturbance to vegetation, wildlife, special status plant and animal species, soil, cultural resources, paleontological resources, recreation, surface water and groundwater, range resources, and other resources. In addition, under the No Action Alternative, workers that would be used to assist with the construction, drilling, and completion under the Proposed Action, would not be employed.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Chapter 3 of this EA describes the baseline conditions for the Baxter Proposal. The baseline conditions are used as a comparison for determining the effects of the proposal on the critical elements of the human environment, as identified in BLM NEPA Handbook H-1790-1 (BLM 2008).

The critical elements of the human environment, their status in the Baxter proposal, and their potential to be affected by the proposed project are listed in Table 3.1-1. They are addressed in the following sections of this chapter.

Table 3.1-1. Critical Elements of the Human Environment

Critical Element	Present	Potentially Affected
Air Quality	Yes	Yes
Areas of Critical Environmental Concern	Yes	Yes
Cultural Resources	Yes	Yes
Environmental Justice	No	No
Farmlands, Prime/Unique	No	No
Floodplains	No	No
Invasive, Non-native Weeds	Yes	Yes
Migratory Birds	Yes	Yes
Native American Religious Concerns	No	No
Special Status Species	Yes	Yes
Wastes Hazardous/ Solid	Yes	No
Water Quality	Yes	Yes
Wetlands/ Riparian	Yes	Yes
Wild and Scenic Rivers	No	No
Wilderness	No	No
Geology/ Minerals	Yes	Yes
Land Use	Yes	Yes
Range/Livestock Grazing	Yes	Yes
Recreation	Yes	Yes
Socioeconomics	Yes	Yes
Soils	Yes	Yes
Vegetation	Yes	Yes
Visual Resources	Yes	Yes
Wildlife	Yes	Yes

3.2 AIR QUALITY/ CLIMATE

3.2.1 Climate

The climate in the Baxter project area (south of Rock Springs, Wyoming) is semiarid and continental, with short, dry summers and long, cold winters. July and August are the hottest months of the year while December and January are the coldest. According to the Western Regional Climate Center (WRCC, 1971-2000), Rock Springs's mean temperature in January is 21.2 degrees F with a mean of 69.1 degrees F

in July. The average precipitation in the area is 8.5" and average snow fall is around 49.2" (WRCC 1948 - 1979).

The project area is subject to strong and gusty winds due to the complex terrain. Distinct diurnal changes occur, with surface wind speeds generally increasing during the day and decreasing during the night. Violent weather is common in the area and during the winter with the accompaniment of snow, blizzard conditions are quite frequent. In this particular area of Wyoming, typical wind direction is from West to East at an annual average speed of 11.1 mph (WRCC 1996 - 2006).

3.2.2 Air Quality

3.2.2.1 Wyoming And National Ambient Air Quality Standards

National and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health. State standards must be as strict as, or more strict than, federal standards. Table 3.2-1 illustrates both the NAAQS and WAAQS. These standards are reviewed every 5 years and undergo extensive peer review and public comment. The NAAQS specify the maximum concentration level, the averaging time or exposure time, and a statistical form of the standard that defines when an exceedance would occur.

Comprehensive air quality monitoring has not been conducted within the Baxter project area. However, background concentrations of pollutants recorded in the surrounding area are considered representative of the air quality in the Baxter proposal area.

Criteria pollutants for which standards have been set include sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$). All of the surrounding areas measured values are below the NAAQS and WAAQS. A brief description of the regulated Criteria Pollutants are as follows:

• **Carbon Monoxide**. CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation. Wildland fires are natural sources of CO.

• **Nitrogen Dioxide**. NO_2 is a red-brown gas formed during operation of internal combustion engines. Such engines emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_x). Internal combustion engines emit primarily NO which, in the presence of ambient ozone, forms NO_2 (the regulated pollutant). High concentrations of NO_2 can contribute to the formation of a brown cloud. NO_2 in the presence of ammonia can form a particulate nitrate as well as nitric acid.

• **Sulfur Dioxide**. SO_2 forms during combustion from trace levels of sulfur in coal, natural gas or diesel fuel. It can convert to ammonium sulfate ($(NH_4)_2SO_4$) and sulfuric acid (H_2SO_4), which can cause visibility impairment and acid rain. Volcanoes are natural sources of SO_2. Anthropogenic sources include refineries and power plants.

• **Ozone**. Ozone (O_3) is formed by a chemical reaction catalyzed by VOC, in which free oxygen is combined with the oxides in NOx. Sources of NO_x and VOC include industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents. The faint acrid smell common after thunderstorms is caused by O_3 formation by lightning. Ozone is a strong oxidizing chemical that can burn lungs and eyes and damage plants at high concentrations.

• **Particulate Matter**. Particulate matter (e.g., soil particles and pollen) is essentially small particles suspended in the air that settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- **PM_{10} particles**, particles with diameters of less than 10 micrometers, are small enough to be inhaled and can cause adverse health effects.
- **$PM_{2.5}$ particles**, particles with diameters of less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. Particles in this size range are also the main cause of visibility impairment.

Table 3.2-1. National and Wyoming Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS			WAAQS		
		(µg/m3)	(ppm)	(ppb)	(µg/m3)	(ppm)	(ppb)
Carbon Monoxide CO	1 hour	40,000	35	35,000	40,000	35	35,000
	8 hour	10,000	9	9,000	10,000	9	9,000
Lead Pb	Calendar Quarter	1.5			1.5		
Nitrogen Dioxide NO_2	Annual	100	0.053	53	100	0.053	53
Ozone O_3	8 hour	137	0.075	75	157	0.08	80
Particulate Matter PM_{10}	24 hour	150			150		
	Annual	NA			50		
Particulate Matter $PM_{2.5}$	24 hour	35			65		
	Annual	15			15		
Sulfur Dioxide SO_2	3 hour	1,300	0.5	500	695	0.266	266
	24 hour	365	0.14	140	260	0.099	99
	Annual	80	0.03	30	60	0.023	23

3.2.2.2 Hazardous Air Pollutants

There are a wide variety of HAPs, including n-hexane, ethylbenzene, toluene, xylene, formaldehyde, and benzene. Although HAPs do not have regulatory ambient air quality standards, the EPA has issued reference concentrations for evaluating the inhalation risk for cancer and non cancer health effects, known as Reference Concentrations for Chronic Inhalation (RfC).

Any source that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs is considered a major source and will require a Title V, Part 70,

operating permit. In addition, WDEQ has a Best Available Control Technology (BACT) requirement that is applicable to minor sources of HAPs.

3.2.2.3 Regulatory Environment

The Baxter proposal area falls under State of Wyoming Jurisdiction; therefore, it is subject to the Wyoming Air Quality Standards and Regulations (WAQSR) implemented by the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ-AQD).

3.2.2.4 Prevention Of Significant Deterioration

The goal of the Prevention of Significant Deterioration (PSD) program is to ensure that air quality in areas with clean air does not significantly deteriorate, while maintaining a margin for future industrial growth. Under PSD, each area in the United States is classified by the air quality in that region according to the following system:

PSD Class I Areas. Areas with pristine air quality, such as wilderness areas, national parks, and some Indian reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas. PSD Class I Areas are mandatory areas designated by Congress for protection and preservation.

PSD Class II Areas. Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS).

PSD Class III Areas. No areas have yet been designated as Class III. Concentrations would be allowed to increase all the way to the WAAQS and NAAQS.

Federal air quality regulations adopted and enforced by WDEQ-AQD limit incremental emission increases to specific levels defined by the classification of air quality in an area. The PSD Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. PSD Increments are defined for NO_2, SO_2, and PM_{10}. The incremental increase depends on an area's classification.

The closest federally designated Class I area is Dinosaur National Monument, managed by the U.S. National Park Service. Dinosaur National Monument is classified as a Colorado Class I Area for SO_2. The closest boundary of Dinosaur National Monument is 32 miles southeast of the proposed Baxter South Well. Two other federally designated Class I areas located in the general vicinity of the Baxter Proposal are the Bridger and Fitzpatrick Wilderness Areas, both managed by the U.S. Forest Service. The closest boundary of the Bridger Wilderness Area is 95 miles north of the proposed Baxter North Well.

3.2.2.5 Regional Haze Regulations

Visibility impairment is an indicator of air pollution concentration. Visibility can be defined as the distance one can perceive color, contrast, and detail. Fine particulate matter ($PM_{2.5}$ - particles 2.5 microns or less in diameter) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the farthest distance a person can see a landscape feature. Without human-caused

visibility impairment, natural visual range is estimated to average about 110–115 miles in the western United States and 60–80 miles in the eastern United States (Malm 1999).

The Regional Haze Regulations were developed by EPA in response to the Clean Air Act Amendments of 1990. They are intended to maintain and improve visibility in PSD Class I areas across the United States. These regulations require states to demonstrate reasonable progress in maintaining or improving visibility in PSD Class I areas. They are intended to maintain visibility on the least impaired days and to improve visibility on the most impaired days in mandatory federal Class I areas across the United States so that visibility in these areas is returned to natural conditions by the year 2064.

3.3 CULTURAL RESOURCES

Class III cultural resource inventories were conducted for the Rubicon Federal No. 16-5-14-105 (North Well) and the Rubicon Federal No. 16-28-13-106 (South Well) including associated proposed access roads for each. Approximately 48 acres were inventoried, all of which are administered by the BLM Rock Springs Field Office (RSFO). The cultural resource inventory objectives were to locate, document, and evaluate the extent of cultural resources that may be affected by construction of or operation of the well pads, their attendant facilities, and proposed access routes. Information obtained from the Class III inventories is used to predict possible impacts to historic and archaeological resources that may result from oil and gas exploration and development in the area.

The Class III inventories were carried out in compliance with Federal and State legislation including Section 106 of the amended National Historic Preservation Act of 1966 (NHPA), the National Environmental Policy Act of 1969, the Archaeological and Historic Conservation Act of 1972, the American Indian Religious Freedom Act of 1978, and the Archaeological Resources Protection Act of 1979. The NHPA, in particular, promulgates national policy and procedures with regard to "historic properties," which comprise regions, sites, buildings, structures, and objects that are included in or eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 of the NHPA requires the head of any Federal agency to take into consideration the effects of proposed undertakings on "historic properties" following regulations issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR 800).

The criteria for eligibility for nomination to the NRHP provide a systematic, definable means to evaluate historic and cultural properties. Site significance is evaluated based on the criteria set forth in Title 36 of the Code of Federal Regulations Section 60.4 (36 CFR 60.4) as supplemented by established guidelines (36 CFR 800). The criteria specified in 36 CFR 60.4 are as follows:

"The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

(a) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) That are associated with the lives of persons significant in our past; or

(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded or may be likely to yield information important in prehistory or history."

In the region encompassing the proposed well sites, two prehistoric cultural sequences are recognized. These include the northern Great Plains sequence and the Great Basin sequence (Frison 1991; Metcalf 1987). While the former is generally associated with *in-situ* cultural development based on large game hunting, the latter is associated with hunter-gatherer traditions that appear to have come from the deserts of Nevada and Utah (Ireland 1986: 55).

The historic period in the region surrounding the proposed well sites begins in the mid-eighteenth century with the explorations of French traders who entered the area from the north, likely following the Missouri River southwestward from the Mandan Villages near what is now Bismarck, North Dakota. As early exploration and westward migration expanded across Wyoming, several well-traveled routes were established that are today recognized as important historic properties. Examples of historic trails in Wyoming include the Sublette Cutoff of the Oregon Trail; Emigrant Springs, an historic campsite that is listed on the NRHP; the Hockaday Dempsey Trail; the Overland Migration Trail; and the Cherokee Trail, which is near the proposed North Well.

3.3.1 Cherokee Trail (48SW3680)

The Cherokee Trail is named after several parties of Cherokee Indians, who in 1849 and 1850, traveled west from Oklahoma Indian Territory to the gold fields of California. The route followed by the Cherokee gold seekers followed the well-established Santa Fe Trail from McPherson, Kansas, to Bents Fort in Colorado (Gardner 2002, Whiteley 1999: 7-9). At Bents Fort they left the Santa Fe Trail, heading northwest to join the Hastings Cutoff of the California Trail near Fort Bridger, Wyoming, and on to the California gold fields. The route which became known as the Cherokee Trail refers to the route from Bents Fort in Colorado, to Fort Bridger, Wyoming (Darlington 2007a).

As traffic increased through the last half of the 19th century, several variants were established which offered seasonal or yearly advantages in road conditions, water, and forage (Fletcher et al. 1999). The general route north from Bents Fort paralleled the east face of the Colorado Rockies to the Laramie Basin in southeastern Wyoming where it then split. The North branch followed the general route of the Overland Trail through Bridger Pass, Rock Springs, Green River, and onto Fort Bridger. The South branch crossed the head of the North Platte River, passing through or near Encampment and Baggs, Wyoming, past Lower Powder Spring to Vermillion Creek, which it paralleled for a short distance, and continued northwest to cross the Green River in the vicinity of Current Creek, and then onto Fort Bridger (Darlington 2007a).

The Cherokee Trail in its entirety is eligible for inclusion on the NRHP due to its contribution to history and the transcontinental migrations of the 19th century. However, not all portions of the Trail are contributing due to the impacts of modern road constructions and natural erosional processes (Darlington 2007a). A portion of the Cherokee Trail is located south of the North Well. It trends north through the center of Section 16 (T14N, R105W), then turns west to cross the SW ¼ of Section 9 and the center of Section 8, then turns northerly through the NE ¼ of Section 7. It continues westerly to cross the Green River in the vicinity of Current Creek. It is visible as a moderately-used two-track road maintained by modern vehicle use, and is marked by concrete posts. This segment passes 1,000 feet west of the Ramsay

Ranch, and 100 feet east of Malinda Armstrong's grave, an emigrant who died on the Trail at the age of 18 on August 16, 1852. Some portions of the trail in the present study area have been destroyed by construction and use of the modern county road (Darlington 2007a).

3.3.2 Survey Methods

Prior to the field work for the proposed well sites, a Class I files and literature search was conducted at the State Historic Preservation Office, Cultural Records Division. Records at Western Archaeological Services and Government Land Office maps were also consulted. An intensive, 100 percent pedestrian survey was performed for the proposed well sites comprising both block and linear survey areas. Linear rights-of-way (ROW) were inventoried by walking a series of parallel transects spaced on both sides of the centerline within a 150-foot (approximately 45-meter) wide corridor. Block inventory areas were surveyed in transects no more than 30 meters wide. Special attention was given to areas of enhanced subsurface visibility such as erosion cuts and pans, drainage side profiles, road ditches, anthills, and the back dirt of animal burrows.

The survey consisted of a ten-acre parcel centered on each of the proposed well sites. Linear acreage for the proposed well-site access ROWs included 0.77 acres for the North Well (approximately 1,000 feet) and 2.55 acres for the South Well (approximately 3,700 feet).

In addition, a site setting and visual contrast rating analysis were conducted for the Cherokee Trail in relation to the proposed North Well pad and access road to see if there would be any visual impacts to the Trail from the proposed project.

3.3.3 Summary of Inventory Results

The cultural resources inventory of the proposed North Well pad and access road determined that no eligible historic properties occur within the surveyed areas. In addition, there is low potential for encountering intact buried cultural remains within sandy silt residuum and slopewash within the project area. However, the Cherokee Trail lies within the view shed of the proposed well site. The site setting and visual contrast analysis determined that an intermittent segment of the Cherokee Trail located in the west half of Section 16 would be visible from the proposed access road at its juncture with the existing county road. The visible segment through Section 16 is approximately 4,000 feet long. However, all but a short (1,500 feet) portion of the segment has been destroyed by construction and use of the modern county road. A low ridge to the south of the proposed well pad obscures the view between the staked pad, most of the access route, and the Trail. Based on the settings analysis, the proposed well pad will not be visible from the Cherokee Trail, and only a short segment of the proposed access road, at its juncture with the existing county road, will be visible. The Class I files and literature search conducted at the State Historic Preservation Office, Cultural Records Division revealed no previously conducted cultural resource investigations in Sections 4 or 5 (T14N, R105W). One site was found within a mile of the proposed North Well. Site 48SW4463 is a prehistoric lithic scatter located approximately 4,000 feet west of the project area in Section 5 (T14N, R105W). Although the site is recommended as eligible to the NRHP with SHPO concurrence, it will not be impacted by the proposed project (Darlington 2007a).

The cultural resources inventory of the proposed South Well pad discovered a single isolated artifact. It is a small brown, opaque chert cobble exhibiting several flake scars and cortex, suggesting it was tested for

suitability for the manufacture of chipped stone tools. The artifact is non-diagnostic and was left in situ (Darlington 2007b). By definition, isolated finds like this are categorically excluded from eligibility for nomination to the NRHP.

The Class I files and literature search conducted at the State Historic Preservation Office, Cultural Records Division for the South Well pad and access road listed one previously conducted cultural resources inventory in Section 27 (T13N, R106W). This was a Class III inventory for Union Telephone Company's Little Mountain cell tower and buried telephone line. No sites were recorded as a result of the inventory. No projects have been conducted or sites recorded in Section 28 (T13N, R106W). Four projects comprising approximately 165 acres have been conducted in Section 34 (T13N, R106W). These include the Green River-Washakie Basin Class II inventory conducted in 1982 encompassing the SW ¼ of the section; the Little Mountain power line for Pacific Power and Light Company; the Little Mountain sub-station access road for Pacific Power and Light, and the Little Mountain cell tower buried telephone line for Union Telephone Company.

On April 28, 2008 a Class III cultural survey was conducted for the proposed reroute of the access road to the Rubicon Federal No. 16-28-13-106 (South Well) (Pastur 2008). The original Class III survey had been conducted on October 27, 2007. The proposed route was changed by the BLM to minimize impacts to the juniper trees along the original route. The length of the access road from the staked well to its intersection with the Little Mountain Sub-station road is approximately 3,700 feet. The new access reroute begins in the center of SE ¼ SE ¼ SE ¼ of Section 28, T13N, R106W at the staked well pad, and trends southeast through the SW ¼ SW ¼ SW ¼ SW ¼ of Section 27, to the E ½ of Section 34, to the SW ¼ SW ¼ SE ¼ NW ¼ of Section 34, where it intersects with the existing crown and ditched road to the Little Mountain Sub-station. No cultural materials were encountered (Pastur 2008).

3.4 WATER RESOURCES

3.4.1 Surface Water

Both proposed wells are in the Green River watershed, and precipitation from the area around the wells and the streams near the wells would drain west to the Flaming Gorge Reservoir (see Figure 3.4-1 in Appendix A). The area is characterized by relatively small watersheds (less than 100 square miles) draining from the Little Mountain area at an elevation of just over 9,000 feet to Flaming Gorge Reservoir at an elevation 6,020 feet above sea level. Most of the streams in the Little Mountain area are intermittent receiving water from rainfall runoff, springs, or snow melt. There has been little development or intensive land use activities in the area, and as a result there have been relatively little anthropomorphic impact to surface water quality.

Both well locations are in BLM management units that emphasize improvement and enhancement of watershed values. The North Well is located in the Sage Creek portion of the Greater Red Creek ACEC, where a primary BLM management action is that "all resource and land uses in the area will be managed in support of watershed stability and Colorado River Cutthroat Trout (CRCT) habitat management objectives" (BLM 1997). The South Well is located in the Sugarloaf Special Management Area (SMA), where improving watershed condition and enhancing watershed value is a main management objective (BLM 1997). Land use activities and events in the area that could potentially affect water resources

include recent wildfires, livestock grazing, wild horse range, big game range, unimproved and improved roads, OHV use, dispersed recreation, and fire wood cutting.

According the EPA EnviroMapper there are no water discharge permits, toxic waste release sites, hazardous waste sites, or CERCLA-related sites near the North Well or South Well site (EPA 2008).

3.4.1.1 North Well

The proposed North Well is located approximately one-half mile west of the main stem of Trout Creek, about a mile downstream from the confluence of Gooseberry Creek, and two miles upstream from the confluence with Sage Creek. Little Mountain forms the headwaters of Trout and Sage Creeks, approximately 8 miles to the south of the project area. The proposed well pad is approximately 400 feet south of an unnamed ephemeral stream channel. The access road parallels the unnamed ephemeral stream channel for approximately 0.25 miles. The northern section of CR 34, the primary route to the well pad access road, parallels Trout Creek and then Sage Creek for approximately 6.2 miles before it ends at the Sage Creek Road. CR 34 crosses Sage Creek just below the confluence with Trout Creek.

There are no stream flow gauging station data for the Sage Creek watershed. The USGS has measured discharge seven times on the lower reach of Sage Creek over the last 30 years (USGS, 2007). The measured discharges ranged from a high of 16 cfs on June 5, 1975, to a low of 0.5 cfs on June 9, 1975. The mean discharge was 5.2 cfs. These data suggest that at least the lower reaches of Sage Creek are perennial. Trout Creek is perennial from the headwaters to the confluence with Sage Creek and the area near the proposed well pad is a gaining stream reach (D. Doncaster, BLM, pers. comm. March 7, 2008). Stream flows may, however, have been altered by a wildfire in 2000 which resulted in reduced base flows (J. Caldwell, BLM, pers. comm. February 29, 2008). The WGFD lists Trout Creek as capable of supporting cold water game fish populations, at least seasonally.

The Wyoming Department of Environmental Quality Water Quality Division (DEQ/WQD) classifies Trout Creek and the lower three miles of Sage Creek as Class 2AB waters. These waters are characterized as "known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable" (DEQ/WQD, 2001). The remainder of Sage Creek is listed as class 2C waters. Class 2C "waters are those known to support or have the potential to support only nongame fish populations or spawning and nursery areas at least seasonally including their perennial tributaries and adjacent wetlands" (DEQ/WQD, 2001). Wyoming water quality standards for Class 2AB and Class 2C waters are protective of aquatic life. Aquatic life standards are relatively stringent as compared to other uses, such as agriculture, because cold water fisheries are very susceptible to water quality degradation. For example Class 2 waters can be only nominally influenced by human activity for parameters such as turbidity, dissolved oxygen, and temperature.

There are limited water quality data for Sage Creek and no water quality data were found for Trout Creek based on a search of the EPA STORET and USGS National Water Information System (NWIS) online databases. The USGS data are summarized in Table 3.4-1 and discussed below. The four sampling locations were close enough to each other to allow for combining the results for statistical purposes.

The mean of the two dissolved oxygen readings was 10 mg/L; this is a high level of dissolved oxygen and would support a trout fishery. The total suspended sediment (TSS) measurements are relatively high

compared to other area streams with a mean concentration of 3,304 mg/l, although the concentrations are not out of the range of other values found. The mean total dissolved solids (TDS) concentration was 1,149 mg/L, and is very typical of the area streams in similar geologic settings where surface geology is dominated by rocks deposited in marine environments. The Acid Neutralizing Capacity (ANC) is moderately high (mean = 280 mg/L), which is not unusual in areas that drain marine deposits, and reflects the high carbonate level of the parent rocks. The Sodium Absorption Ratio (SAR) is considered low (mean = 2), reflecting the relatively low concentration of sodium relative to calcium and magnesium. The hardness is somewhat high at 673 mg/L; but not necessarily high compared to other area streams. The primary anion is sulfate with a mean concentration of 602 mg/L and is typical of area waters. Nitrate levels are comparable with other area streams with mean nitrate concentrations at 0.17 mg/L. The mean phosphorous concentration at 2.3 mg/L is higher than other area streams and was dominated by one high reading of 6.1 mg/L.

Table 3.4-1. Summary of Water Quality Analysis for Sage Creek[1]

Parameters	No. of Results	Range	Mean
Discharge (cfs)	6	0.5-16	5.2
Specific Conductance (uS/cm)	7	1,000-2,720	1,625
Dissolved Oxygen	2	9.9-10	10
pH (standard units)	3	7.9-8.8	8.4
Total Hardness (mg/L)	4	590-740	673
Sodium-Adsorption Ratio (ratio)	4	1-3	2
Acid-Neutralizing Capacity (mg/L)	4	235-344	281
Total Dissolved Solids (mg/L)	4	875-1520	1,149
Total Suspended Sediments (mg/l)	5	370-5,940	3,304
Turbidity (NTU)	3	120-2,000	773
Sulfate (mg/L)	4	450-829	602
Total Phosphorous (mg/L)	3	0.25-6.1	2.3
Nitrite & Nitrate (mg/L)	3	0.04-0.3	0.17

1. USGS stations where data were collected.
a. 411648109165901 SAGE C AB SAGE C RANCH NR SHEEP MOUNTAIN, WYO, Latitude 41°16'57", Longitude 109°26'57" NAD27
b. 411657109265701 SAGE C BL SAGE C RANCH NR GREASEWOOD DRAW, WYO, Latitude 41°16'57", Longitude 109°26'57" NAD27
c. 09217180 SAGE CK AT MOUTH NR ROCK SPRINGS, WYO, Latitude 41°17'45", Longitude 109°28'32" NAD27
d. 411740109282800 SAGE C NR ROCK SPRINGS WYO, Latitude 41°17'40", Longitude 109°28'28" NAD27

3.4.1.2 South Well

The proposed South Well pad is located approximately 800 feet south of an unnamed intermittent tributary to Krause Marsh Creek, which is a tributary to Middle Marsh Creek. Middle Marsh Creek drains into Flaming Gorge Reservoir approximately nine miles west of the proposed well site. Little Mountain forms the headwaters of Krause Marsh Creek, approximately two miles to the east of the proposed well. The proposed access road does not cross or approach any drainages or other water crossings.

There are no gauging station data for the Krause or Middle Marsh Creek watershed. Three discharges records were collected just to the north on Upper Marsh Creek by the USGS over the last 30 years (USGS 2007). Upper Marsh Creek has very similar hydrologic and geologic characteristics to Middle Marsh Creek, although it has more than twice the watershed area. The discharge measurements were 0.6 cfs on March 30, 1.2cfs on May 13, and 0.1cfs on June 12 (Mason & Miller 2004). These data suggest that the lower reaches of Middle Marsh Creek are possibly perennial in nature. Krause Marsh Creek is believed to be a perennial stream at its headwaters and becomes intermittent at its lower reaches (D. Doncaster, BLM, per. comm. March 7, 2008). The stream receives water from snow melt on Little Mountain and from rainstorms. Some of the flow into Krause Marsh Creek also comes from springs along the west flank of Little Mountain.

The DEQ/WQD classifies Middle Marsh Creek and its tributaries as class 3B waters. These are water bodies that are characterized as "tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles" (DEQ/WQD 2001).

The DEQ/WQD collected one water sample in Upper Marsh Creek in 1997 (STORET, 2008). Based on similar climactic, hydrologic, geologic, and land use conditions, the water quality in Krause Marsh Creek should be similar to Upper Marsh Creek. Upper Marsh Creek is characterized as having moderate to high hardness (mean = 560 mg/L), moderate to high alkalinity (mean = 337 mg/L), near neutral pH (mean 8.0), and a fairly high TSS (mean = 565 mg/L).

3.4.2 Groundwater

For purposes of the ground water assessment, the analysis area includes the Sage Creek portion of the Greater Red Creek ACEC and the Sugarloaf SMA. These areas are within the Flaming Gorge Subbasin of the Green River watershed. Ground water resources are relatively undeveloped in the analysis area, primarily because landownership is almost entirely federal. As a result, information on aquifer properties, well yields, recharge/discharge relations, and water quality is limited and primarily available for wells from outside the analysis area. The most comprehensive assessment of ground water resources in this area was completed by the U.S. Geological Survey (USGS) in 2004 (Mason and Miller 2004).

3.4.2.1 Regional Ground Water Aquifers

The primary aquifers in the analysis area are in the Green River and Wasatch Formations. These units form the majority of bedrock surface exposures and are the most widely used aquifers in Sweetwater County (Mason and Miller 2004). Static water-level depths are generally less than 200 feet below ground surface (bgs) and most aquifers are confined and contain water under artesian conditions. In the Tertiary aquifers, ground water flows to the west toward Flaming Gorge Reservoir (Mason and Miller 2004). The Bishop Conglomerate is locally an unconfined aquifer, but in most places the deposits are topographically high and probably well-drained. Unconfined Quaternary aquifers may be present locally in alluvium along perennial reaches of Sage Creek or Trout Creek and in landslide deposits.

In the southern part of the Sugarloaf SMA, the Tertiary Fort Union Formation and the Upper Cretaceous Mesaverde Group (primarily the Ericson Sandstone and Rock Springs Formation) are important aquifers. Aquifers are also present in older Mesozoic and Paleozoic strata throughout the region. However, they are deeply buried (greater than 2,600 feet) and water quality is generally poor (Mason and Miller 2004).

There have only been five water wells drilled within the analysis area based on data from the Wyoming State Engineers Office (WSEO) groundwater database (WSEO 2008). Three wells are in good standing (GST) or unadjudicated (UNA) and are located from 4–6 miles south of the South Well (see Figure 3.4-1 in Appendix A). These wells are completed in Tertiary aquifers and are used for domestic and stock purposes. Well depths range from 75 to 290 feet, reported yields are from 5–20 gallons per minute (gpm) and static water levels are between 5–20 feet bgs. One monitoring well was drilled by the BLM in 1992 in the vicinity of Little Mountain, approximately 2 miles northeast of the South Well. The well was drilled to 330 feet (presumably into the Laney Member of the Green River Formation) and was a dry hole. The well was subsequently abandoned and cancelled (A&C).

3.4.2.2 Baxter Proposal Aquifers

The North Well is underlain by the Main body of the Tertiary Wasatch Formation (see Geology Map in Appendix). The predominant lithologies are claystone and siltstone and some locally derived conglomerate. The Wasatch Formation is reported as a good source of water (with well yields ranging from less than 1 to 1,300 gallons per min) in the northern part of the Green River Basin (Welder 1968). Less is known about its ground-water potential at the southern end of the basin.

The South Well is near the contact between the Green River (undifferentiated Wilkins Peak-Tipton Shale Members) and the Main body of the Wasatch Formation. The predominant lithologies in the Wilkins Peak Member are mudstone, marlstone, oil shale, and trona beds. The potential for ground-water development is considered poor except near recharge areas (Mason and Miller 2004; Welder 1968).

3.4.2.3 Groundwater Quality

Regionally, groundwater quality is highly variable and tends to deteriorate with increasing distance from recharge areas and with increasing depth below land surface (Mason and Miller 2004). Total dissolved solids (TDS) concentrations tend to be marginally high (greater than 500 mg/L) to high in most areas and many samples contained relatively high sulfate, boron, iron, and manganese (compared to USEPA and WDEQ drinking water standards). The shallower Tertiary aquifers, especially near recharge areas, contain water that can be suitable for most uses (domestic, livestock, irrigation, and industrial). At depths greater than a few thousand feet, ground water tends to have TDS concentrations that make it moderately saline (TDS greater than 10,000 mg/L) to briny (TDS greater than 35,000 mg/L) and unsuitable for most uses.

There are twelve water-quality samples from the analysis area that were collected by the USGS (Mason and Miller 2004). Most (eleven of twelve) are from springs and one is from a well located in the headwaters of Sage Creek (see Figure 3.4-1 in Appendix A). The samples represent water from the Green River Formation (6 samples), the Wasatch Formation (4 spring samples, 1 well sample), and the Bishop Conglomerate (1 sample). Table 3.4-2 provides a summary of key water quality parameters for the Wasatch and Green River samples.

Table 3.4-2. Groundwater Quality Summary

Parameter	Wasatch Formation		Green River Formation	
	Median	Range	Median	Range
TDS (mg/L)	413	287–2380	550	246–987
Sulfate (SO_4) (mg/L)	130	50–1400	141	30–490
Manganese (Mn) (µg/L)	<10	<10–20	<10	<10–10
Iron (Fe) (µg/L)	120	20–410	30	<10–30

The sample from the Bishop Conglomerate had a TDS of 298 mg/L. In general, the results indicate that water from the springs and wells is suitable to marginally suitable for domestic use and suitable for livestock and industrial purposes. Most of the samples were collected near recharge areas and may be biased toward better water quality. None of the samples were collected from springs in the Trout Creek (North well) or Krause Marsh Creek (South well) drainages, but presumably water quality would be within the ranges observed for the USGS samples, because both proposed wells are near recharge areas and in similar geologic settings.

3.4.2.4 Recharge/Discharge

The South Well falls within a groundwater recharge area identified in the Green River RMP (Map 26) (BLM 1997). The RMP states that "*Aquifer recharge areas will be managed to protect groundwater quality and to ensure continued ability for recharging aquifers. Protection will be provided by limiting road density and surface occupancy to maintain a healthy recharge area. Vegetative cover and geological soil condition that are conducive to groundwater recharge will be maintained*." GRRMP, page 22.

Recharge to ground water occurs by infiltration of precipitation on outcrop areas, infiltration of snowmelt runoff, and leakage from stream flow. The estimated groundwater recharge per year to the Tertiary aquifers in the project area is less than 0.5 inches per year, although higher altitude areas generally have higher precipitation and greater recharge. The higher-altitude areas in the project area (primarily Little Mountain and vicinity) get an estimated 12–16 inches of precipitation per year; lower altitude areas typically receive around 7–8 inches per year (Mason and Miller 2004). May is usually the month with the highest precipitation. Both wells are located near areas of hydrologic concern (recharge areas) as delineated in the RMP (BLM 1997).

Groundwater discharge occurs mainly as seepage to streams and the Flaming Gorge Reservoir, and discharge to springs, evaporation, and as underflow along streamways and aquifers that extend out of the Green River Basin (Mason and Miller 2004). Springs are common around Little Mountain and most have perennial discharge (Dennis Doncaster, BLM, pers. communication, 2008). Withdrawal of ground water from wells for domestic, agricultural, and industrial (oil and gas) purposes is currently negligible, because there are very few water wells in this area and no nearby oil and gas production.

3.4.3. Floodplains

The Green River RMP Waters and Floodplain map does not show any floodplains in the area of either proposed well. There are no known FEMA floodplain maps covering the Baxter proposal area.

3.5 SPECIAL STATUS SPECIES

The BLM is required to protect and manage threatened, endangered, proposed, and sensitive species on land administered by the agency. BLM also provides protection and manages for sensitive species jointly with the Wyoming Game and Fish Department.

3.5.1 Federally Listed Species

The Endangered Species Act (ESA) requires that Federal agencies protect those species listed under the Act. The endangered or threatened species that are potentially present in the vicinity of the North and South wells include the black-footed ferret, Canada lynx, Ute ladies'-tresses, and the four endangered Colorado River fish. Two species that may occupy habitat in the area are currently being petitioned for federal listing. The pygmy rabbit and greater sage-grouse are both in the status review process, which is the initial step to possible ESA listing. The yellow-billed cuckoo is an ESA candidate species that is found in the region, but is not expected to be found in the Proposal Area. Both the pygmy rabbit and yellow-billed cuckoo are also designated sensitive species. There are a number of other BLM designated sensitive species found in the area as well, which are described below.

3.5.1.1 Black-Footed Ferret

The black-footed ferret (*Mustela nigripes*) inhabits white-tailed prairie dog colonies. There are no known occurrences of this species in the area of the proposed wells (WYNDD 2008), as the nearest population of white-tailed prairie dogs is the Baxter Basin prairie dog town located north of I-80 in central Sweetwater County.

3.5.1.2 Canada Lynx

The Canada lynx (*Lynx canadiensis*) is typically found in high elevation spruce and fir communities. There is no suitable habitat and no known occurrences of this species in the area of the proposed wells.

3.5.1.3 Yellow-billed Cuckoo

The western population of the yellow-billed cuckoo (*Coccyzus americanus*) is a candidate for listing under the ESA. The yellow-billed cuckoo is also listed as a BLM sensitive species. As determined by genetic testing, the western population is distinct from the eastern population, which is not a candidate species. The secretive yellow-billed cuckoo is a robin-sized bird. It nests in dense stands of willows, requires mature cottonwood forests along water courses, and is a riparian obligate species (WYNDD 2008). More than 90 percent of the habitat for the western yellow-billed cuckoo has been lost or degraded due to riparian conversion to agriculture, dam building, tamarisk infestations, overgrazing, or water withdrawals (USFWS 2001). Yellow-billed cuckoo populations have experienced a large decline historically and a moderate decline more recently, with the greatest declines occurring prior to 1950. Its abundance of this species in Wyoming is not well known, although it may never have been abundant (WYNDD 2008). The Wyoming Natural Diversity Database (WYNDD) lists the yellow-billed cuckoo as very rare in Wyoming. Several observations of this species were made near the Green River in the northern part of Sweetwater County prior to 1982. One more recent observation was made along the Flaming Gorge Reservoir in Utah just west of the Wyoming Stateline. The proposed well sites are not

adjacent to riparian areas, and there are no dense cottonwood forests or other suitable habitat for the yellow-billed cuckoo in the Sage Creek or Middle Marsh Creek Basins.

3.5.1.4 Endangered Colorado River Fish

Four species of endangered fish are reported from the Green River and Colorado River downstream of the Flaming Gorge Reservoir, and include the Colorado pikeminnow (*Ptychocheilus lucius)*, razorback sucker *(Xyrauchen texanus)*, humpback chub (*Gila cypha),* and bonytail (*Gila elegans).*

Bonytail

Historically, the bonytail was abundant and widespread in rivers throughout the Colorado River Basin (59 Fed. Reg. 13374 (March 21, 1994)). The current distribution of the species is limited to a small population in Lake Mojave and a few records exist from Lake Havasu and from the Yampa, Green, and Colorado Rivers (59 Fed. Reg. 13374 (March 21, 1994)). Wild populations consist only of older fish, and recruitment of younger fish is virtually non-existent (59 Fed. Reg. 13374 (March 21, 1994)). The optimum habitat for bonytail appears to be open rivers of relatively uniform depth and moderate current (Behnke and Benson 1980). The bonytail requires warm water temperatures of approximately 18° C (64° F) for spawning (59 Fed. Reg. 13374 (March 21, 1994)). Bonytail are the rarest of the native fish in the Upper Colorado River Basin.

Colorado pikeminnow

Historically, the Colorado pikeminnow originally was found throughout lower elevation, warm waters of the Colorado River Basin (Behnke and Benson 1980). Currently, the Colorado pikeminnow is found in the Green River and upper Colorado River basins, and there are small numbers of individuals (with limited reproduction) in the San Juan River basin (USFWS 2002). Habitat requirements of the Colorado pikeminnow include pools, deep runs, and eddy habitats (USFWS 2002). Colorado pikeminnow habitat is found in areas with high spring flows that maintain the necessary channel and habitat diversity (USFWS 2002). The critical habitat for the Colorado pikeminnow includes portions of the Green and Colorado rivers and the 100-year floodplain (Service 2004b).

Humpback chub

The historical distribution of the humpback chub is not well known. It was presumably limited to swift, deepwater areas in the Colorado River Basin (Behnke and Benson 1980). Presently, the species is restricted to areas in, and upstream of, the Grand Canyon (Woodling 1985). The humpback chub is found in river canyons, where it uses a wide variety of habitats, including pools, riffles, rocky runs, rapids, and eddies (USFWS 2002d). Critical habitat for the humpback chub was designated on the Colorado River from Black Rocks downstream to Fish Ford River in Utah (59 Fed. Reg. 13374 (March 21, 1994)).

Razorback sucker

Historically, razorback suckers were widespread in warm-water reaches of the Colorado River Basin (USFWS 2002b). Today, razorback suckers occur in small numbers in the Green River, upper Colorado River, San Juan River, lower Colorado River between Lake Havasu and Davis Dam, reservoirs of Lakes Mead and Mojave, Verde River, Salt River, and Fossil Creek (USFWS 2002b). Razorback suckers inhabit a wide variety of habitats including impounded and riverine habitats, eddies, backwaters, gravel pits, flooded bottoms, flooded mouths of tributary streams, slow runs, sandy riffles, and others (59 Fed.

Reg. 13374 (March 21, 1994)). The critical habitat for this species includes portions of the Colorado River its 100-year floodplain [59 Fed. Reg. 13374, (March 21, 1994)].

3.5.1.5 Ute ladies'-tresses

The Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial species in the orchid family and is listed as a threatened species under the ESA. The flower stalk stands 20 to 50 cm tall and has white flowers arranged around the top of the stalk with grass like leaves at the base of the stalk. In Wyoming this threatened species is found in stream floodplain terraces and abandoned oxbows areas with a groundwater feed water table that is at or near the surface. Ute ladies'-tresses occupies habitat between emergent plants and upland plants and is found in sandy to silty loam soils with gravel deposits that are derived from flood deposits (WYNDD 2008). It is generally found at an elevation of less than 7,000 feet. While all the known Wyoming populations of the plant are found east of the continental divide, there are populations in northern Utah, south of the proposal area.

3.5.2 Species Petitioned For Listing

3.5.2.1 Pygmy Rabbit

The pygmy rabbit (*Brachylagus idahoensis*) is currently being petitioned for listing under the ESA. It is also a BLM sensitive species. The WGFD lists the pygmy rabbit as a Species of Special Concern and considers it a rare species because of restricted and vulnerable habitat (WGFD 2008). Pygmy rabbits prefer habitat dominated by mature, Wyoming big sagebrush (*Artemisia tridentata*) with a dense canopy, which provides cover from predation. Pygmy rabbits are often found in the area where the sagebrush is denser and taller than in other nearby areas (Katzner and Parker 1997; Gabler et al. 2000; Himes and Drohan 2007; L. Keith, BLM, pers. Comm., March 2008). The sagebrush habitat is often near streams or riparian areas. Pygmy rabbits dig their own burrows and are found in areas were the soil is relatively deep and friable. Sagebrush is also the primary food of the pygmy rabbit (Green and Flinders 1980; Thines et al. 2004). Wyoming big sagebrush is not fire tolerant, so habitat can be temporarily lost from wildfires. The distribution, trends, and populations of the pygmy rabbit are not well known in Wyoming (WGFD 2008). A map of potential habitat was generated using data from the WGFD (Figure 3.5-1, Appendix A). An onsite review of the Baxter Proposal well pads and new access roads area was conducted by the BLM. No suitable habitat or rabbit sign were noted (L. Keith, BLM, pers. comm., March 2008).

3.5.2.2 Wyoming Pocket Gopher

A status review process by the USFWS is currently underway for the Wyoming pocket gopher (*Thomomys clusius*) to determine if the species warrants listing under the Endangered Species Act. Gophers (*Thomomys* spp.) generally are tolerant of natural disturbances such as wildfire and grazing, but intolerant of habitat conversion to agricultural use (Keinath and Beauvais 2006). Current records (WYNDD 2008) indicate that Wyoming pocket gophers may be present in the vicinity of the proposed well sites.

3.5.2.3 Greater Sage-grouse

A status review process by the USFWS is currently underway for the greater sage-grouse *(Centrocercus urophasianus)* to determine if it warrants listing under the ESA. It is also a BLM Sensitive Species. The greater sage-grouse, (sage-grouse) is highly dependent upon sagebrush-steppe habitat. It relies on sagebrush not only for forage but also for cover from predators and shelter from the elements (Schroeder et al. 2004; Aldridge and Boyce 2007). Sage-grouse also require open locations with high visibility and adequate escape cover for courtship and mating. Mating areas are referred to as "leks" (Connelly et al. 2000).

The greater sage-grouse has been extirpated from approximately half of its pre-settlement range (Schroeder et al. 2004). Threats include conversion of grasslands and sagebrush-steppe habitat to dry-land farming as well as invasion of weeds, such as cheatgrass. Most recently, outbreaks of West Nile virus have been major contributors to the sage-grouse decline (Naugle et al. 2005; Schroeder et al. 2004, Holloran 2005, Naugle et al. 2006, and Walker et al. 2007) investigated how sage-grouse respond to gas field and coal bed methane development considering multiple variables, including male lek attendance, nesting success, -egg-laying success, juvenile survival, and overall population vigor. Holloran (2005) and Naugle et al. (2006) concluded that sage-grouse populations are highly likely to decline from extensive energy field development, when there is extensive surface occupancy. Naugle et al. (2006) concluded that when drilling was conducted near active leks and nesting areas, declines would be expected at least two miles from the drilling site. There are no occupied leks within that two-mile influence zone from either proposed well. There is one unoccupied lek just less than four miles from the North Well.

3.5.3 Sensitive Wildlife Species

3.5.3.1 Gray wolf

The gray wolf (*Canis lupus*), a BLM Sensitive Species, was abundant prior to European settlement of the U.S. As settlers moved westward they depleted most of the primary prey of the wolves, including bison, deer, elk, and moose. The wolf then turned to sheep and cattle for a food source. To protect livestock, ranchers and government agencies began a wolf eradication campaign, which started in the 19th century and continued to 1965. As a result, only a few hundred wolves remained in the continental U.S. The wolves were first listed as endangered under the ESA in 1973 (USFWS 2007). Because of successful recovery efforts, the wolf was delisted from the ESA on March 28, 2008. It is currently listed as a BLM Sensitive Species (L. Keith, BLM, pers. comm., March 2008).

Today there are a minimum of 1,240 wolves living in the Rocky Mountains of Montana, Idaho, and Wyoming. The gray wolf habitat is diverse, ranging from heavily forested areas to the open prairie. It has a range from 81-1,609 km (50-1,000 mi). The wolf matures at an age of two to three years (USFWS 2007). The adult male is 0.6-0.9 m (2-3 ft) in height, a length of 1.4-2 m (4-6 ft), and weighs 25-59 kg (55-130 lb). The lifespan of the gray wolf is 7-8 years, but some individuals have been reported to live 10 or more years. Breeding begins in January or February; gestation takes 63 days, and a litter of 4 to 7 pups are born, which the pack will take care of for 10 months. The diet of the gray wolf is comprised of elk, deer, and moose, but it also eats beaver, rabbits, and other small prey. The gray wolf is not known to occur in the proposal area. There is potential for the wolf to colonize the area, based on the rate of expansion during the last decade.

3.5.3.2 Townsend's Big-eared Bat

Townsend's big-eared bats (*Corynorhinus townsendii*) are BLM Sensitive Species and Wyoming Special Status Species (G4/S2) (WYNDD 2008). They are dependent upon caves or mine adits for shelter (Sherwin et al. 2000). There is some evidence they may utilize trees as temporary day roosts (Miller et al. 2003). Within the proposed area, large diameter juniper or pinyon pine trees are most likely to provide such roosts. Townsend's big-eared bats have the potential to occur in the proposal area.

3.5.3.3 Spotted Bats

Spotted bats (*Euderma maculatum*) generally roost on cliffs (Wai-Ping and Fenton 1989). Thus, scattered rock outcrops in the project area may provide some marginal habitat. Spotted bats have the potential to occur in the proposal area.

3.5.3.4 Swift Fox

Swift foxes (*Vulpes velox*) occupy interior rangelands. Predation from coyotes may be the main threat, although predator control and diseases like distemper can have severe adverse impacts (Olsen and Lindzey 2002). Dark-Smiley and Keinath (2003) concluded that the distribution of swift foxes is limited to the southeastern corner of Wyoming. Therefore, the swift fox is not expected to be present in the proposal area.

3.5.3.5 Midget Faded Rattlesnake

The midget faded rattlesnake *(Crotalus concolor)* is a BLM Sensitive Species and Wyoming Special Status Species (WYNDD 2008), and is the smallest member of the nine western rattlesnakes. It makes short seasonal movements and can be found in the vicinity of its den throughout the active season (Ashton and Patton 2001; Ashton 2003; Parker and Anderson 2007). Though population densities are lower than other subspecies of the western rattlesnake, populations still remain relatively dense around rock outcrops used for communal denning sites (Parker and Anderson 2007). Midget faded rattlesnakes were observed at approximately 25% of known Green River Basin sites containing rock outcrops (Parker and Anderson 2007). They conducted a study of the ecology and behavior of midget faded rattlesnakes in the Flaming Gorge area from 2000 to 2002 and observed 13 den locations and over 400 snakes. The elevation range for the dens was between 1,840 m and 1,975 m, and snakes were located between 1,840 m and 2,125 m. Figure 3.5-3 (Appendix A) shows the suitable elevation ranges in relationship to the proposal areas. According to this map, the North Well is located near potentially suitable habitat. A BLM field inventory of the areas immediately adjacent to the well sites was conducted by the wildlife specialist. She concluded there were no rock outcrops near either well pad or access road that would comprise suitable habitat (L. Keith, BLM, pers. comm., March 2008).

3.5.3.6 Great Basin Spadefoot Toad

Great Basin spadefoot toads (*Spea intermontana*) breed where permanent or temporary water bodies are present, but spend the majority of their lifespan in upland sites. Spadefoot toads prefer xeric bunchgrass-dominated sites (Maxell 2000), and are potentially present in or near the proposal area. The Great Basin spadefoot toad is both a BLM sensitive species and Wyoming special status species (WYNDD 2008).

3.5.3.7 Colorado River Cutthroat Trout

The Colorado River Cutthroat Trout (CRCT) (*Oncorhynchus clarki pleuriticus*) is of primary management concern in the Sage Creek watershed. The CRCT is the only trout native to the Green and Little Snake river drainages in Wyoming. The CRCT now occupies less than 1% of its historic range (CDOW 2006). The CRCT is currently being evaluated by the U. S. Fish and Wildlife Service (USFWS) for listing under the Endangered Species Act (ESA). The CRCT is also a BLM listed Sensitive Species and a State Species of Special Concern.

The North Well is located in the Sage Creek portion of the Greater Red Creek ACEC. According to the Green River RMP, all resource and land uses are to be managed in support of watershed stability and CRCT habitat management objectives (BLM 1997). According to *Range-wide Status of Colorado River Cutthroat Trout* (CDOW 2006) there are populations of CRCT in Sage, Trout, and Gooseberry creeks of the Sage Creek watershed. The CRCT populations in the Sage Creek watershed are considered to be isolated conservation populations that are at risk of hybridizing or have already hybridized with non-native cutthroat trout. Most of the CRCT occupied habitat through the watershed is in fair condition, but Gooseberry Creek and a portion of Trout Creek are in poor condition (CDOW 2006). There is an estimated 28 miles of potentially occupied CRCT habitat in the Sage Creek watershed. In Lower Trout Creek there is an estimated CRCT population density of 151-400 fish per stream mile, with that number decreasing further upstream. Trout Creek CRCT population density estimates range from zero to fifty fish per stream mile.

3.5.3.8 Flannelmouth Sucker

The flannelmouth sucker *(Catostomus latipinnis)* is approximately 22 inches long and well adapted to living and migrating in strong currents of river systems. In the spring it migrates up smaller stream systems where it breeds. It is reported by the WGFD as inhabiting Sage Creek downstream from the confluence with Trout Creek (L. Keith, BLM, pers. comm., March 2008). The flannelmouth is in decline across its range as a result of alteration of flow regimes, flood control and subsequent alterations in spawning areas, stream dewatering, and competition with non-native fish. A significant issue is hybridization with white suckers (*Catostomus commsonii*) (WYNDD 2008).

The flannelmouth sucker is a BLM sensitive species and also a State Species of Special Concern. Because of ongoing habitat loss and greatly restricted or declining populations that could lead to extirpation, the flannelmouth has a Wyoming Native Species Status rating of 1, the State's most imperiled status.

3.5.6 Sensitive Plant Species

Table 3.5-1 is a summary of the sensitive plant species analyzed for this project, and includes special status designation and heritage rank. The primary data source for plant species potentially present in the Baxter Proposal area was the Wyoming Natural Diversity Database (WYNDD).

Table 3.5-1. Sensitive Plant Species Potentially Present in the Baxter Proposal Area

Common Name *(Scientific Name)*	Family	Global Rank[1]	State Rank[1]	BLM Status
Ownbey's Thistle *(Cirsium ownbeyi)*	Asteraceae	G3	S2	Sensitive
Erect Cryptantha *(Cryptantha stricta)*	Boraginaceae	G3	S3	Sensitive
Daggett Rock Cress *(Boechera pendulina var. russeola)*	Brassicaceae	G5	S3	Sensitive
Uinta Draba *(Draba juniperina)*	Brassicaceae	G2	S2	Sensitive
Garrett's Beardtongue *(Penstemon scariosus var. garrettii)*	Scrophulariaceae	G4	S1	Sensitive
White fir *(Abies concolor)*	Pinaceae	G5	S1	Sensitive
Ute Ladies'-tresses *(Spiranthes diluvialis)*	Orchidaceae	G3	S1	Sensitive

[1]**Heritage Rank:** WYNDD uses a standardized ranking system originally developed by The Nature Conservancy and its network of natural heritage programs (now coordinated by Nature Serve [Arlington, Virginia]) to indicate the probability of extinction, at both the global and state scales, of each plant and animal taxon. The following letters denote the spatial scale at which a taxon's status is scored : G = Global rank: refers to the range-wide probability of extinction for a species; S = State rank: refers to probability of extinction from WY for a given species. These letters are each followed by a numeric, 1-5 score: 1 = Critically imperiled because of extreme rarity (often <5 extant occurrences) or because some factor makes it highly vulnerable to extinction; 2 = Imperiled because of rarity (often 6-20 extant occurrences) or because of factors making it vulnerable to extinction; 3 = Rare or local throughout its range or found locally in a restricted range (often 21-100 known occurrences); 4 = Apparently secure, although it may be quite rare in parts of its range, especially at the periphery; 5 = Demonstrably secure, although it may be rare in parts of its range, especially at the periphery.

3.5.6.1 Ownbey's Thistle

The Ownbey's thistle *(Cirsium ownbeyi)* is a regionally endemic species located in northwestern Colorado, southeastern Utah, and southwestern Colorado. Ownbey's thistle is a BLM listed sensitive species and State species of concern. The only known occurrences in Wyoming are in an areas east of the Flaming Gorge Reservoir. One population is known to exist in the Sage Creek portion of the Greater Red Creek ACEC. Ownbey's thistle is often found at the base of shale cliffs, but can also be found along shale flats and rim tops at elevations ranging from 6,440 to 8,200 feet. It is often associated with soils consisting of loose shale and sandy clay soils covered by slate fragments, and in sparsely vegetated areas generally associated with desert shrub communities (WYNDD, pers. comm. March 10, 2008). It can also be found in areas along dirt two track roads with loose shale soils (J. Glennon, BLM, pers. comm. March 2008). The population is thought to be stable, but long-term monitoring information is not available. There are limited threats to the plant due to its rugged habitat and because it is relatively unpalatable to wildlife (WYNDD 2008). While the WYNDD shows the thistle to be present within 2.1 miles of the proposal area, based on lack of suitable habitat, Ownbey's thistle is not likely to be found in the Baxter proposal area (J. Glennon, BLM, pers. comm. March 2008).

3.5.6.2 Erect Cryptantha

Erect cryptantha, *(Cryptantha stricta*), also known as the Yampa River cryptantha, is a perennial forb found in Sweetwater County in the southwestern corner of Wyoming. It is found in grassland, sagebrush,

and juniper communities in rocky soils. Based on the WYNDD, this species is known to occur within 5 miles of the Baxter proposal area (WYNDD 2008).

3.5.6.3 Daggett Rock Cress

Daggett rock cress *(Boechera pendulina var. russeola)* is a perennial forb found in Wyoming, Utah, and Colorado. It is found in sagebrush and juniper communities in granitic or limestone soils. Based on the WYNDD this species is known to occur within 5 miles of the Baxter proposal area (WYNDD 2008).

3.5.6.4 Uinta Draba

Uinta Draba *(Draba juniperina)* is a mat-forming perennial herb found on the east side of the Flaming Gorge Recreation Area in Sweetwater County. It is primarily found in juniper woodlands on sandy-clay gravelly soil with abundant cryptogamic crusts and needle duff. The population is secure, but can be negatively affected by disturbances, such as off-road vehicles. Based on the WYNDD this species is known to occur within 5 miles of the Baxter proposal area (WYNDD 2008). However, the species is not found in recently burned areas.

3.5.6.5 Garrett's Beardtongue

Garrett's Beardtongue *(Penstemon scariosus var. garrettii)* is found in rolling semi-barren badlands on clay soils, openings within sagebrush-shrublands communities, on gentle clay slopes covered with small slate fragments, or on steep clay or talus slopes covered with brown to bluish-gray slate chips below steep cliffs at elevations of 5,000 to 6,800 feet.

3.5.6.6 White Fir

The white fir *(Abies concolor)* is found on south facing slopes on dry shallow soils and is typical of foothills and lower slopes of mountains. It is often associated with aspen or lodgepole pine. It is found in southwest Wyoming in Sweetwater County. This species is relatively abundant throughout its range. However, it is sparse in Wyoming.

3.6 HAZARDOUS MATERIALS - AND WASTES

3.6.1 Hazardous Materials

Devon anticipates use of limited quantities of hazardous materials during drilling and completion of the proposed gas wells. The term hazardous materials is generally defined as any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a hazard to human health or the environment.

Hazardous materials are defined and regulated primarily by laws and regulations administered by the U.S. Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the U.S. Department of Transportation (DOT). Each has its own definition of hazardous material and procedures for handling, disposing of, and spill response requirements. Hazardous materials can include substances the in the following categories:

- Flammable and Combustible Material,
- Toxic Material,
- Corrosive Material,
- Oxidizers,
- Aerosols and Compressed Gases,
- Radioactive Materials

Hazardous materials anticipated to be used or produced from this proposed action might come from fuels, drilling materials, bore plugging materials, geophysical survey materials, vehicle emissions, and other miscellaneous materials.

For the purposes of this EA, hazardous materials are defined as those substances listed in the Environmental Protection Agency (EPA) *List of Hazardous Substances* (40 Code of Federal Regulations [CFR] 302) and extremely hazardous materials are those identified in the EPA *List of Extremely Hazardous Substances* (40 CFR 355).

BLM instruction memorandum WO-93-344 requires all NEPA documents to list and describe hazardous materials that would be produced, used, stored, transported and disposed of as a result of the proposed action. The intent of that policy is to ensure that the public has the opportunity to be advised and informed regarding the use of hazardous materials on the public lands. This covers chemicals included in the EPA *List of Hazardous Substances* that are produced, stored, transported, or disposed in quantities in excess of 10,000 pounds, or any chemical on the EPA *List of Extremely Hazardous Substances* that are produced, stored, transported, or disposed of in any quantity. If either of these conditions is expected to exist as part of the project, the EA shall include a narrative description of chemicals intended uses, storage, transport, and disposal plans (BLM, 1997).

No Extremely Hazardous Substances will be used in this project. Quantities less than 10,000 pounds of some hazardous materials may be used or generated in this project. These include potential hazardous materials associated with the natural gas stream, condensates, produced water, fuels, lubricants, drilling and fracing fluids, and other miscellaneous fluids. A complete set of Material Safety Data Sheets (MSDS), listing all the potential hazardous materials is included in the Emergency Response Plan (ERP) and the Spill Prevention Control and Countermeasures (SPCC) Plan both available from Devon.

Devon will prepare and implement plans and/or policies to ensure environmental protection from hazardous and extremely hazardous materials. Copies of these plans and policies are kept on site. Devon and its contractors will ensure that all production, use, storage, transport, and disposal of hazardous and extremely hazardous materials as a result of the proposed project would be in accordance with all applicable existing federal, state, and local government rules, regulations, and guidelines. Devon will comply with emergency reporting requirements for releases of hazardous materials. Any release of hazardous substances in excess of the reportable quantity will be reported to the BLM AO and EPA within the required reporting period.

3.6.2 Hazardous Wastes

Hazardous wastes are regulated under Resource Conservation and Recovery Act (RCRA) Subtitle C. The objective of the subtitle C program is to ensure that hazardous waste is handled in a manner that protects

human health and the environment (EPA, 2006). Hazardous waste generators are encouraged to avoid generating hazardous waste by using non-hazardous material where possible, reducing the amount of hazardous materials on hand to just what is needed, and to recycle hazardous wastes were possible.

Activities directly related to the Baxter proposal are not expected to generate any hazardous waste, but if wastes are generated, Devon is required to follow all applicable RCRA regulations.

3.7 GEOLOGY & MINERAL RESOURCES

For purposes of this assessment, the geologic analysis area encompasses the area from west of the Rock Springs uplift to Flaming Gorge Reservoir. This includes the Sage Creek portion of the Greater Red Creek ACEC and the Sugarloaf SMA.

3.7.1 Regional Geology

The proposed wells are within the southeastern portion of the Green River Basin, the largest subbasin of the Greater Green River Basin. The broad synclinal basin encompasses approximately 10,000 square miles in southwestern Wyoming and is bounded by the Wind River Mountains to the north and northwest, the Rock Springs Uplift to the east, the western Wyoming thrust belt to the west, and the Uinta Mountains to the south.

The Green River Basin consists of approximately 26,000 feet of Paleozoic to Cenozoic age sedimentary rocks overlying crystalline Precambrian basement rock (Bradley 1964; Mason and Miller 2004). The oldest and deepest rocks (Late Cambrian to Cretaceous age) are predominately sandstone, shale, and limestone of marine origin exposed in the uplifted areas around the basin margin. The youngest rock is Tertiary to Quaternary age (Cenozoic) and includes the Green River and Wasatch Formations which are widely exposed at the surface. The Cretaceous and Tertiary strata are major sources of oil and gas, oil shale, coal, and sodium minerals (trona and halite) in the Rocky Mountain Region.

3.7.1.1 Well Site Geology

The majority of the area is underlain by the Tertiary (Eocene) Green River and Wasatch Formations (Table 3.7-1, Appendix A). The estimated combined thickness of the two formations ranges from 3,000 to about 6,200 feet (Roberts 2005). The Green River Formation underlies the western portion of the study area and includes, from west to east, the Laney Member, the undifferentiated Wilkins Peak-Tipton Shale Members, and the Luman Tongue. The Wasatch Formation interfingers with and underlies the Green River Formation. It is exposed in an arcuate band that extends from the west flank of the Rock Springs uplift south and west to Flaming Gorge Reservoir. The Oligocene Bishop Conglomerate caps many of the ridges and bluffs. Surficial deposits overlie bedrock in many areas and include Quaternary alluvium in the drainage bottoms, numerous landslide deposits, and shallow accumulations of slopewash and colluvium (Case et al. 1998).

The North Well and access road are located in an area underlain by the Main body of the Wasatch Formation. The predominant lithologies are mudstone and interbedded sandstone and siltstone. The Main body is approximately 1,236 feet thick at a measured stratigraphic reference section on the west side of the Rock Springs uplift (Roehler 1992). The South Well and access road are located near the contact

between the Main body of the Wasatch Formation and the undivided Wilkins Peak and Tipton Shale Members of the Green River Formation. The Wilkins Peak Member is noted for an abundance of saline minerals and trona deposits within a succession of sandstone, siltstone, mudstone, clay-shale, and oil shale (Roberts 2005). The thickness of this member is approximately 1,068 feet (Roehler 1992). The Tipton Shale Member consists of shale and organic marlstones and can be several hundred feet thick (Roehler 1992).

3.7.2 Mineral Resources

The primary mineral resources in the Green River Basin include oil and gas, oil shale, coal, and sodium minerals (trona and halite).

3.7.2.1 Sodium Minerals

Economic deposits of trona and halite are found in the Wilkins Peak Member of the Green River Formation (Roehler 1992). The known sodium leasing areas (KSLAs) are outside the Baxter proposal area, primarily to the west of Flaming Gorge Reservoir. The analysis area is considered to have low sodium development potential (BLM 1997).

3.7.2.2 Oil Shale

The Baxter Proposal is near the southeastern limit of the most geologically prospective oil shale resources in the Green River Basin (BLM 2007). The oil shale resources are within the Green River Formation and are generally of lower grade (average 15 gallons/ton or greater than 15 feet thick) than comparable resources in Utah and Colorado (average 25 gallons/ton or greater than 25 feet thick). The thickness of the overburden in this area (greater than 500 feet) would preclude surface mining. BLM land in the analysis area with potential oil shale resources is currently under oil shale withdrawal (BLM 1997). Production of oil shale remains in the development stage and, in conjunction with the lower grades and overburden depths, there appears to be low or no potential for development in the foreseeable future.

3.7.2.3 Coal

The analysis area is in the southwestern corner of the Green River Coal Field and contains potential coal resources in the Wasatch, Fort Union, and Lance Formations and the Mesaverde Group. Strippable coal deposits are not present in the analysis area and the resource value of coal beds in the Wasatch Formation is considered minimal (Root et al. 1973). Potential coal resources in the Fort Union Formation, Lance Formation, and Meseverde Group are buried by several thousand feet deep of overburden and unlikely to be developed.

The Green River RMP identifies about 9,600 acres of federal and state coal in the Sage Creek watershed that are acceptable for further consideration for development by surface and subsurface coal mining methods. Large tracts of land in the vicinity of the proposed wells are under a coal withdrawal, including the area around the South Well and the area east of the North Well, along the southern margin of the Rock Springs uplift (BLM 1997). The nearest active coal mining is at the Jim Bridger and Black Butte mines along the east flank of the Rock Springs uplift.

3.7.2.4 Coalbed Methane

The Tertiary Green River and Wasatch Formations and the Upper Cretaceous Mesaverde Group (primarily the Almond Formation) are potential targets for coalbed methane exploration in the analysis area. Early-stage gas exploration has targeted the Wilkin Peak Member of the Green River Formation in the Washakie and Great Divide Basin, but there is currently no commercial production from this unit in those areas (Roberts 2005). The extent of coal beds suitable for methane gas generation in the Wasatch Formation west of the Rock Springs uplift is not well constrained, but the coal beds are likely of marginal quality because the primary depositional centers for coal beds in the Wasatch Formation were further east in the Washakie and Great Divide Basins.

The Mesaverde Group occurs in the subsurface in the analysis area and is exposed to the east in the Rock Springs uplift. With the exception of the area on the west flank of the uplift, most of the coal beds in the Mesaverde Group may be buried too deeply for methane gas generation (Johnson et al. 2004). Although there is potential for coalbed methane development in the analysis area, it is more likely that development in the foreseeable future will occur further east, in the eastern portion of the Green River Coal Field.

3.7.2.5 Oil and Gas

There have been 12 exploration wells drilled in the vicinity of the Baxter proposal area (Wyoming Oil and Gas Commission 2008). Five wells were within the Sage Creek Portion of the Greater Red Creek ACEC and seven were within the Sugarloaf Basin SMA (see Figure 3.7-1, Appendix A). These exploratory wells were drilled between 1957 to 1981. The well depths ranged from 4,950 feet below ground surface (bgs) to 21,161 feet bgs. Eleven were gas wells, one was an oil well, and all have been permanently abandoned. There was no production from any of the wells.

The majority of exploration and development in the vicinity of the proposal area has been to the west and northwest in the Rock Springs uplift area. The closest producing wells to the North Well are approximately 9 miles to the east in the Baxter Basin South and Little Worm Creek gas fields. The Middle Mountain South gas field is approximately 19 miles east of the South Well and has one producing well.

3.7.3 Geologic Hazards

Potential geologic hazards include seismic hazards (fault-related earthquakes, mining-related earthquakes, surface rupture from active faults) and landslides.

There are no active faults within the analysis area and historically there has been very little seismic activity. The nearest known active faults are in the Chicken Springs fault system located in the northeast corner of Sweetwater County (Case et al. 2002). Seismic records show the largest recorded natural earthquake (magnitude 2.2) was located approximately 6.5 miles north of the South Well. Small earthquakes associated with mining activity have also occurred in the area.

A number of landslides are present near the proposal area, primarily along the steeper slopes of Little Mountain. Numerous small debris-flow type landslide deposits occur along stream drainages (WSGS 2008). The larger landslides are within the mudstones and siltstones of the Green River and Wasatch Formations.

3.8 PALEONTOLOGY

3.8.1 Bedrock Geology

The North Well and the associated proposed access road are underlain by bedrock of the Wasatch Formation. The South Well and its proposed access road are underlain by bedrock of the main body of the Wasatch Formation and the Wilkins Peak Member of the Green River Formation, the two formations interfingering with one another in strata underlying the well pad.

Bedrock underlying the well pads and access roads is for the most part overlain by a varying thickness of surficial deposits of alluvium, colluvium and aeolian sediments of Quaternary (Recent) age. Satellite imagery suggests that the surficial deposits are relatively thin and as a result the underlying bedrock will be encountered during excavation, of the well pad sites. This is especially true of any cut and fill and cutting pit excavations.

3.8.1.1 Wasatch Formation (Main Body)

The Wasatch Formation consists chiefly of early Eocene age flood-plain deposits that overlie the Paleocene age Fort Union Formation (Bradley 1964). The flood-plain deposits have two distinct color patterns. Around the basin edges the flood-plain deposits range from red to varicolored, with some shade of red dominating. The red coloration appears to be a result of oxidation of iron compounds in well-drained, well-aerated soils that formed in sediments that accumulated in areas of moderate topographic relief. In the central parts of the basin these red flood plain deposits are replaced laterally by green to gray flood-plain deposits. The green to gray coloration appears to have been the result of accumulation of sediments in areas that were permanently water saturated where iron compounds were reduced. In addition to flood-plain deposits, the main body of the Wasatch Formation includes some freshwater limestones that accumulated in ponds and marshes in low lying areas and some coarse-grained sands and conglomerates that accumulated along the basin margin in alluvial fan environments.

The high paleontological potential of the Wasatch Formation southern Wyoming is well known (Holroyd, 1999). In many areas the main body of the Wasatch contains local accumulations of the fossils of vertebrates (fish, turtles, crocodiles, birds and mammals), invertebrates (snails and clams), traces and tracks of these organisms, as well as plants. For this reason the Wasatch Formation satisfies Potential Fossil Yield Classification (PFYC) 4 or 5 depending on the outcrop exposures present.

Few fossil localities are known from the Wasatch Formation in the vicinity of the proposed well pads. In a 1992 survey for the Questar Fidlar pipeline expansion G. Winterfeld at Erathem Vanir Geological (EVG) discovered four fossil locations in the Wasatch Formation of which two were located in the area covered by the Richards Gap Quadrangle (Kanda mile post (MP) 87 and 90.2) and two in the area covered by the Maxon Ranch Quadrangle (Kanda MP 93.7 and 94). Monitoring of a pipeline excavation in 2006 in the area covered by the Maxon Ranch Quadrangle (EVG 2007) led to the discovery of fragmentary fossil vertebrate at several locations in area. None of this material was considered of enough scientific significance to warrant collection and curation, but did serve as an important indicator of paleontological specimens potentially present in the area.

Even in well-exposed areas (i.e., the Red Creek Badlands) the Wasatch Formation in the general vicinity of the well pads is not known to be fossil rich. Bown (2007) reported finding a few partial mammal jaws

and a few isolated mammal teeth after nearly a week of work prospecting in the Red Creek badlands. The specimens Bown collected were curated at the University of Wyoming. A Survey for the Kanda Pipeline (EVG 2007), which skirts these badlands along their western extent, led to the discovery of only one fossil locality. At this location a number of fragmentary and weathered fossil vertebrate bones were identified, including a partial leg fragment of what is thought to have come from the extinct giant ground bird *Diatryma*.

3.8.1.1 Wilkins Peak Member

The Wilkins Peak member consists of many layers of recurring sediments that include oil shale, trona, halite, and mudstone. These sediments accumulated at the center of the former Lake Gosiute and record repeated lake expansion and restriction. Fossils of plants, invertebrates, and vertebrates have been reported from the Wilkins Peak Member. Well-preserved fossil leaves, insects and fish are known from several localities in the upper part of the member (Roehler, 1993). Fossil plant fragments, fish bones, ostracods, and bird bones (possibly flamingo) have been reported from the lower part of the member along the western side of the Washakie Basin. Hundreds of fossil flamingo bones, apparently the remains of a large nesting colony, may have been collected from rocks of the lower part of the Wilkins Peak. A Survey of a proposed western loop of the Kanda Pipeline, which goes from the Firehole Basin southward into Utah and passes near the two proposed wells, did not result in the discovery of any fossils (EVG 2007).

3.8.2 Paleontological Sensitivity/Ratings

In 2007 the BLM began classifying geological deposits with respect to paleontological resources using the Probable Fossil Yield Classification (PFYC) system. The PFYC, which replaces the Paleontology Condition classification previously used, is a tool developed by the Paleontology Center of Excellence and the Region 2 Initiative, whereby geological units are classified according to the probability of yielding paleontological resources of concern to land managers. Formations with a ranking of 3 or higher require consideration of mitigation during environmental review.

The Wasatch and Green River Formations are considered by the BLM to have a high paleontological sensitivity (Hansen, 2007) and have a PFYC ranking of 4 or 5, depending on the nature of exposure present. These classes are defined as follows:

Class 4 geologic units are similar to Class 5 units (see below) but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation. These units may have significant soil/vegetative cover; or include areas where outcrops are not likely to be impacted. They may also include areas of exposed outcrop that are smaller than two contiguous acres; have outcrops that form cliffs of sufficient height and slope that they are, for the most part, out of reach by normal means; or have other characteristics that lower the vulnerability of both known and unidentified fossil sites. The land manager's concern for paleo-resources in Class 4 areas tends toward management and away from unregulated access.

Class 5 geologic units include highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant non-vertebrate fossils, and that are at risk of natural degradation and/or human-caused adverse impacts. Class 5 geological units are known to yield vertebrate

fossils and/or scientifically significant non-vertebrate fossils consistently, predictably, and/or abundantly. They are exposed with little or no soil/vegetative cover; include outcrop areas that are extensive, with discontinuous areas larger than two contiguous acres, or outcrops that erode readily and may form badlands that have easy access to extensive outcrops in remote areas; and may have other characteristics that increase the sensitivity of both known and unidentified fossil sites. The land manager's highest concern for paleo-resources focuses on Class 5 areas.

3.9 SOIL RESOURCES

Soils information for the area around the two Baxter Proposal wells were obtained from the Sweetwater County Natural Resources Conservation Service (NRCS) office. The information is from the Sweetwater County Soil Survey Area 751, which is an unpublished survey that is in draft form and subject to change. Portions of the June 1979 NRCS soils descriptions for the dominant soils types at each well site are summarized below.

3.9.1 North Well

The North Well is located within the Rentsac-Blackhall complex, a cool soil with 20 to 50 percent slopes. This map unit is on steep residual uplands; slopes are irregular and broken; and elevation is 6,900 to 8,000 feet. The average annual precipitation is about 10 to 14 inches, the average annual air temperature is 35 to 40 degrees F, and the average frost-free period is 60 to 90 days.

The soil complex is 40 percent Rentsac channery sandy loam, thin solum; 20 percent Rentsac loam; and 15 percent Blackhall sandy loam. The Rentsac, thin solum soil is very shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is pale brown channery sandy loam about 2 inches thick. The substratum is very pale brown channery sandy loam and about 2 inches thick. The underlying material to a depth of 10 inches is very pale brown channery loam. In some areas the surface layer is channery loam. Depth to hard sandstone bedrock is 10 to 20 inches. Permeability of the Rentsac, thin solum soil is moderately rapid. Available water capacity is about ½ to 1 inch. Effective rooting depth is less than 10 inches. Runoff is rapid and the hazard of water erosion is severe. The hazard of soil blowing is severe.

The Blackhall soil is shallow and well drained. It formed in residuum derived from sandstone. Typically, the surface layer is light yellowish brown sandy loam about 6 inches thick. The underlying material to a depth of 20 inches is very pale brown sandy loam. In some areas the surface texture is loam or fine sandy loam. Depth to soft sandstone bedrock ranges from 10 to 20 inches. Permeability of the Blackhall soil is moderate. Available water capacity ranges from 1.5 to 3 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of soil blowing is moderate. Table 3.9-1 provides a summary of the dominant soil features a the location of the proposed North Well.

Table 3.9-1. Summary of Dominant Soil Features at North Well Location

Soil Feature	Rentsac, Thin Solum	Rentsac	Blackhall
Depth	Very Shallow	Shallow	Shallow
Drainage	Well Drained	Well Drained	Well Drained
Permeability	Moderately Rapid	Moderately rapid	Moderate

Soil Feature	Rentsac, Thin Solum	Rentsac	Blackhall
Available Water Capacity	0.5 to 1 inch	1 to 3 inches	1.5 to 3 inches
Rooting Depth	<10 inches	10 to 20 inches	10 to 20 inches
Depth to Bedrock	4 to 10 inches	10 to 20 inches	10 to 20 inches
Run off	Rapid	Rapid	Medium to rapid
Wind Erosion	Severe	Severe	Moderate
Water Erosion	Severe	Severe	Moderate to Severe
Shrink-swell	Low	Low	Low
Ecological Site	Shallow Breaks 10–14W	Shallow Breaks 10–14W	Shallow-Breaks 10–14W

3.9.2 South Well

The South Well is located on the Redcreek-Thermopolis complex, 3 to 30 percent slopes. This map unit is undulating to hilly residual uplands. Slopes are smooth to irregular and broken. This unit is 40 percent Redcreek sandy loam and 20 percent Thermopolis sandy loam. Also in this unit is about 15 percent Redwash sandy loam and 15 percent rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. The Redcreek soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 3 inches thick. The subsoil is reddish yellow fine sandy loam about 10 inches thick over sandstone. Depth to sandstone bedrock ranges from 10 to 20 inches. Permeability of the Redcreek soil is moderately rapid. Available water capacity is about 1.5 to 3 inches. Effective rooting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of soil blowing is moderate.

The Thermopolis soil is shallow and well drained. It formed in residuum derived dominantly from shale. Typically, the surface layer is light brown sandy loam about 2 inches thick. The subsoil is brown to pinkish gray loam about 15 inches thick over reddish brown platy shale. Depth to shale bedrock ranges from 10 to 20 inches. Permeability of the Thermopolis soil is moderate. Available water capacity is about 1.5 to 3.5 inches. Effective rooting depth is 10 to 20 inches. Runoff is medium to rapid, and the hazard of water erosion is moderate to severe. The hazard of soil blowing is moderate.

Table 3.9-2. Summary of Dominant Soil Features at South Well

Soil Feature	Red Creek	Thermopolis
Depth	Shallow	Shallow
Drainage	Well Drained	Well Drained
Permeability	Moderately Rapid	Moderate
Available Water Capacity	1.5 to 3 inches	1.5 to 3.5 inches
Run off	Medium to Rapid	Medium to Rapid
Rooting Depth	10 to 20 inches	10 to 20 inches
Depth to Bedrock	10 to 20 inches	10 to 20 inches
Wind Erosion	Moderate	Moderate

Soil Feature	Red Creek	Thermopolis
Water Erosion	Moderate to Severe	Moderate to Severe
Ecological Site	Shallow-Loamy 10–14	Shallow-Loamy 10–14

The Green River RMP (BLM 1997) provides management objectives and actions to protect the soil resources. The management objectives for watersheds and soils are:

- Stabilize and conserve soils
- Increase vegetative production
- Maintain or improve surface and groundwater quality; and
- Protect, maintain, or improve wetlands, floodplains, and riparian areas.

3.10 VEGETATION

Vegetation resources within the Baxter proposal area are best understood in terms of plant communities and key species within those communities. Several data sources were evaluated to best understand the current vegetation communities. The plant community composition is provided below. Riparian and wetland communities were reviewed and evaluated from both the BLM data sets and a query of the National Wetlands Inventory. The unpublished NRCS Sweetwater County Wyoming Soil Survey (SCS 1979) provides mapping unit, soil series, and range site descriptions for the project area. This soil information is used to interpret ecological sites and the plants found within those ecological groupings. While this particular Soil Survey was conducted in the late 1970s, it is still a draft and subject to change. No field inspection has taken place to verify plant species.

The BLM, in the Instruction Memorandum No. 2007-202 (BLM 2007) notes that "the BLM utilizes ecological sites as the method to divide rangeland into basic units for study, evaluation and management". Ecological sites best describe plant communities and are used to understand Historic Climax Plant Community (HCPC). For the purposes of this EA, the NRCS-developed ecological site information for Wyoming was the primary source of information regarding plant communities (NRCS 2005).

3.10.1 Vegetation Communities

In the NRCS Shallow Breaks 10-14W ecological site description report (USDA 2008), the plant communities in the area of the Baxter Proposal occur in three states. The Historic Climax Plant Community (HCPC) is a bluebunch wheatgrass/juniper state. A second state results from heavy season-long grazing and is the juniper/Wyoming big sage state. The third state is the cheatgrass state. The HCPC evolved with grazing by large herbivores. Vegetation state descriptions are included below (WYNDD 2008).

3.10.1.1 North Well Site

The majority of the North Well site is covered by the Rentsac-Blackhall complex soil mapping unit (522) (see Section 3.9, Soils). The primary vegetation community associated with this soil is juniper woodland with a sparse herbaceous understory and much bare ground.

Bluebunch Wheatgrass/Juniper Plant Community

In the bluebunch wheatgrass/juniper plant community, vegetation is typically about 50% grasses or grass-like plants, 10% forbs, and 40% woody plants. The major grasses include bluebunch wheatgrass, Canby bluegrass, rhizomatous wheatgrass, Indian ricegrass, and needle-and-thread. Other grasses include Sandberg and mutton bluegrass, prairie junegrass, Letterman needlegrass, bottlebrush squirreltail, plains reedgrass, and thread-leaf sedge. Junipers and Wyoming big sagebrush are the dominant woody plants. Other woody plants include bitterbrush, limber pine, black sagebrush, and green rabbitbrush (Table 3.10-1).

Table 3.10-1. Plant Species Associated with Vegetation Communities

Common Name	Scientific Name
Basin big sagebrush	*Artemisia tridentata* ssp. *tridentata*
Bitterbrush	*Purshia tridentate*
Bluebunch wheatgrass	*Pseudoroegneria spicata*
Bottlebrush squirreltail	*Eymus elymoides*
Canby bluegrass	*Poa canbyi*
Cheatgrass	*Bromus tectorum*
Cottonwood	*Populus sp.*
Green rabbitbrush	*Ericameria viscidiflora*
Indian ricegrass	*Achnatherum hymenoides*
Juniper	*Juniper spp.*
Letterman's needlegrass	*Achnatherum Lettermanii*
Limber pine	*Pinus flexilis*
Mutton bluegrass	*Poa fendleriana*
Needle-and-thread	*Hesperostipa comata*
Thread-leaf sedge	*Carex filifolia*
Plains reedgrass	*Calmagrostis montanensis*
Prairie junegrass	*Koeleria macrantha*
Sandberg bluegrass	*Poa secunda*
Western phlox	*Phlox sp.*
Western yarrow	*Achillea millefolium*
Wheatgrass	*Agropyron sp.*
Willow	*Salix spp.*
Winterfar	*Krascheninnikovia lanata*
Wyoming big sagebrush	*Artemisia tridentata* ssp. *Wyomingensis*
Wyoming low sagebrush	*Artemisia arbuscula* ssp. *thermopola*

Juniper/Wyoming Big Sagebrush Plant Community

The Juniper/Wyoming big sagebrush plant community is the result of frequent and severe grazing in the absence of fire or brush management. Juniper, Wyoming big sagebrush, and other woody species dominate this community, often exceeding 80% of the annual production. Rhizomatous wheatgrass and annual forbs make up the majority of the understory.

Cheatgrass Plant Community

The cheatgrass plant community is the result of wildfire or a hot prescribed fire. Dominant species include green rabbitbrush and rhizomatous wheatgrass. Cheatgrass often invades, on south and west facing slopes, in particular, effectively increasing the fire frequency and preventing the re-establishment of non-sprouting woody species. The total annual production (air-dry weight) of this state is about 400 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 600 lbs./acre in above average years.

3.10.1.2 South Well Site

The South Well site is mapped as the Redcreek-Thermopolis complex with 3-30% slopes, which consists of Shallow Loamy 10-14W ecological site (R034AY262WY). The HCPC is the bluebunch wheatgrass/Wyoming big sage plant community (NRCS 2005).

Bluebunch Wheatgrass/Wyoming Big Sage Plant Community

Potential vegetation in the bluebunch wheatgrass/Wyoming big sage community is about 75% grasses or grass-like plants, 10% forbs, and 15% woody plants. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrass, Indian ricegrass, needle-and-thread, and bottlebrush squirreltail. Other grasses include Canby, mutton, and Sandberg bluegrass, Letterman needlegrass, thread-leaf sedge, plains reedgrass, and prairie junegrass. Big sagebrush is the major woody plant. Other woody plants include green rabbitbrush and winterfat. A typical plant composition for this state consists of bluebunch wheatgrass 10-25%, rhizomatous wheatgrass 10-25%, needle-and-thread 5-15%, Indian ricegrass 5-15%, bottlebrush squirreltail 5-10%, other grasses and grass-like plants 10-20%, perennial forbs 5-10%, Wyoming big sagebrush 5-10%, and 5-10% other woody species. Ground cover, by ocular estimate, varies greatly depending on the amount of exposed parent material, and herbage cover ranges from 15-30%.

Wyoming Big Sage/Rhizomatous Wheatgrass Plant Community

The Wyoming big sagebrush/ rhizomatous wheatgrass plant community is the result of frequent and severe grazing. Intermixed Wyoming big and low sagebrush are a significant component of this plant community, often making up 15-40% of the annual production. Thickspike wheatgrass, Letterman needlegrass, and unpalatable annual and perennial forbs dominate the herbaceous understory. Green rabbitbrush and bare ground have increased. Western yarrow and phlox are often significant components of this site.

Wyoming Big Sagebrush/Cheatgrass Plant Community

The Wyoming big sagebrush/cheatgrass plant community is the result of severe ground disturbance, including very severe grazing. Dominant species include intermixed Wyoming big and low sagebrush, which often exceeds 20-40% annual production, green rabbitbrush, and rhizomatous wheatgrass. Cheatgrass often invades, on south and west facing slopes, in particular. The total annual production (air-dry weight) of this state is about 150 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 700 lbs./acre in above average years.

3.10.2 Wetlands/Riparian

3.10.2.1 Wetlands

Wetlands are subject to a variety of federal and state regulations including the Clean Water Act (CWA), Rivers and Harbors Act, and the Wyoming Water Quality Regulations and the related Surface Water Quality Standards. In addition, Executive Order (EO) 11990 and federal statues require federal agencies to take action to minimize the destruction, loss, or degradation of wetlands. The Corps of Engineers (COE), through Section 404 of the CWA and Section 10 of the Rivers and Harbors Act, is the lead permitting and regulatory agency with jurisdiction over activities in waters of the United States, including wetlands.

The National Wetlands Inventory (NWI) was queried to determine the location of mapped wetlands in the Baxter proposal area. According to the NWI maps, several wetlands are located within one half mile of the proposed well sites.

3.10.2.2 Riparian Areas

Riparian areas are defined as lands that exist been open water and upland areas. Riparian areas in the proposal area are generally characterized by willow or cottonwood woody vegetation and are important wildlife habitat for many of the species present in the area. Riparian areas are located along perennial parts of Trout Creek, but occur only sporadically along the ephemeral Krause Marsh Creek.

3.10.3 Invasive and Noxious Weeds

Noxious and invasive weeds inhabit about 1.3 million acres in Wyoming. They pose a significant threat to Wyoming crop lands, rangelands and natural areas. Wyoming has long recognized the importance of managing noxious weeds, with its first noxious weed law legislated in 1913 (Wyoming Weed Management Strategic Plan 2003). Noxious weeds, as defined by the Wyoming Weed and Pest Control Act of 1973, are weeds, seeds or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect, or as carriers of diseases or parasites that exist within this state. The Sweetwater County Weed and Pest Control District has identified four weeds of concern for the county (Table 3.10-2).

Table 3.10-2. Sweetwater County Weed List

Common Name *(Scientific Name with Authority)*
Black henbane (*Hyoscyamus niger* L)
Foxtail barley (*Hordeum jubatum* L.)
Lady's bedstraw (*Galium verum* L.)
Mountain thermopsis (*Thermopsis montana Nutt)*

There has been no formal noxious weed mapping at the two proposed well locations. The Sweetwater County Weed and Pest District was contacted and they were not aware of any noxious weeds at the two sites (Cotterman, Sweetwater County, pers. comm., April 2008). In addition, BLM vegetation specialists, who were on site during initial siting visits, did not identify any designated noxious weeds (J. Glennon, BLM pers. comm., April 2008). However, the North Well site was infested with cheatgrass and halogeton, which are not listed weed species, but are of management concern to the BLM.

3.11 WILDLIFE AND FISHERIES

3.11.1 Big Game Species

The term big game includes those large mammals that are typically hunted for recreational purposes and include mule deer, pronghorn, elk, and moose. Habitat for these species is typically defined by the ranges that are used seasonally, i.e. winter range, spring range, or summer/fall range.

3.11.1.1 Big game migration corridors

Big game migrate seasonally to find suitable foraging and thermal conditions, i.e. warmer, low elevations in winter, and cooler, high elevations in summer. Forage availability, ambient temperatures that minimize stress, avoiding impediments to movement (i.e. deep snow), suitability of parturition areas, and avoidance of predation are all factors influencing seasonal habitat selection (Marcum 1975). Migration corridors are routes between seasonal ranges. Figure 3.11-1 depicts the migration routes in the vicinity of the Baxter proposal area (WGFD 2008).

3.11.1.2 Pronghorn

The pronghorn antelope (pronghorn) (*Antilocaptra americana*) is likely to occur in the Baxter proposal area. The WGFD (2007) has designated three ranges utilized by pronghorn antelope in the vicinity of the area: Spring/summer/fall pronghorn range, winter/yearlong pronghorn range, and crucial winter/yearlong pronghorn range. The South Well is located in an area designated as "out" of range (peripheral or non-pronghorn range). Though still part of designated pronghorn herd units, these "out-designated" areas do not contain enough animals to be considered important habitat (WGFD 2007). The South Well is immediately adjacent to spring/summer/fall range and within five miles of winter/yearlong range and crucial winter/yearlong range. The North Well is located at the edge of spring/summer/fall range (Figure 3.11-2).

The pronghorn population utilizing the range surrounding the Baxter proposal area is designated by WGFD as the South Rock Springs Herd (Unit #412). The population size was estimated to be 5,900 individuals in 2006, slightly below the WGFD objective of 6,500 individuals. From a sample of 1,812 pronghorn, the ratio of fawns to bucks to does was 63:46:100, respectively.

3.11.1.3 Elk

The elk (*Cervus canadensis*) is common in the vicinity of the Baxter proposal area. The WGFD has designated two elk ranges in the area: yearlong elk range and crucial winter/yearlong elk range. In addition, there is a parturition area (an area with seasonally high concentrations of birthing animals) between the two well sites.

The proposed South Well is located approximately one mile southwest of the parturition area and the proposed North Well is located 3.5 miles to the northeast of the parturition area. The peak calving period occurs between May 15 and June 15. The North Well is located approximately 0.5 mile to the east of crucial winter/yearlong elk range (Figure 3.11-3).

The South Rock Springs Herd (Unit #424) utilizes the area surrounding the Baxter proposal area. The population size of the herd was approximately 1,500 animals in 2006, above the WGFD objective of 1,000 animals. Aggressive management through hunting has been utilized, with targeted harvests of 200 bulls, 235 cows, and 40 calves during the 2007 hunting season. Average age of bulls harvested in 2006 was 4.2 years, down slightly from the 2005 average of 4.4. Accurate population estimates and management in this area are problematic because the herd ranges into Colorado and Utah.

3.11.1.4 Mule Deer

The mule deer (*Odocoileus hemionus*) is a common inhabitant of the area near the Baxter proposal site. The WGFD has designated three mule deer ranges in the area: Spring/summer/fall mule deer range, winter/yearlong mule deer range, and crucial winter/yearlong mule deer range (Figure 3.11-4).

The proposed South Well is located within crucial winter/yearlong range. The proposed North Well is located within winter/yearlong range and 0.5 miles from crucial winter/yearlong range. The mule deer population in the proposal area is designated by WGFD as the South Rock Springs Herd (Unit # 424). This herd size is below the WGFD objective of 11,750 individuals, with an estimated population of 6,600 individuals in 2006. The population is slowly increasing. However, the recent drought has decreased fawn survival and mature buck recruitment. Average age of sampled bucks has decreased by almost one year from 4.7 in 2005 to 3.9 in 2006. From a sample of 1,254 deer the ratio of fawns to bucks to does is 62:32:100, respectively.

3.11.3 Migratory Birds

Migratory birds that may occur in the Baxter proposal area include the loggerhead shrike, sage thrasher, sage sparrow, and Brewer's sparrow (L. Keith, BLM, pers. comm, March 24, 2008).

3.11.3.1 Loggerhead Shrike

The loggerhead shrike (*Lanius ludovicianus*), a BLM Sensitive Species, and Wyoming Special Status Species (WYNDD 2008), is a migratory songbird that is widely distributed across North America. It is irregularly found around Wyoming, although it can occasionally be found near the Flaming Gorge area (Keinath and Schneider 2005). The loggerhead shrike is found in prairie and scrub areas in Wyoming, and inhabits edge habitat. It uses open areas with scattered shrubs and trees for foraging, adjacent to dense shrubs or trees used for nesting. Scattered trees and shrubs are also used as perches for hunting. The loggerhead shrike typically nests on the edge of scrub or forest lands, although it will nest in other types of habitat, such as mature sagebrush, if the preferred habitat is not available. Because this species has shown a marked decline in abundance throughout its range (Keinath and Schneider 2005), habitat preservation and restoration is a primary conservation goal in Wyoming.

3.11.3.2 Sage Thrasher

The sage thrasher (*Oreoscoptes montanus*), a BLM Sensitive Species and Wyoming Special Status Species (WYNDD 2008), is a common summer inhabitant in western Wyoming. The thrasher is considered a sagebrush obligate species, and occupies shrubland where sagebrush is present and prefers areas with tall sagebrush and low grass cover (WGFD 2008). The sage thrasher migrates in late winter/early spring and early fall between breeding areas and wintering areas. It is designated as a

Species of Special Concern by the State because of declining habitat and habitat vulnerability. State conservation goals include monitoring and maintaining large tracts of unfragmented sagebrush habitat (WGFD 2008).

3.11.3.3 Sage Sparrow

Sage sparrows (*Amphispiza belli*) are listed as a BLM Sensitive Species and a Wyoming Special Status Species (WYNDD 2008). The WGFD classifies it as a species of special concern because populations are declining, and because its habitat is vulnerable, although there is no ongoing significant loss of habitat. The sage sparrow is a common summer resident in Wyoming. It is a sagebrush obligate species that inhabits prairie and foothills shrubland habitat where sagebrush is present and prefers shrublands with tall shrubs and low grass cover. It also requires large blocks of unfragmented habitat to successfully breed and survive (WGFD 2008).

3.11.3.4 Brewer's Sparrow

Brewer's sparrows (*Spizella breweri*) are sagebrush obligate and BLM Sensitive Species Wyoming Special Status Species (WYNDD 2008). The species is a Nearctic Neotropical migrant. In the summer Brewer's sparrow is found throughout Wyoming and is a common summer resident. Brewer's sparrow is also found in other shrublands, such a mountain mahogany. It prefers areas with abundant scattered shrubs and short grass (WGFD 2008). It is listed as a Species of Special Concern by the State, because of declining breeding populations and nesting habitat vulnerability (WGFD 2008).

3.11.4 Raptors

The BLM has mapped raptor nest sites in the Green River planning area. No raptor nest sites have been recorded within a one-mile buffer of the North Well and South Well (maps obtained from BLM 2008). One red-tailed hawk nest is located just outside the one-mile buffer of the North Well.

3.11.4.1 Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) is found in Sweetwater County, Wyoming. The hawk is protected by the Migratory Bird Treaty Act of 1918. The ferruginous hawk's breeding and nesting habitat is found in the prairie shrublands, plains in the foothill grasslands, riparian areas, and rocky outcrops. No nests were recorded within a one-mile radius surrounding the proposed drilling location (BLM data 2008).

3.11.4.2 Golden Eagle

The golden eagle (*Aquila chrysaetos*) is found in Sweetwater County, Wyoming. The eagle is protected by the Bald and Golden Eagle Act of 1962. The golden eagle's breeding and nesting habitat occurs in open areas near trees or cliffs. No nests have been recorded within the mile radius surrounding the proposed drilling location; however, three nests have been recorded within a five-mile buffer of the proposed South Well (BLM data 2008).

3.11.4.3 Northern Harrier

The northern harrier (*Circus cyaneus*) is found in Sweetwater County, Wyoming. The harrier is protected by the Migratory Bird Treaty Act of 1918. The northern harrier's breeding and nesting habitat can be found in the prairie or the foothills and often occurs in grasslands and marshlands. No nests were recorded within a one-mile radius surrounding the proposed well locations (BLM data 2008).

3.11.4.4 Prairie Falcon

The prairie falcon (*Falco mexicanus*) can be found in Sweetwater County, Wyoming. The falcon is protected by the Migratory Bird Treaty Act of 1918. The falcon's breeding and nesting habitat is found on cliffs, rocky outcrops, ledges and holes overlooking open areas. No nests were recorded within a one-mile radius surrounding the proposed well locations (BLM data 2008).

3.11.4.5 Red-tailed Hawk

The red-tailed hawk (*Buteo jamaicensis*) is found in Sweetwater County, Wyoming. The hawk is protected by the Migratory Bird Treaty Act of 1918. The red-tailed hawk's breeding and nesting habitat is found below 9,000 feet and is associated with open foraging areas with nearby trees or cliffs. One nest has been identified at approximately one mile from the proposed North Well location, and two other nests are located within a five-mile buffer of the proposal location.

Other species that may be present in the vicinity of the Baxter proposal include the gray flycatcher (*Empidonax wrightii*), juniper titmouse (*Baeolophus griseus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Polioptila caerulea*), and black-throated gray warbler (*Dendroica nigrescens*) (WYNDD 2008). These species are typically associated with mature pinyon-juniper stands (Pavlacky 2000; and Pavlacky and Anderson 2001). However, the 60,000-acre (approximate acreage) Sheep Creek wildfire probably substantially reduced the habitat suitability for these species in the project vicinity.

3.11.5 Fisheries

The Wyoming Department of Environmental Quality Water Quality Division (DEQ/WQD) classifies Trout Creek and the lower three miles of Sage Creek as Class 2AB waters. These are waters characterized as those known to support game fish populations or spawning and nursery areas at least seasonally (DEQ/WQD 2001). The remainder of Sage Creek is listed as Class 2C waters which are waters that support or have the potential to support only nongame fish populations at least seasonally (DEQ/WQD 2001). Fish species present in the Sage Creek watershed are listed in Table 3.11-1

Table 3.11-1. Fish species present in the Sage Creek Watershed

Fish Species	Trout Creek	Sage Creek above Trout Creek	Sage Creek below Trout Creek
Colorado River cutthroat trout	✓	✓	✓
Mountain suckers	✓	✓	✓
Flannelmouth suckers			✓
Fathead minnows (introduced)			✓
Longnose dace (introduced)			✓
Redside shiners (introduced)			✓
White suckers (introduced)			✓

Source: Robert M. Keith, Regional Fisheries Supervisor, WGFD Green River Region

The Middle Marsh Creek watershed, which includes Krause Marsh Creek, likely does not support a fishery. It is apparently perennial at its headwaters and intermittent in the lower reaches (D. Doncaster, BLM, pers. comm., April 2008). However, at least seasonally, some fish may move into lower Middle Marsh Creek from the Flaming Gorge Reservoir (J. Henderson, BLM, pers. comm. April 2008). The DEQ/WQD classifies the waters Middle March Creek watershed as Class 3B waters which are tributary waters that are not known to support fish populations, and where that use is not attainable. However, Class 3B waters can support and sustain aquatic life communities including invertebrates, amphibians, and other flora and fauna, which inhabit the creek of this watershed at some stage of their life cycle (DEQ/WQD 2001).

3.11.6 Wild Horses

The Salt Wells Herd Management Area (HMA) encompasses almost 1.2 million acres south of Interstate 80 and east of US Highway 191 with the exception of one portion west of US 191 bounded primarily by the southern loop of Upper Sage Creek Road (County Road 34). The north well would be located on the western boundary of the HMA near its southwest corner. In addition to the wild horses, the HMA is also utilized by cattle and sheep, with cattle use predominating.

3.12 RANGE RESOURCES (GRAZING ALLOTMENTS)

The proposed exploratory wells are located within two separate grazing allotments that are administered by the BLM. The North well is within the Salt Wells grazing allotment and the South well is located within the Spring Creek allotment. Both grazing allotments are managed under direction of the following documents:

- Green River Resource Management Plan (BLM 1997)
- Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming (BLM 2008)
- Allotment Management Plan (AMP).

The affected environment for both grazing allotments is detailed in the following sections.

3.12.1 Salt Wells Allotment (North Well Site)

The Salt Wells allotment consists of 52,351 acres and includes three pastures (Beans Spring, Buffalo Springs, and Little Mountain). The proposed North Well is located in the Little Mountain Pasture. The allotment is within the Sage Creek Watershed portion of the Greater Red Creek ACEC and contains a portion of the Pine Mountain SMA. The North well is located within the Sage Creek Watershed ACEC. The Pine Mountain SMA is several miles away from the proposed north location.

The Green River RMP management objectives for livestock grazing within the Greater Red Creek ACEC – Sage Creek watershed states: Livestock grazing objectives and management practices will be evaluated and, as needed, modified to be consistent with the watershed, water quality, fisheries, recreation, and riparian management objectives. Grazing systems will be designed to achieve desired plant communities and proper functioning condition of watersheds (upland and riparian).

This allotment has a permitted stocking rate of 2,618 Animal Unit Months (AUMs) which equates to 0.05 AUMs/acre (52,351 acres/2,618 AUMs) or 20 acres per AUM (1 acre/0.05 AUMs). The period of use runs from May 1 through October 31. The allotment is shared by two permittees; one permittee has a stocking rate of 2,040 AUMs for the period of May 1 through October 3, while the other permittee's stocking rate is 578 AUMs from June 16 through October 15.

There are a number of range improvements within the allotment. The BLM has 2 springs, 11 reservoirs, 2 pits and 1 trough identified within the allotment. No range improvements are within 2 miles of the proposed well location.

3.12.2 Spring Creek Allotment (South Well Site)

The Spring Creek allotment is 38,634 acres and consists of five pastures (North, Central, South, Gathering, and Winter). The proposed South Well is located in the North Pasture. The allotment is within the Sugar Loaf Basin Special Management Area, which has a grazing objective that states: Livestock grazing objectives will be re-evaluated and, as needed, modified to be consistent with the watershed, water quality, fisheries, recreation, and riparian management objectives. Grazing systems will be designed to achieve desired plant communities and proper functioning condition of watersheds (upland and riparian).

This allotment has a permitted stocking rate of 3,134 AUMs which the equivalent of 0.08 AUM/Acre (3,134 AUM/38,634 Acres) or 12.5 Acres/AUM (1 Acres/0.08 AUM). The period of use for the allotment is year round. One permittee has 2,820 AUMs for the period of March 16th thru February 28th of the following year and the other permit is for 314 AUMs for the period of May 16th through October 31st. In order to maintain livestock within the appropriate allotment, the permittees monitor the allotment boundary for livestock drift.

There are several range improvement projects within two miles of the proposed South Well. There are three springs located to the northwest of the proposed well, one of which supplies water to the Iron Mountain pipeline. This water pipeline runs north of the proposed south well location on the north side of an unnamed drainage. The unnamed drainage and Krause Marsh Creek, below the confluence, is the boundary for the Spring Creek and Sugarloaf Allotments.

3.13 RECREATION

3.13.1 Dispersed Recreation

The Green River RMP provides Management Objectives and Actions for each applicable resource area. The RMP objectives for recreation management are to:

- Ensure the continued availability of outdoor recreational opportunities sought by the public while protecting other resources:
- Meet legal requirements for the health and safety of visitors; and
- Mitigate conflicts between recreation and other types of resource uses.

The proposed North and South wells in the Baxter proposal area are located in the Little Mountain Recreation Use Area, as depicted by Map 21 of the Green River RMP. The area is managed to assure its

continuing value for recreational opportunities. The area contains several popular mountain bike trails and a relatively long segment of the Little Mountain Back Country Byway.

The Little Mountain Recreation Use Area provides a wide array of year-long, motorized and non-motorized dispersed recreation opportunities. The most popular recreational pursuits include, but are not limited to: driving for pleasure, viewing scenery, wildlife viewing, Off Road Vehicle (ORV) riding, mountain bike riding, horseback riding, camping, hiking, hunting, and fishing. There are no developed recreation sites such as campgrounds or picnic areas in or in close proximity to the Baxter Proposal emphasizing dispersed camping and picnicking instead. Both proposed well sites are located relatively close to State Highway 191 Information on vehicle and truck traffic on U.S. Highway 191 are provided in Sectin 3.16 (Access). The State does not have a category for recreational vehicles. County Roads 34 and 36 are described by the County as receiving little traffic (J. Radosavitch, Sweetwater County, pers. comm., March 10, 2008). No specific information on recreational use of the county roads is available.The Recreation Opportunity Spectrum (ROS) is one tool, and a framework, the BLM has to inventory, plan, and manage recreational opportunities on public lands (Foster, BLM, pers. comm., 2008). The ROS classifies BLM-administered lands into six classes, based on three principal components: the environmental setting, the activities possible or managerial setting, and the experiences that can be achieved. The Baxter Proposal area is classified as semi-primitive motorized and can be described as a predominantly natural or natural-appearing environment of moderate to large size where motorized recreation opportunities exist, are provided, and can be experienced.

3.13.1.1 North Well

The Cherokee Historic Trail, which is identified with concrete markers, passes a little more than a mile away from the North Well. Some designated mountain bike trails exist in the area and are marked with carsonite signs. There are no numerical data available regarding recreation use in the area (Foster, BLM, per. comm. 2008). The "BLM Wyoming 2005 Recreation Statistics" indicates there were 1,890,126 recreation visitor-days on BLM-administered lands in Wyoming in 2005.

In addition, the North Well is located in a Special Designation Management Area known as the Sage Creek Watershed portion of the Greater Red Creek ACEC. The recreation objectives for the entire ACEC are to:

- Provide opportunities for dispersed recreation uses in the area that are consistent with the primary watershed, riparian, and fisheries management objectives, and
- Allow the recreation user the opportunity to have a high degree of interaction with the natural environment, to have moderate challenge, and to use outdoor skills.

3.13.1.2 South Well

The South Well is located in the Sugarloaf Basin Special Management Area which is not an ACEC, but is maintained as a geographic management unit. The recreation objective for this area is "to provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives" (BLM 1997).

3.13.2 Hunting

The area is a popular for hunting, especially for big game trophy elk and mule deer, and to a lesser extent pronghorn. According to the Wyoming Game and Fish Department, demand for big game permits, especially elk and mule deer, in the area is extremely high. The Little Mountain area is well known for its trophy bull elk and buck mule deer.

The Baxter proposal area is within the following elk, mule deer, and pronghorn Herd Units and Hunt Areas: South Rock Springs Elk Herd Unit 424 and Elk Hunt Area 31; South Rock Springs Mule Deer Herd Unit 424 and Hunt Area 102; and South Rock Springs Antelope Herd Unit 412 and Hunt Area 112. The Elk Hunt Area is relatively small and surrounded by Hunt Area 107 to the west; Hunt Area 30 to the northeast; and Hunt Area 32 to the east. The southern boundary of Hunt Area 31 is the Wyoming-Colorado state line. The mule deer Hunt Area 102 is much larger than the Elk Hunt Area. Hunt Area 132 is the nearest other Mule Deer Hunt Area located over a township away to the west. The Pronghorn Hunt Area 112 is bordered by Hunt Area 95 to the west and northwest, and Hunt Area 59 to the north and northeast (See Figures 3.11-2, 3.11-3, and 3.11-4). The popularity of hunting for elk and mule deer in the area is shown in the Table 3.13-1, which covers hunt areas within and adjacent to the proposed wells.

Table 3.13-1. Harvest of Elk and Mule Deer within and adjacent to the Baxter Proposal.

ELK					
Hunt Area	**License/Hunters**	**Total Harvest**	**Hunter Success**	**Days/Harvest**	**Hunter Days**
30 Aspen Mt.	129	111	86%	8.8	973
31 Little Mt.	210	184	87.6%	7.9	1452
32 Pine Mt.	188	100	53.2%	15.1	1515
MULE DEER					
101 Black Butte	113	73	64.6%	8.8	644
102 Aspen Mt.	374	282	75.4%	7.9	2216

http://gf.state.wy.us/downloads/pdf/HarvestRpt/2006%20Elk.pdf
http://gf.state.wy.us/downloads/pdf/HarvestRpt/2006%20Deer.pdf

The WGFD provides information depicting the drawing odds and draw results by hunt area for the past three years (2005–2007). A general summary of 2007 data indicates a non-resident had less than a 1.40% chance of drawing an Any Elk license for Elk Hunt Areas 30, 31, or 32, and less than 0.43% chance of drawing a license in Elk Hunt Area 31. A resident had less than 6.00% chance of drawing an Any Elk license in Elk Hunt Areas 30 and 31 and about a 16.52% chance in Area 32. A nonresident had a 0.60% chance of drawing an Antlered Deer License in mule deer Hunt Area 102 and a resident had only a 9.45% chance. Nonresident antelope chances were 1.61% and resident odds were 61.26% for an Any Antelope License.

More than 700 nonresidents applied for the quota of two Any Elk licenses in Hunt Area 31 and approximately 2,400 residents applied for the 83 available Any Elk licenses in Hunt Area 31.

Approximately 2,100 nonresidents applied for the 11 Antlered Deer licenses available in Hunt Area 102 and over 3,500 residents applied for the available 300 licenses in the same hunt area.

The data indicate the high demand for elk and mule deer permits in the vicinity of the Baxter proposal area. In addition, some of the Governor's and Wyoming Game and Fish Commissioners' special big game licenses are used in this area.

3.13.3 Off-Highway Vehicle (OHV) Management

The Green River RMP management objective for OHV management is "to provide opportunity for off-road vehicle use in conformance with other resource management objectives." The term ORV is used in the RMP, but has since been formally replaced with the term "off-highway-vehicle" or OHV (J. Foster, BLM, per. comm., March 2008).

OHV travel within the Baxter Proposal area is limited to designated roads and trails (Table 13 in the Green River RMP), which means that motorized vehicles must stay on designated roads and trails. Designated roads and trails are those that are depicted on the current BLM land status map for the area (J. Foster, BLM, per. comm., March 2008). This limitation applies to all activities involving motorized vehicles. Most OHV use in the area occurs in late summer and throughout the fall during hunting season.

There are no seasonal OHV use restrictions in the area. Generally, over-the-snow vehicle use is subject to the prescriptions described in Table 13 of the RMP, unless a site specific analysis determines that exceptions can be allowed. Snowmobile use is very sporadic due to limited snow cover. The winter of 2007/2008 was one of the first where snowmobiling has been possible over an extended time period. However, road access was limited or restricted, due to very limited snowplowing. No BLM transportation planning has been done for the area (J. Foster, BLM, per. comm., March 2008).

3.13.4 Wilderness Resource Management and Wilderness Study Areas

The objective for management of the wilderness resource is to retain the wilderness quality and manage the Wilderness Study Areas (WSAs) in the planning area in accordance with the Interim Management Policy and Guidelines for Lands under Wilderness Review until Congress acts on designation. The BLM recommendations on WSAs in the Resource Area have been made to the Secretary of the Interior. The Baxter Proposal is not located in, adjacent to, or in close proximity to any congressionally designated Wilderness or WSA, or WSA recommended for wilderness.

3.14 SOCIOECONOMICS/ ENVIRONMENTAL JUSTICE

3.14.1 Socioeconomics

The proposed exploratory wells are located in Sweetwater County, Wyoming, which has a population of 39,305 residents (U.S. Census Bureau, 2007). Two cities and several municipalities are located in Sweetwater County. The county seat is Green River, with a population of 11,933 (U.S. Census Bureau, 2006). Mining of the mineral trona is a major industry in the area, giving Green River its nickname "Trona Capital of the World". Trona is a sodium-based mineral used in the production of glass, paper products, and laundry detergents. It is also used in the manufacturing of baking soda (sodium bicarbonate)

and detergents (sodium phosphates). The area offers many recreational activities including hiking, hunting, white-water rafting, and fishing.

Approximately 20 miles to the east of Green River is Rock Springs, the largest city in the county with a population of 19,324. Established in the late 1800s as a center of coal mining, it continues to be an important force in the energy industry. Over half of the workforce is employed in an energy-related capacity, including mining, petroleum, power generation, and related services (Sweetwater Economic Development Association, 2008). The 2005 population distribution Sweetwater County is shown in Table 3-.14-1.

Table 3.14-1. 2005 Population Distribution in Sweetwater County, Wyoming

Age	2005 Estimate	2010 Projected
< 19	10,674	9,983
20-34	7,368	7,912
35-54	11,312	9,402
55-75	6,106	7,577
75+	1,463	1,492

Sweetwater County, Wyoming County Profile 2007 (www.whywyoming.org/pdf/Counties/Sweetwater.pdf)

3.14.1.1 Income and Employment

In 2005, per capita income in Sweetwater County was estimated at $38,039 ("A Profile of Wyoming Demographics, Economics, and Housing – December 1, 2007 (www.headwaterseconomics.org), compared to the statewide value of $32,808, and the national value of $31,632 (U.S. Census Bureau, 2007). Unemployment in 2006 was 2.5%, below the state average of 3.2% and the national average of 4.6% (U.S. Census Bureau, 2007). The top five employment sectors and their average 2005 wages are depicted in Table 3.14-2.

Table 3.14-2. Top Employment Sectors in Sweetwater County, Wyoming in 2005

Employment Sector	Number of Employees	Average Annual Wages
Retail	259	$22,100
Accommodations & Food Services	1,979	$13,614
Mining	1,884	$62,833
Manufacturing	1,848	$67,566
Health Care	1,266	$30,690

Sweetwater County, Wyoming County Profile 2007 (www.whywyoming.org/pdf/Counties/Sweetwater.pdf)

3.14.1.2 Energy Industry Revenues and Distributions

Mineral production, including oil and gas, generates income through four revenue streams:

- State Severance Tax – assessed on product at 100% of taxable value based on state assessment percentages.
- County Ad Valorem Tax – assessed on product at 100% of taxable value according to appropriate mill levy.
- Federal Mineral Royalty Tax – assessed by the federal government for production on federal lands, approximately 50% of revenues are returned to the state.

- Payment In Lieu of Taxes (PILT) – payments made by the federal government to counties which contain federal lands.

Revenues and distributions in 2006 are provided in Tables and 3.14-3 and 3.14-4.

Table 3.14-3. Mineral Revenues, Statewide and in Sweetwater County in 2006

Revenue Stream	Assessed Levy – Sweetwater County	Assessed Levy – Statewide
State Severance Taxes	$102,352,397	$882,383,479
Ad Valorem (County Property Tax)	$117,121,229	$913,011,683
Revenue Stream	**Distribution – Sweetwater County**	**Distribution – Statewide**
PILT	$1,699,067	$15,299,146
Federal Mineral Royalty	$1,313,110	$757,351,848

Wyoming Department of Revenue, 2007

Table 3.14-4. Revenue Distributions in Sweetwater County in 2006

Recipient of Funds	County Ad Valorem	State Severance	Federal Mineral Royalty	PILT
Sweetwater County	$117,121,229	$444,866	Not available	$1,699,067
Green River	Not available[1]	$564,130	$542,448	Not available[2]
Rock Springs	Not available[1]	$893,779	$850,662	Not available[2]

[1] Data not provided by city
[2] Payments in Lieu of Taxes not subdivided by city
Wyoming State Treasurer's Office, 2007

3.14.1.3 Housing

The average 2006 home price in Wyoming was $187,869, compared to the average Sweetwater County price of $196,000. The rental market throughout the state is very tight, with a 1.2% vacancy rate. Within Sweetwater County, the rental market is even tighter with a 0.88% vacancy rate for apartments and a 0.08% rate for mobile/modular homes. Apartment rentals averaged $709/month in Sweetwater County during 2007 (http://www.wyomingcda.com/files/Profile07b_Vol_I_FNL.pdf).

3.14.1.4 Public Services

Medical Services and Facilities

Sweetwater County is home to The Memorial Hospital of Sweetwater County, located in Rock Springs. It is a 100-bed facility with a 24 hour physician-staffed emergency department. Four medical clinics are located in the county, providing medical offices, laboratories, and outpatient surgical services.

Education

Sweetwater County has two K-12 school districts, educating approximately 7,000 students. Sweetwater District #1 services Rock Springs and areas east, while Sweetwater District #2 serves the Green River area. Approximately 76% of all students graduate from the combined high schools (Wyoming Department of Education, 2004). The Western Wyoming Community College is located in Rock Springs and has a total enrollment of approximately 3,500.

Police/Fire/Crime

The Sweetwater County Sheriff's Department employs 136 staff and patrols 10,352 square miles (Sweetwater County web site, 2008). Additionally, the cities of Green River and Rock Springs staff their own Police Departments. The County Fire Department employs three career firefighters and approximately 33 volunteers. County Search and Rescue field an all-volunteer force of 30. Table 3.14-5 lists crime statistics for 2005.

Table 3.14-5. Sweetwater County 2005 Crime Statistics

Violent Crime Category	Arrests – Green River	Arrests – Rock Springs	Arrests – Sweetwater County
Murder/manslaughter	1	1	0
Forcible Rape	0	10	3
Robbery	0	7	0
Aggravated Assault	33	92	16
Property Crime Category	**Arrests – Green River**	**Arrests – Rock Springs**	**Arrests – Sweetwater County**
Burglary	68	151	45
Larceny/Theft	309	600	195
Motor Vehicle Theft	19	49	30

http://www.disastercenter.com/wyoming/crime/15038.htm
http://www.disastercenter.com/wyoming/crime/15037.htm
http://www.disastercenter.com/wyoming/crime/15039.htm

3.14.2 Environmental Justice

Federal agencies are required to conduct programs, policies, and activities that substantially affect human health or the environment in a manner that ensures no person is excluded from participation therein, denied the benefit thereof, or subjected to discrimination due to race, color, or national origin. Executive Order 12898 requires federal agencies to assess their projects to ensure they do not result in disproportionately high or adverse environmental, health, or safety effects to minority or low-income populations.

Table 3.14-6 shows data from the Bureau of Census 2000 Racial Composition for the Baxter Proposal. These data illustrate that the racial composition of Sweetwater County is predominantly white (greater than 90 percent overall). They also show that across Southwest Wyoming less than 10 percent of the population is below the poverty line compared to more than 11 percent in Wyoming and more than 12 percent in the United States.

Table 3.14-6. Race and Poverty as a Percentage of Total Population in Wyoming and Sweetwater County.

State of County	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and other Pacific Islander	Some other race	Persons reporting other race or multiple races	Total[2]	Hispanic or Latino origin[3]	Below the poverty line
Sweetwater	91.6	0.7	1	0.6	0	3.6	2.4	99.9	9.4	7.8

Lincoln	97.1	0.1	0.6	0.2	0.1	0.7	1.2	100	2.2	9
Sublette	97.5	0.2	0.5	0.2	0.1	0.52	1	100	1.9	9.7
Wyoming	92.1	0.8	2.3	0.6	0.1	2.5	1.8	100.2	6.4	11.4
U.S.	75.1	12.3	0.9	3.6	0.1	5.5	2.4	99.9	12.5	12.4

[1] Source: U.S. Census Bureau, 2002

[2] This table uses U.S. Census Bureau statistics which, due to rounding, may total slightly more or less than 100 percent.

[3] People who identify their origin as Hispanic or Latino may be of any race. Thus the percent Hispanic or Latino should Not be added to the race as a percentage of population categories.

3.15 VISUAL RESOURCES

The BLM is required to manage public lands in a manner that will protect the quality of the visual (scenic) values in accordance with Section 102(a)(8) of FLPMA. The BLM Visual Resource Management (VRM) system provides the BLM with a methodological approach to identify visual (scenic) values, establish objectives through the RMP process or on a case-by-case basis for managing those values, and provide input into proposed surface-disturbing projects to ensure that the assigned objectives are met or intrusions are sufficiently mitigated. The VRM process considers the scenic quality of the landscape, the sensitivity of the viewer, and the distance from the viewer to the landscape. Based upon these characteristics, the BLM assigns a VRM class to the lands under their jurisdiction. The VRM classes and corresponding objectives are provided in Table 3.15-1.

Table 3.15-1. BLM Visual Resource Management (VRM Objectives)

VRM Class	VRM Objective
I	To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
II	To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer.
III	To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Contrasts to the basic elements of form, line, color and texture caused by management activity may be evident and begin to attract attention in the characteristic landscape. The changes should remain subordinate to the existing characteristic landscape. Structures located in the foreground distance zone often create a contrast that exceeds the VRM Class even when designed to harmonize and blend with the characteristic landscape.
IV	To provide for management activities that require major modification of the existing character of the landscape. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements of form, line, color, and texture inherent in the characteristic landscape. Structures located in the foreground distance zone often create a contrast that exceeds the VRM Class even when designed to harmonize and blend with the characteristic landscape.

All surface disturbing actions, regardless of the visual resource management class, are required to be mitigated to reduce visual impacts (Green River RMP, pg 21). The Baxter Proposal (both wells) is located in VRM Class III according to the Green River RMP, MAP 24 (BLM 1997). The Baxter proposal area lies on a landscape that can best be described as gently rolling juniper woodlands with rock outcroppings and with adjacent sagebrush and mountain shrub habitats, with lesser amounts of riparian

habitats. Higher elevations are more rugged terrain and may consist of pinyon-juniper and aspen-conifer habitats.

3.16 ACCESS/ RIGHTS-OF-WAY

Wyoming State Highway 191 serves both proposed well sites. Highway 191 can be accessed from Interstate Highway 80, exit 99. Highway 191 receives on average approximately 600-700 vehicles per day and 110 to 130 trucks per day (T. Thomas, WDOT, per. comm., March 10, 2008). This stretch of U.S. Highway 191 is also subject to recurrent winter weather closures. The highway is a secondary route and may not get cleared until after a winter storm. As a result U.S. Highway 191 may be closed for days at a time during the winter months (T. Thomas, WDOT, per. comm., March 10, 2008).

The 51-mile-long section of U.S. Highway 191 from I-80 to the Utah Stateline has a higher accident rate (average = 2.2) then other Class 2 roads (multilane highways, and other important roadways) in Wyoming (average = 1.3), as calculated by the WDOT. On average, there are 26 accidents per year along this segment of U.S. Highway 191. A majority of the automobile accidents involve wildlife or livestock (WDOT 2008).

3.16.1 North Well

The North Well is accessed from U.S. Highway 191. From I-80 travel south approximately 20.4 miles on U.S. Highway 191. Turn right (west) on to County Road 36 (aka Lower Sage Creek Road) and proceed west 2.3 miles to the junction of with CR 34 (aka Ramsey Ranch Road, or Upper Sage Creek Road). Turn left and proceed for 6.1 miles to the beginning of the proposed access road. The proposed operator-constructed and maintained access road will be 0.2 miles long. The proposed access road does not cross any drainages. The total distance from Rock Springs to the proposed well site is 32.1 miles.

Devon has applied for access permits from Sweetwater County for use of County Roads 34 and 36. The two county roads are unimproved dirt roads that currently do not see much traffic (J. Radosevich, Sweetwater County, per. comm., March 10, 2008).

3.16.2 South Well

The South Well is also accessed from U.S. Highway 191. From I-80 travel south approximately 44.7 miles on U.S. Highway 191. Turn north (right) onto the existing BLM dirt road (identified as R-O-W WYW167589). Proceed north for 0.3 miles on the dirt road, and then turn west onto another existing dirt road. This road ends at a power substation. Proceed 0.3 miles and turn north onto the proposed access road 0.7 mile in length. Neither the existing or proposed access roads cross any drainages. The existing access roads are improved roads and no upgrades are necessary. Devon will be responsible for the maintenance of the proposed and existing access road per BLM road standards, while it is being used for the Baxter proposal, in accordance with the BLM Goldbook Standards (BLM 2005). This could include dust suppression and road stabilization as required by the BLM authorized officer (Jeromy Caldwell, BLM, per comm., March 11, 2008). The total distance from Rock Springs to the South Well is 49.0 miles.

3.17 LAND USE

The Baxter proposal area lies within the Sage Creek portion of the Greater Red Creek Area of ACEC and the Sugarloaf Basin SMA. Both management areas are open to mineral leasing and related exploration and development activities, with appropriate mitigation requirements applied to protect all other resource values. The Green River RMP (BLM 1997) provides land use management direction for land use activities that occur within the two management units.

There is some State and privately-owned lands in the area. The proposed access road does not cross or come near any State of Wyoming land. State land use management in the area focuses primarily on hunting and fishing, but can include grazing.

3.17.1 North Well

For the Sage Creek portion of the Greater Red Creek Area of ACEC land use management objectives include:

- Livestock grazing consistent with other management objectives.
- Protection and enhancement of watershed conditions for conservation of CRCT.
- Dispersed recreation with an emphasis on not developing facilities.
- Off-highway vehicle use, with travel limited to designated routes.
- Hunting with an emphasis on large game hunting.
- Timber harvesting, on a limited basis, including fire wood gathering.
- Protection of aquifer recharge functions in the Little Mountain area.
- Coal mining is allowed in a portion of the ACEC.

The proposed access road to the North Well crosses a small section of private land. Devon has an agreement with the landowner on use of the property.

3.17.2 South Well

In the Sugarloaf SMA, land use management objectives include:

- Livestock grazing consistent with other management objectives.
- Habitat management for special status species.
- Protection actions for raptors and big game.
- Dispersed recreation with an emphasis on not developing facilities.
- Off-highway vehicle use, with travel limited to designated routes.
- Hunting with an emphasis on large game hunting.
- Timber harvesting, on a limited basis.
- Protection of aquifer recharge functions in the Little Mountain area.

3.18 FIRE MANAGEMENT

The proposed project occurs within the Little Mountain Fire Management Unit (FMU), which has the highest fire frequency in the State of Wyoming (USDI BLM 2004). Seventy five percent of all fires within the lands under jurisdiction of the Rock Springs, Kemmerer, and Pinedale Field Offices, occur within the Little Mountain FMU (Stephenson pers. com.). Of the lands under Little Mountain FMU

jurisdiction, the fire season generally extends from June 1 to October 30. From 1980 to 2003 approximately 733 fires burned over 100,000 acres in this FMU (BLM 2004). In the Little Mountain FMU two fires alone in 2000 burned 70,000 acres (Stephenson pers. comm.). A fire in 1995 burned over the proposed South Well site and a fire in 2000 burned just to the edge of the proposed north site.

The majority of fires in the Little Mountain FMU are lightning-caused. Major fuels in the area include juniper, Wyoming big sage brush, basin big sage brush, and mountain big sage brush. Juniper is the primary ignition source from lightning strikes and the majority of fires in the area are less than 20 acres in size and the great majority of suppression actions are on "single tree fires" (Stephenson pers. comm.).

3.18.1 Fire Regulatory and Management Direction

There has been an active prescribed burning program within the Little Mountain FMU in the past, but there are not any planned burns for the immediate future (Stephenson pers. comm.). Direction for fire management comes from the Green River RMP, ROD, and the Fire Management Plan (BLM 1997, 2004). The BLM Green River RMP gives broad direction for fire management, stating that: Fire management, suppression needs, and prescribed burning in timber stands will be evaluated on a case-by-case basis to ensure timber stands are maintained in healthy condition and the "snowfence effect" is preserved. Fire management in other areas will be evaluated on a case-by-case basis to ensure that area objectives are met.

The Green River RMP ROD (BLM 1997) states that immediate fire management suppression actions "will be used only in cases of arson, direct threat to public safety, or a strong potential to threaten structural property."

More specific direction on the BLM fire response for the Baxter proposal area is defined within the Fire Management Plan (BLM 2004, p. 65–69):

- No more than 25 percent of this FMU would be burned or treated in the next 20 years.
- Provide for human health and safety first, while minimizing loss of property, threats to private land, and maximizing the ecological benefit of wildland fire.
- Minimize suppression impacts by identifying opportunities to use roads, riparian areas, and natural barriers for control lines depending on resources at risk.

3.18.2 Fire Environment

The proposed project area occurs within fire prone-vegetation communities consisting of grassland, sagebrush, and conifer vegetation types. Please refer to Section 3.10.1 for a description of these major vegetation types. These vegetation communities have well-documented fire occurrences recorded in historical accounts and evidenced in fire scars on trees (Fischer et al. 1983, USDA Forest Service 2008).

Sage brush communities (including Wyoming big sagebrush, basin big sagebrush, and mountain big sagebrush) in this FMU are considered unaltered to slightly altered from historic fire regimes (BLM 2004). Natural fire regime intervals in sagebrush are generally from 10 to 70 years with longer fire intervals associated with less productive sites (USDA Forest Service 2008). The big sagebrush

communities are fairly susceptible to fire, as compared to other sagebrush species, though at least Wyoming big sagebrush-decadent communities rely on fire for regeneration (Blank et al. 1994).

Juniper provides the primary ignition source within the Little Mountain FMU (Stephenson pers. comm.). Juniper communities for the FMU are considered unaltered to slightly altered from historic fire regimes (USDI 2004). Juniper communities typically experience fire intervals of less than 35 years. Both juniper and Wyoming big sagebrush communities are prone to cheatgrass invasion following wildfires.

A forested area of subalpine fir, lodgepole pine, Douglas-fir, and aspen lies between the two well sites. There have not been many historical fire starts within this forested environment (Stephenson pers. comm.). Fires occurring within these vegetation types are typically mixed or high severity often resulting in the generation of new cohorts. Fire suppression in this area can be difficult due to vertical fuels structures and potentially large flame lengths.

In the areas that burned in the 1995 and 2000 fires, forbs and grasses are thriving and form a fairly continuous fine fuel layer. There is less continuity in the immediate vicinity of the proposed well sites (Stephenson pers. comm.). In the last decade grazing pressure has decreased and currently the proposed South Well has been very lightly grazed, and north area has not been grazed in seven years.

Currently cheatgrass is considered a minor component of the onsite fuels, but there have been noticeable increases in recent years (Stephenson pers. comm.). Cheatgrass tends to favor more frequent fires throughout most of its range in the Rocky Mountain West and it also thrives in post-fire environments. Cheatgrass is a fire hazard concern, as it forms a fine, flashy fuel which is easily ignited after it completes its life cycle and desiccates early in the fire season. It is abundant throughout most of the proposal area landscape and is especially prevalent along roads and other areas of ground disturbance. Frequent fires can encourage cheatgrass establishment, survival, persistence, and dominance (USDA Forest Service 2008).

3.19 NOISE

The EPA established a noise level of 55 dBA as a guideline for acceptable environmental noise (EPA 1974). This established EPA environmental noise level is used as a basis of evaluating noise effects when no other local, county, or state standard has been established. The Federal Energy Regulatory Commission (FERC) adopted the 55 dBA noise level as criteria for the maximum noise that can be allowed from a new compressor station at established sensitive receptors (residences, schools, medical facilities, recreational areas). It is important to understand that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value for the public health and welfare. Furthermore, this noise level is directed at sensitive receptors, where people would be exposed to an average noise level over a specific period of time. In this context, public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms, such as hearing loss or demonstrable physiological injury. Therefore, the 55 dBA noise level is 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. Loud noises can negatively impact wildlife populations in many ways, causing some wildlife species to avoid otherwise functional habitats and reducing breeding success of some wildlife species that initiate courtship by using sounds.

Loud noise may reduce a person's opportunity to enjoy solitude. Noise disturbance can annoy people to differing degrees, depending on their expectations, attitudes towards development activities, magnitude and duration of the noise, the activity they are pursuing, and the time of day. The BLM has compiled typical noise levels for familiar indoor and outdoor sources, measured in decibels (dBA) (Table 3.19-1).

Table 3.19-1. Typical Sound Levels of Common Noise Sources

Sound Pressure Level (dBA)	Common Indoor Noise Levels	Common Outdoor Noise Levels
105	--	Jet flyover at 1,000 ft
95	--	Gas lawn mower at 3 ft
90	Food blender at 3 ft	--
80	Garbage disposal or shouting at 3 ft	Urban daytime noise
70	Vacuum cleaner at 10 ft	Gas lawn mower at 100 ft
60	Normal speech at 5 ft	Commercial area, heavy traffic at 300 ft
60	Large business office	--
50	Dishwasher in next room	Quiet urban daytime
40	Small theater, large conference room	Quiet urban nighttime
35	--	Quiet suburban nighttime
33	Library	--
25	Concert hall (background)	Quiet rural nighttime
15	Broadcast and recording studio	--
5	Threshold of hearing	--

3.20 AREAS OF SPECIAL DESIGNATION

3.20.1 Greater Red Creek Area of Critical Environmental Concern (ACEC)

The ACEC designation is an administrative designation used by the BLM that is accomplished through the land use planning process. It is unique to the BLM in that no other agency uses this form of designation.

The Federal Land Policy and Management Act (FLPMA) of 1976 states that the BLM will give priority to the designation and protection of ACECs in the development and revision of land use plans. BLM regulations (43 Code of Federal Regulations part 1610) define an ACEC as an area "*within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards*." Private lands and lands administered by other agencies are not included in the boundaries of ACECs. ACECs differ from other special management designations, such as wilderness study areas, in that designation by itself does not automatically prohibit or restrict other uses in the area (with the exception that a mining plan of operation is required for any proposed mining activity within a designated ACEC). In order to be designated, special management beyond standard provisions established by the plan must be required to protect the relevant and important values.

As part of the process for developing the Green River Resource Management Plan, BLM planning team members reviewed all BLM-administered public lands in the planning area to determine if any areas should be considered for designation as Areas of Critical Environmental Concern (ACEC) or if any existing ACEC designations should be modified or terminated. Only BLM-administered public lands (i.e., public land "surface") can be considered for ACEC designation.

One of the ACECs in the Green River resource area is the Greater Red Creek ACEC covering 131,890 acres. It is located in the southwest part of Wyoming east of the Flaming Gorge Reservoir and recreation area. Originally this ACEC was referred to as the Red Creek ACEC, but it was expanded by the revision of the RMP in 1997 to include the Sage Creek and Current Creek drainages. The North Well of the Baxter Proposal is located in the Sage Creek portion of the Greater Red Creek ACEC.

The Greater Red Creek ACEC meets Relevance Criteria 1, 2, 3, 4 and Importance Criteria 1, 2, 3, described below. The relevance and importance criteria for this ACEC include unstable fragile soils; unique ecological features; watershed and cultural values; and sensitive species of regional, national, and international importance.

Relevance Criteria:

1. A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).

2. A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).

3. A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities which are terrestrial, aquatic, or riparian; or rare geological features).

4. Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of a natural process.

Importance Values:

1. Has more than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.

2. Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.

3. Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of the Federal Land Policy and Management Act as amended (Public Law 94-579, Section 102 (8) and (11).

3.20.2 Sugarloaf Basin Special Management Area

The Sugarloaf Basin Special Management Area consists of 85,880 acres of BLM administered public lands. It is not designated as an ACEC, but is maintained as a geographic management unit. The area was not recommended as part of the Greater Red Creek ACEC because the BLM determined that the Sugarloaf Basin does not contain the same sensitivity of resources found in Greater Red Creek ACEC, even though the watershed resources in the area are interconnected with those of Greater Red Creek area. In addition, the area does not contain populations of the Colorado River cutthroat trout that are present in the Greater Red Creek ACEC, and thus does not need to receive the same management emphasis. The watershed, scenic, and wildlife resources are determined not to be more than locally significant nor fragile, sensitive, or rare, when compared to those values found in Currant, Sage, and Red Creeks.

The management objectives for the Sugarloaf Basin Special Management Area are to: 1) improve watershed condition and enhance watershed values; 2) improve riparian areas to proper functioning condition, as a minimum; 3) provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives; and 4) maintain and protect important wildlife habitat (BLM 1997).

The area is open to mineral leasing and related exploration and development activities with appropriate mitigation requirements applied to protect all other resource values. Restrictions for protection of raptors, big game crucial winter range, and big game calving/fawning areas will apply to proposed development in the SMA.

Aquifer recharge zones in the SMA will be managed to protect groundwater quality and aquifer function. Protection includes limiting road density, surface disturbing activities, and surface occupancy in identified recharge zones to maintain them in a healthy and functioning condition.

New road construction will be reviewed on a case-by-case basis for conformance with area and transportation plan objectives. In some cases, consideration of a "no net gain in roads" factor may be an effective way to help meet objectives in the area.

The Sugarloaf Basin Special Management Area is open to consideration of activities that conform with objectives for the area. Such activities may include fencing, interpretive signs, construction of placement of transportation barriers, and sediment or erosion control structures to meet resource management objectives. Any actions proposed in the Sugarloaf Basin area will be considered and analyzed on a case-by-case basis. Controls may be placed on the amount, sequence, timing, or level of activity or development that may occur to assure that the actions will be consistent with or help to meet the management objectives for the area. This may result in such things as limiting the number of roads and other construction or other surface disturbing activities (such as well pads) or deferring activities or development in some areas until other areas have been reclaimed and restored to previous uses (BLM 1997).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter discloses the potential impacts on the human environment that would occur if the Baxter Proposal or the No Action alternatives would be implemented. The "human environment" is defined by the CEQ regulations as the natural and physical environment and the relation of people with that environment (40 CFR 1508.14). This chapter analyzes the direct, indirect, and residual impacts in each resource section. The disclosure of impacts includes the effects after all legal requirements are met as well as the implementation of the Applicant-Committed Environmental Protection Measures listed in Section 2.1.13. This chapter also identifies mitigation measures to be considered, which include those identified in the Green River RMP (BLM 1997), stipulations attached to each lease, and other relevant regulations. Additional mitigation measures are also recommended that could further lessen the identified environmental impacts. Cumulative impacts that may result from the Baxter Proposal are discussed in Section 4.20 in this chapter.

4.2 AIR QUALITY/CLIMATE

As noted earlier, specific air quality monitoring was not conducted in the proposal area, but air quality conditions are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

4.2.1 Proposed Action

Construction of two new 30-foot wide unpaved access roads, approximately 1000 feet long for the North Well and 3,700 feet long for the South Well would generate local fugitive dust emissions. Devon plans to apply water to the roads to minimize fugitive emissions. These emissions are short term and are presented in Table 4.2-1.

The principal air quality parameter likely to be affected by construction of well pads and roads is the inhalable particulate level (PM_{10} - particles ten microns or less in diameter) associated with fugitive dust. Although no monitoring data are available for the Baxter proposal area, it can be assumed that the air quality is good. The construction of the facilities proposed for the project area – well pads and access roads - would result in short term, local impacts on air quality during and after construction, due to dust being blown into the air.

Vehicle emissions would result from work crews commuting to and from the work sites and from the transportation and operation of equipment to construct the two wells pads and access roads. Vehicle tailpipes would emit NO_X, SO_2, VOC, CO, and small amounts of PM as they travel to and from the sites. Fugitive dust concentrations would increase with additional vehicle traffic on the roads.

At the proposed site, two drill rig engines will be employed; at the North well, a 750 hp Caterpillar engine will be used to reach a well depth of approximately 10,550 feet below ground surface, and at the South well, a 1,500 hp Caterpillar 3512 engine will be used to reach a depth of approximately 16,000 ft. The drill rig engines are estimated to be operating approximately 45 days for the North Well and 65 days for the South Well.

Emissions will reach the highest levels of the project during drilling and completion operations. Drill rig operations will result mainly in an increase of NO_X and CO emissions. After the two wells are drilled, they will be tested. During the approximately 30 day testing period, gas and condensate will be flared. In accordance with the WDEQ regulations, total gas released during flaring will not exceed 50 MMCF for a maximum duration of 30 days. A summary of emissions generated from well pad construction, drilling, and flaring the two wells are provided in Table 4.2-1 and 4.2-2.

Table 4.2-1. Well Pad Construction & Drilling Emissions Summary

Emission Source	HP	Drilling & Flaring Days	Pollutants (tons)					
			NO_x	CO	SO_2	VOC	PM	HAPs
Well Pad Construction Fugitive Emissions (North & South)	-	-	-	-	-	-	2.0	-
Caterpillar Rig Engine	750	45	4.11	2.32	0.18	0.18	0.13	0.02
Caterpillar 3512 Rig Engine	1,500	65	11.87	6.71	0.52	0.52	0.39	0.03
Well Completion Flaring (North & South Wells)	-	60	9.45	2.36	-	3.38	-	-
TOTALS			**25.43**	**11.39**	**0.7**	**4.08**	**2.52**	**0.05**

Emissions from well flaring operations are provided in Table 4-2.

Table 4.2-2. Well Completion Flaring Emissions

Emission Source	Flaring Days	Maximum Volume of Gas Flared (MMSCF)	Pollutants (tons)					
			NO_x	CO	SO_2	VOC	PM	HAPs
Well Completion Flaring North Well	30	50	4.73	1.18	-	1.69	-	-
Well Completion Flaring South Well	30	50	4.73	1.18	-	1.69	-	-
TOTALS			**9.46**	**2.36**	**-**	**3.38**	**-**	**-**

Construction, drilling, and completion and construction of the proposed Baxter wells would impact air quality with short term emissions generated from well pad and access road maintenance/construction activities, and with drilling and completion operations. Vehicular traffic will likely generate air-borne dust during well pad and access road construction and during well drilling and completion operations. Dust suppression will be employed during the construction period by wetting road surfaces. Upon completion of the drilling and subsequent 30-day well testing period, total emissions would be greatly reduced with only minimal vehicle traffic occurring.

4.2.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal and no construction and drilling activities would occur. Because there would be no change in current conditions, impacts to air quality from Devon's proposal would not occur.

4.2.3 Additional Mitigation

No additional mitigation measures are suggested.

4.3 CULTURAL RESOURCES

4.3.1 Proposed Action

Cultural resources inventories were conducted on the proposed North and South Well pads and access ROW. The results determined that no eligible historic properties occurred within the surveyed areas. In addition, there is low potential for encountering intact buried cultural remains within the project area. No direct impacts to cultural resources would occur as a result of constructing and operating the proposed North Well and South Well pads and associated access roads.

Indirect impacts as a result of the Baxter Proposal could include visual contrast caused by the proposed access road, noise from construction equipment, and other effects on the location, design, setting, feeling, or association of historic properties. The site setting and visual contrast analysis determined that only a short segment of the proposed access road at its juncture with the existing county road would be visible from the Cherokee Trail. Based on these observations and analyses, construction and use of the proposed North Well pad and access road, would have no physical impact to the Cherokee Trail, and any visual impacts would be insignificant, compared to the existing visual impacts to the trail setting resulting from the county road and associated vehicle traffic (Darlington 2007a).

Therefore, the effects to cultural resources in the Baxter Proposal would not be adverse. Based on this conclusion, a determination of *"no historic properties adversely affected"* is proposed for the Rubicon Federal No. 16-5-14-105 (North Well) and the Rubicon Federal No. 16-28-13-106 (South Well) locations and associated access roads pursuant to Section 106 of CFR 800.

4.3.2 No Action

Under the No Action Alternative the BLM would deny the Devon Baxter Proposal, and no new impacts would occur to cultural resources within the proposal area.

4.3.3 Additional Mitigation

No historic properties were recorded as a result of the cultural resource inventories for the Rubicon Federal No. 16-5-14-105 (North Well) and the Rubicon Federal No. 16-28-13-106 (South Well) and their associated access roads; however, it is always possible that deeply buried archaeological deposits may remain undetected during the survey process, only to be exposed by later construction or other ground disturbing activities. Inadvertent discovery means the unanticipated encounter or detection of cultural resources that may qualify as historic properties, human remains, funerary objects, sacred objects, or objects of cultural patrimony found under or on the surface of Federal or Tribal lands. In the event that an

inadvertent discovery is made during any construction or excavation activities, the operations at the specific location would cease, and the BLM Rock Springs Field Office Archaeologist would be immediately notified in order to evaluate the discovery and determine the appropriate action.

4.4 WATER RESOURCES

4.4.1 Proposed Action

4.4.1.1 Surface Water

Potential impacts to surface water resources from the Baxter Proposal would include:

- Increased sedimentation delivered to surface waters, particularly to Trout Creek and downstream to Sage Creek and the Flaming Gorge Reservoir;
- Increased runoff to surface waters from disturbed areas;
- Potential contamination of surface water resources from spills or discharges of drilling fluids, petroleum, or other chemicals used for natural gas drilling, testing and completion activities;
- Contamination of surface water by uncontrolled discharges of water produced during drilling and completion operations.

For this proposal the required practices and mitigation measures that would be carried out to protect surface waters are covered in a number of documents and regulations. These include but are not limited to:

- Lease Stipulations.
- Onshore Oil and Gas Orders.
- Green River RMP.
- Surface Operation Standards and Guidelines for Oil Exploration and Development (Gold Book).
- Wyoming Stormwater Permit.
- Spill Prevention, Control, and Countermeasure (SPCC) Plan
- Wyoming Water Quality Regulations and the Clean Water Act.
- Applicant Committed Environmental Measures
- Devon's Stormwater Plan (aka Storm Water Pollution Prevention Plan (SWPPP)).
- Devon's Reclamation Plan

Increased sedimentation to surface waters

An increase in surface water sedimentation generally results when a precipitation, a rapid snow melt event, or a combination of events carries soils exposed by land disturbing activities to nearby streams and lakes. The risk of increased sedimentation mobilizing to nearby streams generally occurs when there is a combination of exposed or disturbed soils and a significant rainfall event such as a 2 year 24 hour event (for the proposal area 1.0-1.2 inches). In a sediment-mobilizing event, the risk of sediment reaching surface water is increased if the soils are mobilized near a potential water conveyance, such as a swale, that can transport the sediment to a nearby waterbody. Also the risk of sediment reaching surface waters can increase from lesser precipitation events, if the disturbed soils are near to surface water channels, such

as when a road crosses a stream. Additional factors in sediment mobilizing to surface waters include the distance and the steepness of the grade from the disturbed area to the surface water channel.

The Baxter Proposal would result in the disturbance of 10.97 acres. In the event of major precipitation event, a large amount of sediment could be mobilized from a disturbance this size. However the proposed disturbance areas are not adjacent to any surface water channels or nearby conveyances. However, the proposed North Well pad and access road are only about 200 feet up a gentle slope from an ephemeral channel that drains to Trout Creek. This is close enough that under suitable conditions sediment could be mobilized to the channel. Adherence to the mitigation practices described in the Devon stormwater plan and other relevant documents and regulations would substantially reduce the risk of any sediment discharge to surface waters. With implementation of the required practices, the risk of sediment from the proposal area reaching surface waters would be low.

Increased surface runoff

An increase in surface water runoff generally occurs when impervious areas such as paved areas are created. In the case of the Baxter Proposal, the compacted fill material associated with the well pads and access roads create semi-impervious areas. These areas allow some precipitation to infiltrate, while some runs off to nearby areas. While increased surface runoff has the potential to increase sediment loading as discussed above; it can also result in an increase in peak flows in area streams. These increased flows can cause an increase in stream bank erosion and stream channel down cutting. Together these impacts would result in increased in-channel sediment production and degradation of aquatic habitat.

Surface disturbance associated with the Baxter Proposal may result in a slight increase in surface water runoff to nearby areas. In most cases, however, nearby undisturbed areas would provide an area for the increased runoff from the semi-impervious areas to infiltrate into the ground and slowly percolate to the nearby streams. Other than around the uphill side of the well pads, there are no planned surface conveyances, such a drainage ditches, planned for this proposal. Also there are no known natural channels within 100 feet of the proposed disturbed areas. The amount of semi-impervious area is relatively small (less than 10.97 acres). Mitigation practices, described in the Devon SWPPP and the Applicant-Committed Mitigation Measures and other documents such as the RMP and SPCC Plan should minimize potential increased runoff impacts. With proper implementation of stormwater controls, no damage to nearby streams from increased runoff would be expected.

Accidental Spills

There is a potential for contamination of water resources from spills or discharges of drilling fluids, fuels, or other chemicals used for natural gas drilling, testing and completion activities, as well as produced water. The risk of uncontrolled spills reaching surface water exists throughout the implementation of the proposal. The SPCC plan would cover the storage, transfer, use, training, and spill response related to petroleum products. Adherence to the plan would significantly reduce the risk of a petroleum product spill occurring and would ensure that a proper response is mounted in the event of a spill. Similarly an emergency response plan would be in place that covers non-petroleum product spills, such as hazardous materials. Other steps that Devon would take to reduce risk include use of a closed-loop system (see Applicant-Committed Mitigation Measures, Ch. 2, Section 2.1.13), and moving the well pads away from surface waters and alluvial areas. While adherence to the plan and regulatory requirements reduces the

possibility of a spill, there would still be a small risk of surface waters becoming contaminated as the result of an accidental release.

Water would be produced during the drilling and completion operations. Based on groundwater testing results, the produced water would likely contain high concentrations of salts that could negatively impact water quality, if released to surface waters. There are no planned surface or groundwater discharges of produced water. The use of a closed-loop system would significantly reduce the risk of an uncontrolled release of these waters. Overall, the risk to surface waters from the release of waters produced as a result of drilling and completion operations is considered to be low.

4.4.1.2 Groundwater

The Baxter Proposal is located within an area of hydrologic concern (recharge area) so protecting water-quality is a priority. Groundwater resources of most concern are the shallow aquifers in the Green River and Wasatch Formations and potential water-bearing alluvial aquifers along perennial and ephemeral streams. There are no developed water wells within one mile of the proposed drilling, but numerous springs have been developed for stock water.

Potential impacts to groundwater resources from the Baxter Proposal include possible contamination of groundwater with produced water, drilling fluids, or petroleum constituents during drilling operations. Additionally, shallow groundwater could be impacted by accidental surface spills of petroleum products or other fluids used to support drilling operations. Drill cuttings would be buried on-site and residual contaminants could be leached to shallow groundwater. As the cuttings pits are lined, this scenario would be unlikely.

During drilling operations, the boreholes could penetrate several aquifers or could breach zones that provide barriers between aquifers (aquitards). Cross contamination of aquifers may occur if drilling fluids or other contaminants from the wellbore migrate vertically into freshwater aquifers. Surface casing would be set deep enough and cemented to the surface to protect freshwater aquifers (<10,000 mg/L TDS) and limit the potential for movement of material outside the well casing. Therefore, the potential for contamination or cross-contamination of freshwater aquifers is considered low.

Accidental surface spills of contaminants could adversely impact shallow groundwater. A closed-loop drilling fluid system would be implemented in order to reduce the potential for adverse impacts to groundwater. Use of a closed-loop system avoids the need for a reserve pit and all the drilling muds and other liquids generated from the drilling process are contained.

Additionally, if a spill were to occur, the SPCC plan would be implemented to minimize, control and cleanup the affected area, and the SWPPP would prevent off-site migration. Both wells are located approximately 500 feet away from the nearest ephemeral stream and associated alluvial deposits and depth to groundwater in the bedrock aquifers is likely several hundred feet below ground surface. Therefore, the potential for groundwater contamination due to accidental surface spills is expected to be low.

Construction activities would have the potential to alter runoff and infiltration. These include surface compaction of roads and well pads and direct capture of precipitation in the lined cuttings pit. Other than the lined cuttings pit, no impermeable surfaces are proposed (asphalt, roofs) and runoff from most local

precipitation events would be absorbed or evaporated. During infrequent large storms, there may be increased runoff from road surfaces or the well pad; however, these surfaces represent only a small fraction of surface area available for infiltration. Potential excess runoff would be captured on-site or in erosion control measures stipulated in the SWPPP and would eventually infiltrate into ground surface. With these controls in place, only minor, temporary changes in runoff patterns and no changes in infiltration are expected to occur.

The drill cuttings would be buried on-site and residual contaminants adhering to the rock fragments could be leached to shallow groundwater. Drill cuttings would be tested and characterized based on WDEQ requirements prior to disposal so potential impacts to shallow groundwater are considered low.

There will be no depletion of available groundwater supply in local aquifers because all water for drilling activities and dust abatement will be obtained from the town of Rock Springs municipal supply. No produced water will be discharged or reinjected into the groundwater system, so there would be no augmentation of groundwater supply.

Hyrdofracturing is anticipated as part of the Baxter Proposal. Hydrofracturing is commonly used to enhance the recovery of natural gas from relatively impermeable "tight" sandstones, and involves the injection of water or other fluids (which may contain petroleum constituents) and sand (or some other "proppant") into the formation. The fracing fluids could potentially contaminate freshwater aquifers if the created fractures extend into freshwater zones. Studies conducted for a proposed natural gas project targeting the Mesaverde Formation in western Colorado show that the maximum fracture distance would extend approximately 500 feet from each well (Wright Water Engineers 2003). Hydrofracturing would occur at depths greater than 8,300 feet for the North Well and 13,000 feet for the South Well and it seem very unlikely that shallower, freshwater aquifers would be impacted.

4.4.1.3 Floodplains

There are no known floodplains in the vicinity of either the North or South Well. No known floodplains will be impacted by the proposal.

4.4.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal, so that the proposed wells would not be drilled and the proposed well pads and access roads would not be constructed. Therefore, no change to current conditions would result and no additional impacts to surface and groundwater resources would occur.

4.4.3 Additional Mitigation

Based on the regulatory requirements that would be incorporated into the Baxter Proposal, potential impacts to groundwater resources are considered to be low and no additional mitigation measures are recommended. Additional site-specific mitigations could be defined during the onsite activities as necessary.

4.5 SPECIAL STATUS SPECIES

4.5.1 Proposed Action

The Baxter Proposal may result in direct, indirect and cumulative effects. Effects are addressed at both the local and landscape scales, depending on the home range and distribution of individual species.

4.5.1.1 Federally Listed Species

Black-Footed Ferret

Because the black-footed ferret is not present in the proposal area, the proposed action would have **no effect** to the black-footed ferret. The future potential for white-tailed prairie dog towns, the host species for ferrets, will not be impacted at the landscape scale, due to the small footprint of the proposed well pads and access roads.

Canada Lynx

Because there is no potential Canada lynx habitat in the vicinity of the proposal area the proposed action will have **no effect** on the Canada lynx.

Yellow-Billed Cuckoo

Because both proposed well pads and access roads are far removed from any mature cottonwood habitat, the proposed action would have **no effect** on the yellow-billed cuckoo.

Colorado River Fish

The four endangered species of Colorado River fish, the Colorado pike minnow, razorback sucker, humpback chub, and bonytail may occur approximately eight miles west of the proposal area in the Green River, south of the Flaming Gorge Reservoir. Since the source of water used for drilling and completion operations is the municipal water from the City of Rock Springs, no water depletion would occur as a result of the Proposed Action. Therefore, there would be **no effect** from the proposed action to the endangered Colorado River fish.

Ute Ladies'-tresses

Ute ladies'-tresses (*Spiranthes diluvialis)* is known to occur in the region, but has not been reported near the proposal area. If runoff occurs from the proposed action, it could cause siltation in riparian areas, which could result in a "**may affect not likely to adversely affect**" determination for the Ute ladies'-tresses. If riparian areas are avoided, the impact determination for the Ute ladies'-tresses would be "**no effect.**"

4.5.1.2 Species Petitioned for Listing under the ESA

Pygmy Rabbit

Maps prepared by the WGFD of suitable pygmy rabbit habitat show evidence of habitat overlap with the South Well site (see Figure 3.5-1 in Appendix A). There is no suitable habitat mapped in the vicinity of the North Well. A recent BLM survey found no evidence of pygmy rabbits at either well site (L. Keith, BLM, pers. comm., March 2008). If pygmy rabbits are present in the area, direct impacts could include

vehicle-related mortality. Another direct effect is the loss of 10.97 acres of habitat temporarily lost to well pad and access road construction. A potential indirect impact would be habitat fragmentation. However, the habitat loss is insignificant at the landscape scale, due to the absence of other oil and gas development in the area. Because of these factors, the project may impact individuals, but will not contribute to federal listing.

Wyoming Pocket Gopher

Because Wyoming pocket gophers are confined to gravelly ridges, there is little potential for occurrence at either the proposed North Well or South Well site or access roads. Because of range overlap, however, there is no way to rule out occasional occurrence at either site. Direct impacts include a temporary loss of 10.97 acres of marginal habitat from the proposed well pads and access roads. A potential indirect impact would be habitat fragmentation. However, the habitat loss is insignificant at the landscape scale. For these reasons, the proposed action may impact individuals, but will not contribute to federal listing.

Greater Sage-grouse

A recent compendium of sage-grouse findings plots sage-grouse lek presence and distance from the drilling area (WGFD 2007). The results, based on research conducted by Holloran 2005, Naugle et al. 2006, and Aldridge 2007 suggests the adverse impacts on sage-grouse lek attendance extend for 2.0 miles from active drilling. For the Baxter Proposal there are no leks, either occupied or unoccupied, within a two miles of either well. There is one unoccupied lek approximately 4.0 miles to the northwest of the North Well. The Wyoming Game and Fish records do not indicate the date the lek was last occupied. This unoccupied lek suggests some potential for sage-grouse in the area, but no immediate disturbance-related impacts from the proposal areas. Because there are no direct or indirect effects from the proposed action, the Baxter Proposal would have no impact on the greater sage-grouse.

4.5.1.3 Sensitive Animal Species

Gray Wolf

Wolves are not currently present in the project vicinity (L. Keith, BLM, pers. comm., March 2008). Based on their rapid expansion south, however, they could occur in the proposal area at any time. The limited extent of the proposed action would not result in impacts to the wolf prey base. Consequently, there are no direct or indirect impacts to the gray wolf.

Townsend's Big-Eared Bat

Because the Townsend's big-eared bat's prey base is limited to airborne insects, the direct, temporary loss of 10.97 acres of native vegetation would not measurably affect this species. Artificial lighting resulting from nighttime drilling, however, would disrupt foraging near the proposed well pads. Day roosting on rock outcrops is not expected to be affected by the proposed action due to the distances from rock outcrops. For these reasons, the project may impact individuals, but would not contribute to federal listing.

Spotted Bat

Because the spotted bat's prey base is limited to airborne insects, the direct, temporary loss of 10.97 acres of native vegetation probably would not measurably affect the insect prey base. Artificial lighting resulting from nighttime drilling, however, would potentially disrupt foraging near the well pads. Day

roosting opportunities within nearby juniper or pinyon pine trees may be slightly reduced in the vicinity of well pads. However, the effects would not be significant at the landscape scale. For these reasons, the Baxter Proposal may impact individuals, but not contribute to federal listing.

Swift Fox

The swift fox is not found in this portion of the State. For this reason, the proposed action will have no impact on the swift fox.

Midget Faded Rattlesnake

Suitable habitat for the midget faded rattlesnake occurs either within or near the proposal area. Because rock outcrops are near the proposed well locations, they could be used for communal denning. However, both sites are above the elevations where midget faded rattlesnakes were observed in previous studies (Parker and Anderson 2007). Assuming a limited potential for midget faded rattlesnake occurrence, direct effects would include a low risk of mortality from vehicle collisions. Direct effects would also include a temporary loss of 10.97 acres of foraging habitat from well pad and access road construction. A potential indirect impact would be habitat fragmentation. However, the habitat loss would be insignificant at the landscape scale. Therefore, the proposed action may impact individuals, but will not contribute to federal listing.

Great Basin Spadefoot Toad

Spadefoot toad habitat overlaps the proposal area. Direct effects would include mortality from vehicle collisions and a temporary loss of 10.97 acres of habitat, due to well pad and access road construction. There are no potential breeding habitats for the spadefoot toad near the well sites, as there are no wetlands in the immediate vicinity. For these reasons, the proposed action may impact individuals but not contribute to federal listing.

Colorado River Cutthroat Trout

The Colorado River cutthroat trout populations are found in Sage, Trout and Gooseberry creeks. Erosion resulting from the proposed action could potentially reach Trout Creek from the North Well and result in increased sediment deposition in these creeks. The increased sediment could clog the gills and potentially cause mortality in individual fish. An accidental spill could potentially reach Trout Creek from the North Well and result in mortality of the CRCT. However, use of closed-loop drilling and implementation of BMPs would minimize the likelihood of impacts to the Colorado River cutthroat trout.

Flannelmouth Sucker

The flannelmouth sucker may be found in Trout Creek in the vicinity of the proposal area. Erosion from construction and drilling activities at the North Well could potentially impact this species. However, the use of closed-loop drilling and implementation of BMPs for erosion control would minimize the likelihood of impacts to the flannelmouth sucker.

4.5.1.5 Sensitive Plant Species

Five WYNDD special status species, including a BLM sensitive species, were reported within a five-mile buffer of proposed wells, including *Abies concolor* (white fir), *Boechera pendulina* var. *russeola* (Daggett rock cress), *Cryptantha stricta* (erect cryptantha), *Draba juniperina* (Uinta draba), and *Penstemon*

scariosus var. *garrettii* (Garrett's beardtongue) (WYNDD, 2008). No special status plant species are known to exist near the proposed well pad sites and access roads. The RSFO BLM vegetation specialist (J. Glennon, BLM, pers. comm., April 10, 2008) does not believe there is suitable habitat for these sensitive plant species.

4.5.2 No Action

Under the No Action Alternative, the BLM would deny Devon's Baxter Proposal and no construction and drilling operations would occur. Therefore, there would be no change to existing conditions, and no new impacts to vegetation communities.

4.5.3 Additional Mitigation

Breeding bird surveys should be considered within one mile of proposed ground-disturbing activities during the spring nesting season.

4.6 HAZARDOUS MATERIALS AND WASTE

4.6.1 Proposed Action

The potential of an uncontrolled release of hazardous materials during proposal operations exists for this proposal. The Green River RMP (BLM 1997) objectives for managing hazardous materials on BLM lands include: protection of public and environmental health and safety; compliance with applicable federal and state laws; prevention of waste contamination due to any BLM-authorized actions; and integration of hazardous materials and waste management policies into all BLM programs. The BLM requires authorized activities that involve hazardous materials, to use precautionary measures to guard against releases or spills into the environment.

Actions, such as proper containment of oil and fuel in storage areas, required containment of hazardous materials, implementation of appropriate design and construction measures, proper well casing and cementing, and locating wells away from drainages, are required in order to prevent potential soil or water contamination. All operations associated with the Devon Proposal would comply with relevant federal and state laws regarding hazardous materials and with directives including the SPCC plan. Sites contaminated with hazardous wastes would be reported, secured, and cleaned up according to applicable federal and state regulations and contingency plans. Given the plans and regulations that Devon is required to follow, the risk of an uncontrolled hazardous waste release that could impact natural resources is considered to be low.

4.6.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal and there would be no construction and drilling activities. Therefore, the potential for uncontrolled releases of hazardous materials would not occur.

4.6.3 Additional Mitigation

No additional mitigation measures are suggested.

4.7 GEOLOGY AND MINERALS RESOURCES

4.7.1 Proposed Action

4.7.1.1 Geology

Potential impacts to geologic resources from the proposed action include changes to the local topography and increased slope instability. Construction of the access roads and well pads would cause minor topographic changes where cut- and fill-slopes are created or the ground surface is otherwise modified. Both well pads and the associated access roads are located on relatively gentle ground (i.e., slopes less than 10%) and do not cross streams or major drainages, so there would be no need for major cuts, fills, or other ground disturbances. Potential direct impacts to geological resources would be minor and temporary.

The Green River and Wasatch Formations underlying the area are prone to mass wasting in areas with steeper slopes. Both well pads and the access roads would be located on gentle slopes (less than 10%) and are unlikely to experience mass movement. Small slope failures could occur on cut and fill slopes along the access roads and well pads. Because the terrain is relatively flat and only small cut and fill slopes would be needed, the potential for localized temporary impacts from these failures would be low.

Potential impacts from seismic hazards (earthquakes, fault rupture) could include damage to the wells or roads. There are no active mapped faults in the area and only minor small earthquakes have been recorded. Therefore, the potential for impacts from seismic hazards is considered low. Because seismic hazards are unpredictable, the operator could use thicker casing, remote access to seal off the well downhole, blind rams on the rig (to shear the casing and drill stem resulting in total loss of access to the well bore), and emergency shutdown valves.

4.7.1.2 Mineral Resources

The inventory of mineral resources in the area of the Baxter Proposal revealed no major mineral resources that would be impacted by the proposed action. There has been limited past mineral exploration, and there is no current mineral resource extraction in the Sage Creek ACEC or the Sugarloaf Basin SMA. The proposed action could interfere with potential coal, trona, or oil shale extraction. However, these mineral resources are unlikely to be developed in the foreseeable future due to depth to resource, BLM withdrawals, or technological limitations.

4.7.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal and no construction or drilling activities would occur. Therefore, no direct impacts on geological or mineral resources would occur.

4.7.3 Additional Mitigation

Based on the regulatory requirements that would be incorporated into the Baxter Proposal, potential impacts to geology and mineral resources are considered to be low and no additional mitigation measures

are recommended. Additional site-specific mitigation could be defined during onsite activities as necessary.

4.8 PALEONTOLOGY

4.8.1 Proposed Action

The Wasatch Formation comprises bedrock underlying the proposed well pads. This formation has a high sensitivity for containing fossils of scientific significance (Probable Fossil Yield of 4 or 5). Ground disturbance, including construction of the two well pads and access roads could result in the exposure and possible destruction of fossil resources of scientific significance, either directly as a consequence of construction, or indirectly as a result of increased erosion rate. The increased access resulting from the proposed action may increase the visibility of fossil resources and lead to increased poaching.

Ground disturbance could also result in beneficial effects in that new fossils of scientific significance may be discovered. Such fossils would need to be properly recovered, catalogued into the collections of a museum repository and made available for study and scientific evaluation. An addition positive benefit would be increased access for professional, permitted paleontologists and geologists, for the purpose of making scientifically significant discoveries.

The magnitude of negative impacts associated with the potential loss of fossil resources as a result of the proposed action would be reduced by the implementation of paleontologic resource mitigation measure described below.

4.8.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal and no construction or drilling would occur. Because there would be no change from current conditions no positive or negative impacts from the Baxter Proposal would occur.

4.8.3 Additional Mitigation

To reduce the potential for negative impacts and foster potential positive impacts to paleontology a spot inspection could be conducted by a qualified paleontologist after construction of each well pad and associated access road. Inspection would include the visual examination of the well pad, cuttings pit, access road, and associated spoils.

4.9 SOIL RESOURCES

4.9.1 Proposed Action

Ongoing drought conditions along with the shallowness and low fertility of the soils in the proposal area makes the soils relatively fragile and impedes recovery from disturbance. Soils of both well sites were formed on nearly level bedrock stream terraces in sandy slope wash, alluvium, and/or residuum of calcareous sandstone members of the main body of the Wasatch Formation. Soil development is minimal in all four soils mapped for the well sites. The soils are shallow (4 to 18 inches thick), with thin (2- to 4-inch) A horizons over highly calcareous Bk horizons or Cr sandstone residuum. Surface and subsurface

soil textures are loam, channery loam, fine sandy loam, and sandy loam, which, together with the shallow depth to bedrock, creates very low water holding capacity. Saline or sodic conditions are not noted for these soils, but geomorphically associated soils do have electrical conductivity (EC) greater than 4 mmhos/cm and/or exchangeable sodium percentage (ESP) greater than 15. The A horizons generally have slightly lower pH and calcium carbonate and slightly higher organic matter contents than subsurface horizons (as noted by color), which makes the thin A horizons crucial for plant germination and growth.

The proposed action would result in a total of 10.97 acres of disturbance associated with the access road and pad construction in the Baxter proposal area. Direct soil impacts would include removal of vegetation, exposure of the soil, mixing of soil horizons, and loss of topsoil productivity, increased potential of wind and water erosion resulting in further loss of the thin soil layers.

4.9.2 No Action

Under the not action alternative, the BLM would deny the Devon Baxter Proposal, and no activities would occur that would potentially affect soil resources. Therefore, no changes in current conditions in the area would occur.

4.9.3 Additional Mitigation

Minimizing disturbance of the fragile soil systems on these sites through use of oak mats would reduce the potential for erosion. Other erosion control measures that may be implemented by the BLM AO may include methods identified in Appendix 5-3 of the Green River RMP (BLM 1997).

- Where scraping of topsoil is necessary, care should be taken to identify and map the thickness of the A horizons across the well pad and access road sites and to scrape only the A horizon. The low organic matter and high $CaCO_3$ in sub-soils would damage the value of topsoil for recovery of vegetation.
- Stockpiling of topsoil should follow proven guidelines for preserving its quality as a plant growth medium, including protection from erosion by covering, mulching, or establishing vegetation.
- Though saline/sodic conditions are not noted in the soils mapped in this area by NRCS, these conditions are common in this area. Site-specific evaluation of soils should include quantifying EC and ESP and planning to avoid disturbance of areas with EC > 4 mmhos/cm or ESP > 15. These conditions support specialized plant communities that are very difficult to restore.

4.10 VEGETATION

4.10.1 Proposed Action

4.10.1.1 Plant Communities

The impact of well pad construction on vegetation is the loss of native plants and the potential invasion of exotic species. Under the proposed action, the direct impacts include approximately 10.97 acres of vegetation removal from the early seral juniper/ big sage Historic Climax Plant Communities (HCPC). Early seral forbs, grasses, and shrubs would be disturbed. This may include the loss of regenerating Wyoming big sagebrush.

The existing well pad maintenance would incorporate vegetation and weed controls (i.e., herbicide application). Where feasible, the interim reclamation activities would be carried out as soon practical.

4.10.1.2 Wetlands/Riparian

There are no wetland and riparian areas that will be directly impacted by the Baxter Proposal. However, short-term indirect impacts to nearby riparian areas are possible due to potential for increased runoff and erosion.

4.10.1.3 Invasive and Noxious Weeds

The ground disturbing activities associated with the development of both well sites will expose approximately 10.97 surface acres to weed infestations. Both sites currently contain cheatgrass. In addition, Canada thistle and black henbane are found along the roads in the area (J. Glennon, BLM, pers. comm., March 2008). Although cheatgrass is not listed as a state or Sweetwater County noxious weed, it does reduce forage value, wildlife habitat, and erosion protection. Black henbane is a Sweetwater County listed species. Invasive and noxious weeds would be addressed in a weed management plan.

4.10.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal. The existing early seral juniper/Wyoming big sagebrush HCPC would continue the current successional trajectory. Because the No Action alternative would not disturb any area, consequently there would be no disturbance to plant communities, wetlands, and riparian areas. In addition, there would be no ground-disturbing activities to expose the area to further infestation by weeds.

4.10.3 Additional Mitigation

Thoroughly clean all equipment prior to bringing on to site. Keep service vehicles clean especially if they are visiting multiple sites where invasive weed seeds may have adhered to the undercarriage of the vehicle.

4.11 WILDLIFE AND FISHERIES

4.11.1 Proposed Action

4.11.1.1 Big Game

The availability and winter range forage is a primary limiting factor to big game populations (Leopold 1933). A second limiting factor is severe or prolonged winter weather, which can result in substantial over-winter mortality (Sawyer et al. 2006).

Human disturbance during the winter can also reduce big game winter survival. A study conducted on the Sublette mule deer herd, north of the proposal area, showed displacement, due to natural gas drilling activities, from preferred wintering habitat, the only exception being during extremely harsh winters when mule deer were forced by starvation to approach disturbed areas (Sawyer et al. 2005). The data for three years suggested that: 1) deer use was only 0–25% of pre-disturbance levels within 0.37 miles of drilling activity; 2) deer use was only 26–50% of pre-disturbance levels within 1.04 miles of drilling activity; 3)

deer use was only 51–75% of pre-disturbance levels within 1.56 miles of drilling activity; and 4) deer use was 76–100% of pre-disturbance levels within 1.88 miles of drilling activity. No displacement was noted beyond 2.3 miles of disturbance. Studies on elk response to human disturbance indicate elk also respond in a similar manner from human disturbance during the winter (Cassirer et al. 1992).

Spring, summer, and fall seasonal ranges are generally considered less limiting to big game populations, but researchers have suggested that having access to productive summer forage results in animals being in better condition for the winter, and increases their chances for over-winter survival (Marcum 1975; Grover and Thompson 1986; Edge et al. 1988).

Disturbance During Parturition

Most elk, mule deer, and pronghorn typically give birth around June 1, plus or minus two weeks (Toweill and Thomas 2002), although there can be significant variation in some populations. Human disturbance during parturition places newborn animals at risk. Most of the research on this topic has focused on elk. Disturbance during and immediately after calving may increase elk calf vulnerability to malnutrition and predation (Kuck et al. 1985; Phillips and Alldredge 2000). These studies indicated that disturbance during and soon after the calving period can increase mortality of calves, and disturbance after the calving period increases movement of calf/cow pairs and may cause displacement. Studies by Shively et al. (2005) showed that within two years after removal of disturbing activities, the calf/cow pair numbers were back to pre-disturbance levels. Because the South Well is one mile southwest of an elk parturition area, there would probably not be direct effects on the parturition. There may, however, be indirect effects from disturbance, because drilling activity may occur during elk calving. These effects are likely to include displacement, i.e. cows and calves are likely to move away from the disturbance. Because elk calves are extremely vulnerable to predators during the first few weeks of life, there is a potential for increased calf mortality. This would not be significant at the landscape scale due to the large size of the elk parturition area, and minimal percentage impacted (see Figure 3.11-3, Appendix A). Changes in calf recruitment are not expected to be measurable at the herd unit scale. This displacement of elk from parturition areas is expected to be short term (one year).

Impacts to Migration Corridors

Given the small scale and seasonal restrictions of the project, the impact on migration routes is expected to be minimal. Increased traffic, however, from the proposed action may increase mortality from vehicle collisions where migration routes cross roads leading to the proposal area. This is not expected to be significant and will not be measurable at the herd unit scale.

Impacts to pronghorn

The North and South Well proposed locations are in Spring/Summer/Fall pronghorn range (see Figure 3.11-2, Appendix A). Well pad and access road construction would result in a temporary loss of 10.97 acres of foraging habitat in the proposal area. The nearest pronghorn crucial winter range is six miles from the South Well and eight miles from the North Well. Potential impacts to pronghorn could result from disturbance to spring calving, and avoidance or temporary displacement of pronghorn from Spring/Summer/Fall range due to noise from equipment use, human presence, and vehicles, and habitat fragmentation. Habitat fragmentation would reduce the connectivity of habitats. However, the small loss of foraging habitat and temporary displacement from the winter habitat resulting from the Baxter Proposal

would have little effect to the pronghorn at the herd unit scale, and would not likely be detectable, considering natural mortality resulting from winter weather conditions.

Impacts to Elk

The proposed North and South Wells are within yearlong range of the elk. In addition, the North Well is also located approximately 0.5 mile from elk crucial winter/yearlong range, and the South Well is within one mile of an elk parturition area (see Figure 3-11-3, Appendix A).

Well pad and access road construction will result in a temporary direct loss of 10.97 acres of elk yearlong winter range and foraging habitat in the proposal area. In addition, noise from equipment use, human presence, vehicles could result in temporary avoidance of the area by the elk. Based on lease stipulations, drilling will cease by November 15th at the South Well proposal area, unless an exception is granted, due to warm weather. The effects of a loss of wintering habitat and disturbance from human activity would be minimized because of the timing stipulation in crucial elk winter range.

Another potential impact to elk would be habitat fragmentation, which would reduce the connectivity of habitats. However, the small loss of foraging habitat and temporary displacement from the winter habitat would have little effect to the elk at the herd unit scale, and would not likely be detectable, considering natural mortality resulting from winter weather conditions.

Impacts to mule deer

The South Well is located within crucial winter/yearlong mule deer range. Well pad and access road construction will have a temporary direct loss of 6.23 acres of habitat. Because drilling will cease by November 15th, there will be no indirect effects of a loss of wintering habitat from drilling operations.

The proposed North Well is located within winter/yearlong range and is only 0.5 miles from crucial winter/yearlong range. Direct effects will include a temporary loss of 4.74 acres of foraging habitat due to well pad and access road construction (see Figure 3.11-4, Appendix A). Because drilling could extend past November 15th, there could be an indirect loss of wintering habitat due to human disturbance. Sawyer (2005) found disturbance-related impacts to mule deer for up to 2.3 miles from active winter drilling.

Another potential impact to elk would be habitat fragmentation, which would reduce the connectivity of habitats. However, the small loss of foraging habitat and temporary displacement from the winter habitat would have a little effect to the mule deer at the herd unit scale, and would not likely be detectable, considering natural mortality resulting from winter weather conditions.

4.11.1.2 Migratory Birds

The migratory Bird Treaty Act of 1918 requires treaty participants (USA, Canada, and Mexico) to protect birds that migrate between the three countries. For this analysis, we consider only those migrants that utilize the bunchgrass/sagebrush and juniper/pinyon pine cover types. Species associated with these cover types that may occur within the proposal area include loggerhead shrike, sage thrasher, sage sparrow, and Brewer's sparrow (L. Keith, March 24, 2008). Potential impacts to these species are discussed below.

Loggerhead Shrike

Because the loggerhead shrike is wide-ranging and a highly mobile avian predator, the limited amount of ground disturbance expected from the proposed action (10.97 acres) would not create any measurable impact on prey populations. For this reason, the proposed action would have little or no impact on the loggerhead shrike.

Sage Thrasher

Direct impacts to the sage thrasher could include vehicle-related mortality. Another direct effect is the loss of 10.97 acres of habitat temporarily lost to well pad and access road construction. This habitat loss would be insignificant at the landscape scale. Because of these factors, the Baxter Proposal may impact individuals, but not contribute to federal listing.

Sage Sparrow

Direct impacts to the sage sparrow could include mortality from traffic within the proposal area. Another direct effect is the loss of 10.97 acres of habitat temporarily lost to well pad and access road construction. This habitat loss would be insignificant at the landscape scale. Because of these factors, the Baxter Proposal may impact individuals, but not contribute to federal listing.

Brewer's Sparrow

Direct impacts to Brewer's sparrow could include mortality from vehicles within the proposal area. Another direct effect would be the loss of 10.97 acres of habitat temporarily lost to well pad and access road construction. This habitat loss is insignificant at the landscape scale. Therefore, the project may impact individuals, but not contribute to federal listing.

4.11.1.3 Raptors

The RMP states that active and historic raptor nest sites are to be protected and managed. Levels of protection are determined on an individual basis. Factors that are included in the determination are species, distance to disturbance, time scale of disturbance, and line-of-site between the nest and disturbance. Disturbances occurring during the nesting season (February 1 - July 31) will be subjected to restrictions. For ferruginous hawks a restriction of one mile can be implemented and 0.5 mile for other raptor-occupied nests (USDI 1997).

Known raptor nest sites, mapped by the BLM, were evaluated in relation to the two proposed well locations. No known ferruginous hawk nests were mapped within one mile of either location and no other known raptor nests were mapped within 0.5 mile of either location (data provided by BLM 2008). Note that the North Well location has one red-tailed hawks nest within one mile of the proposed well site, and one golden eagle and two red-tailed hawk nests within five miles. Near the South Well there are two golden eagle nests within two miles and one golden eagle nest within five miles of the well site. Other nesting raptors reported in the area include the ferruginous hawk, northern harrier, and prairie falcon.

4.11.1.4 Fisheries

Trout, Gooseberry and Sage Creek have game and non-game fish populations (see Table 3.11-1 in Appendix A). These fish populations could potentially be impacted by activities related to the Baxter Proposal. Potential direct impacts to fisheries would include exposure to contaminants from accidental spills or increased runoff and sedimentation from well pad or access road construction. Adherence to the

mitigation practices described in the Devon stormwater plan and other relevant documents would substantially reduce the risk of contaminants or sediment discharge from reaching area surface waters.

4.11.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal so that no construction or drilling would occur. Since there would be no change in current conditions, no new impacts to wildlife would result.

4.11.3 Additional Mitigation

Raptor surveys would be conducted for any disturbing action between February 1 and July 31, raptor surveys should be conducted within one mile of golden eagle and ferruginous hawk nests and ½ mile of other raptor nests.

4.12 RANGE RESOURCES

4.12.1 Proposed Action

The impacts of the Baxter Proposal to rangeland resources will be a short-term loss of forage for grazing, and potential of cattle/vehicular conflicts during development and drilling of the wells. The impacts will be mitigated through reclamation, coordination between Proponent and permittees, and timing of the drilling

A total of 10.97 acres will be disturbed between the two well sites (Figure 3.12-1, Appendix A). There will be a short-term loss of forage for grazing due to vegetation removal, potential weed infestations, cattle-vehicle conflicts, and potential damage to range improvements. The loss of grazing at each well site is disclosed in terms of a reduction in AUMs.

The total disturbance at the North well that is located within the Salt Wells grazing allotment is approximately 4.74 acres. The stocking rate set by the BLM for this allotment is 0.06 AUMs per acre; therefore, there would be a short-term loss of 0.013 AUMs. The use period for this allotment is March 16 through February 28 of the following year. The exploratory drilling will be in progress during this period; therefore, contractors and support crew will be accessing the area increasing the likelihood of vehicle collisions with cattle.

The total disturbance at the South well that is located within the Spring Creek allotment is approximately 6.23 acres. The stocking rate for this allotment is 0.11 AUMs/Ac; therefore, there will be a short-term loss of 0.018 AUMs. This well is scheduled to be drilled in the summer when the stocking rate is at its lowest level of 314 AUMs or 57 head of cattle from May 16 to the end of October. The well is located in the North pasture and there will be no need to use cattle guards, gates or cut fences to access the site. There is potential for interactions with cattle in this allotment during the drilling. In addition there are three springs in the area, one spring supplies the Iron Mountain pipeline. The springs are located to the northwest of the proposed well. The water pipeline runs north of the proposed well location on the north side of an unnamed drainage.

4.12.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal. Since there would be no construction and drilling operations, no impacts to rangeland resources would occur.

4.12.3 Additional Mitigation

The following are additional mitigation measures to protect livestock and rangeland under the proposed action:

- Coordinate with livestock permittees during construction and drilling operations.
- Coordinate with livestock permittees on the drilling schedule to reduce or eliminate interactions with cattle (e.g., design grazing schedule to defer the areas until drilling is complete.
- Locate and mark range improvements such as stock water lines, springs and tanks that may be in close proximity of the well sites and roads to alert allottees using the area.
- Complete reclamation immediately to reduce potential for invasive weeds and to restore forage on the site.
- Bus or carpool crews to the site to reduce traffic and potential for collisions with cattle.
- Strictly enforce speed limits.

4.13 RECREATION

4.13.1 Proposed Action

4.13.1.1 Dispersed Recreation

The recreation effects analysis area for the Baxter Proposal is the Little Mountain Recreation Use Area. The analysis area serves as the geographic basis for assessment of impacts resulting from the actions proposed under each alternative as well as cumulative effect.

The Baxter Proposal will have minor direct effects on the wide array of dispersed motorized and non-motorized recreation opportunities offered and available in the Little Mountain Recreation Use Area. The minor impacts that may occur would be short term due to the short time period needed to fully implement the proposal. The potential effects from the Baxter Proposal on most recreation activities will consist mainly of lost or diminished recreation opportunities or experiences in the immediate vicinity (one mile radius) of each of the North and South Wells due to the construction, drilling, and completion activities associated with each well. The visual impact and/or noise from these activities would affect recreation experiences in the immediate area of each proposed well where they are visible and/or audible. Recreation experiences for persons on the Cherokee Historic Trail or designated mountain bike trails may also be diminished by the sights or sounds of the construction activities, especially for those individuals seeking quiet, solitude, and unchanged natural landscapes. Traffic associated with the proposal on access roads to each proposed well site would be minimal, but may impact recreational traffic on the county roads used for access to the well sites. The impact to the county roads is unknown, as there are no specific data on numbers of recreation users utilizing the county roads for hunting (J. Radosavitch, Sweetwater County, pers. comm., March 10, 2008). The potential impact on traffic on U.S. Highway 191 is provided in Section 4.16.1. Since the Baxter Proposal is short term in nature, the impacts would be temporary.

4.13.1.2 Hunting

The analysis areas for hunting are the respective Hunt Areas for elk, mule deer, and pronghorn antelope in which the proposed North and South Wells are located. These include Elk Hunt Area 31 (see Figure 3.11-3 in Appendix A), Mule Deer Hunt Area 102 (See 3.11-4 in Appendix A), and Pronghorn Hunt Area 112 (See Figure 3.11-2 in Appendix A). Hunting for these three species in the area occurs for about two months, with archery opening on approximately September 1 and lasting for a month, and rifle season opening on about October 1 and lasting for about 30 days.

Both the North and South Wells are located in very close proximity to the eastern boundary of Elk Hunt Area 31, which is a relatively small hunt area compared to the mule deer and pronghorn antelope hunt areas. The adjacent hunt area to the east of the North Well is Elk Hunt Area 30, and the adjacent hunt area to the east of the South Well is Elk Hunt Area 32. All three Elk Hunt Units are part of Elk Herd Unit 424 made up of the South Rock Springs Elk Herd. Both wells are located well into the interior of Mule Deer Hunt Area 102. The North Well is located almost on the Pronghorn Antelope Hunt Area 112 boundary with Pronghorn Antelope Hunt Area 59. The South Well is located well in the interior of Pronghorn Antelope Hunt Area 112.

Hunting, as an important component of tourism, has a positive impact on the local, regional, and state economy. Some comments expressed concern that the Baxter Proposal could have a negative impact on hunting and the revenues from these activities. Because of the very high demand for and very limited number of licenses available in the respective hunt areas, it is doubtful that any licenses will go un-issued, and even more doubtful that successful recipients will forego the opportunity to hunt in the affected hunt areas due to the potentially active Baxter Proposal. Therefore, the economic impacts to the tourism economy would continue to be beneficial or positive.

If construction and drilling activities occur at the proposed well sites during either the archery or rifle seasons, or both, direct affects may include displacement of big game animals from the immediate vicinity of the proposed wells with a corresponding displacement of hunters. The distance and duration of displacement will depend largely on the animal species, individual animal, and type, duration, and intensity of disturbance.

4.13.1.3 OHV

The area of effects analysis for OHV use will be the same as that identified for recreation. The direct affects of the Baxter Proposal will be minimal and negligible on OHV use in the Little Mountain Recreation Area. Motorized travel, including OHV travel, is limited to designated roads and trails (RMP 1997) which means motorized vehicles must stay on designated roads and trails, which are those currently depicted on the current BLM land status map for the area. The Baxter Proposal will not impact these roads or trails in such a way as to further restrict motorized travel in the area. There will be increased traffic to negotiate on those existing roads used to access both the North and South Well, but public use will not be restricted except on those short segments of new road needed to access the proposed well sites. The affects will be short term during the construction, drilling, decommissioning, and reclamation phases of the project. The sights and sounds of the construction work won't be as visible or audible as it is to persons engaged in non-motorized recreation pursuits due to their mostly continuous movement and the sound of the OHV itself muffling other sounds.

There are no identified or known indirect effects, nor are there any known cumulative effects. No past, present, or reasonably foreseeable actions have been identified for the area of analysis.

4.13.1.4 Wilderness Resource Management and Wilderness Study Areas

The Baxter Proposal would have no affect on the wilderness areas and Wilderness Study Areas (WSA) as neither proposed wells is in, adjacent to, or in close proximity to any congressionally designated Wilderness or BLM WSA.

4.13.2 No Action

Under the No Action Alternative, the BLM would deny the Baxter Proposal. Therefore no direct, indirect, or cumulative effects on dispersed recreation, hunting, OHV use, and wilderness and Wilderness Study Areas, would occur.

4.13.3 Additional Mitigation

No additional mitigation is suggested

4.14 SOCIOECONOMICS/ ENVIRONMENTAL JUSTICE

4.14.1 Proposed Action

Implementation of the Baxter Proposal would generally have positive socioeconomic effects for Sweetwater County, including the following: Increased employment opportunities for residents of Sweetwater County and a minor demand for housing and public services in rural towns and unincorporated areas located near the area in Sweetwater County.

The Baxter Proposal will have moderate impacts on the attitudes and opinions regarding the use of public lands. Numerous comments were received regarding the value of this area for hunting, recreation, wildlife viewing, open space, and unobstructed views. The development of these two exploratory wells will have a short-term impact on these social values, which would be minimized by siting of the drilling rigs to avoid visual and noise impacts, timing, and agreed-to mitigation.

4.14.1.1 Local Economy and Employment

Implementation of the Baxter Proposal would create additional employment opportunities in Sweetwater County during the proposed action. Opportunities for direct employment (e.g., positions hired for construction, drilling, and completion), and indirect employment (jobs available in support industries) would arise as a result of drilling operations. When feasible, local contractors and workers would be hired for the proposed project. The non-local population would consist of short-term (construction and drilling rig) contractors. Some of the non-local workers would likely reside in Rock Springs, Wyoming. Temporary housing is available, but limited, in Rock Springs, which has historically offered accommodations for the oil and gas industry. Non-local populations contribute to the local economy of these cities through the rental of motel rooms, or other accommodations, as well as meals, groceries, gasoline, and various other goods and services. Due to increased non-local population, there would be a corresponding increase to the service sector. The Baxter Proposal would result in a minor increased

demand for local services (e.g., housing, law enforcement, fire protection, medical, and social services). In addition, the proposal would result in increased wear on U.S. Highway 191, County Roads 34 and 36, and other county infrastructure.

In terms of employment, personal income, housing, facilities and services, and local, state and federal government fiscal conditions, the analysis indicates that the effect would be minor to negligible, because the proposal involves only two exploratory wells.

4.14.1.2 Federal Mineral Royalties

Federal mineral royalties are collected by the Mineral Management Services (MMS), for oil and gas produced on Federal leases. Federal royalties are collected at a fixed rate and are split evenly between the Federal government and state of origin. Federal Mineral Royalties will not be collected for these exploratory wells.

4.14.1.3 Severance Tax

The State of Wyoming collects a six percent severance tax on oil and natural gas products produced, stored, or transferred from any field within the State. No Severance tax would be collected because these are exploratory wells.

4.14.1.4 Hunting and Recreation

There will be a short-term minor impact to the recreational experience as a result of the development of these two exploratory wells. Persons may see and hear the drilling rigs during hiking, hunting, biking or sightseeing. A considerable amount of time was taken by the BLM and Devon to locate the proposed well sites in areas that would have the least amount of impacts on both natural resources and recreational opportunities.

Loss of hunting revenues as a result of the proposal will be negligible. There were a total of 3,100 applications for 83 permits submitted by resident and non-resident hunters to hunt elk in the hunting area 31 which includes both wells. Because this is a permit-only area for elk and mule deer, the number of applicants would have to decrease dramatically to show impacts to revenues.

There may be impacts to the hunting experience as a result of the Baxter Proposal. Animals may avoid the proposed drilling areas as a result of increased activity in the area. The Hunt Area 31 is 16,607 acres, of which a total of 10.97 acres will potentially have increased activity. The view of the drilling rig at the proposed South Well would result in visual and noise impacts during construction, drilling and completion. Drilling, completion, and testing activities may not be completed at the South Well location prior to the beginning of the big game hunting season. The North Well is located on the edge of hunting districts and visible from Highway 191 which may reduce the impacts to the hunting experience. However, impacts from the North Well are expected to occur during the hunting season.

4.14.1.5 Environmental Justice

The Baxter Proposal would not result in a disproportionately high and adverse human health or environmental impact on minority populations, low-income populations, or Indian Tribes.

4.14.2 No Action

Under the No Action Alternative, the Baxter Proposal would be denied by the BLM. Additional employment and use of local services would not be realized. There would be no impacts to the natural landscape and hunting, as identified in the public comments to be of concern.

4.14.3 Additional Mitigation

The requirements of Executive Order 12898 on environmental justice would be implemented, as necessary. However, as the proposed action would not result in a disproportionately adverse health and environmental impact on minority populations, low-income populations, or Indian Tribes no additional mitigation measures are proposed.

4.15 VISUAL RESOURCES

As directed in the BLM Visual Resource Management protocols, a viewshed analysis was performed on the proposed well locations to investigate visual impacts along travel corridors in the area. Key Observation Points (KOP) were defined by BLM specialists as highways, paved county roads and historical trails (J. Foster, BLM, pers. comm., March 2008). Environmental Systems Research Institute's (ESRI) Spatial Analyst was used to perform this analysis for highways and county roads. A discussion of the impacts to the Cherokee Historic Trail is provided in Section 4.3, Cultural Resources. The highway and county road viewshed analysis is described below.

ESRI's Spatial Analyst created a viewshed using the top of the drilling rig (142 feet above ground level) as the observation point and a 5-foot height for all potential view areas (this was done to model the height that a person would be viewing the rig afoot or in a vehicle). The two proposed drilling locations were buffered by 2.5 miles out to a distance of 10 miles. The resulting viewshed was then intersected with roads and with the 2.5-mile buffers. This allowed the distance of roads within view of the drilling rigs to be quantified by road class and by distance from each proposed drilling location.

4.15.1 Proposed Action

The results of the viewshed analysis indicated that the drill rigs would have a visual impact to people driving along these roads. The results are presented for all roads in the analysis area, even though the only road that classifies as a KOP is Highway 191 (Table 4.15-1 and Figure 4.15-1 in Appendix A).

Table 4.15-1. Baxter Proposal Viewshed Analysis Results

Road Type	Distance from Proposed Drilling Locations (Miles)	Miles of Roads		Grand Total (Miles)	% Visible
		Not Visible	Visible		
US Highway 191	0–2.5	2.3	2.1	4.4	47.7%
	2.5–5.0	10.5	3.7	14.2	26.1%
	5.0–7.5	15.3	0.1	15.4	0.6%
	7.5–10.0	9.3	0.9	10.2	8.8%
County Road	0–2.5	18.1	8.2	26.3	31.2%

Road Type	Distance from Proposed Drilling Locations (Miles)	Miles of Roads		Grand Total (Miles)	% Visible
		Not Visible	Visible		
(unpaved)	2.5–5.0	63.6	4.9	68.5	7.2%
	5.0–7.5	151.9	1.6	153.5	1.0%
	7.5–10.0	197.7	3.4	201.1	1.7%
Other Roads (unpaved)	0–2.5	12.6	4.7	17.3	27.2%
	2.5–5.0	41.1	2	43.1	4.6%
	5.0–7.5	53.8	1	54.8	1.8%
	7.5–10.0	32.5	0	32.5	0.0%
Grand Total	0–10	608.7	32.6	641.3	5.1%

4.15.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal. Since no construction or drilling operations would occur, there would be no change from current conditions; therefore, no impacts would occur to the viewshed in the area.

4.15.3 Additional Mitigation

Visual impacts are required to be minimized in all resource development activities on BLM-administered lands. Therefore, no additional mitigation is necessary.

4.16 ACCESS/ RIGHTS-OF-WAY

4.16.1 Proposed Action

Under the Baxter Proposal a total of 0.9 miles of new access roads would be constructed. Existing access roads include 0.6 miles of BLM dirt road and 8.5 miles of Fremont County Roads. U.S. Highway 191 provides access to the proposal area from Rock Springs.

Vehicle traffic would be greatest during the drilling phase, with 50 to 70 truckloads of equipment needed for the operation. During drilling operations daily traffic of approximately three to five trucks, including water trucks and resupply trucks, would access the site. Worker transportation would add additional five vehicles per day. Drilling operations would occur for approximately 65 days for the South Well and 45 days for the North Well. Another increase in traffic would occur during fracing operations with 15-20 trucks needed to mobilize the equipment to each site, plus 10-15 additional vehicles accessing the site on a daily basis. Other activities such as construction operations, completion operation, and reclamation activities would also require regular equipment and supply truck access to the sites.

The increased traffic to the proposal sites could lead to an increase in accidents in the short term. Estimated current use of U.S. Highway 191 is approximately 600-700 vehicles per day and 110 to 130 trucks per day. On average there are 26 accidents a year on this segment of U.S. Highway 191. The proposal could increase truck traffic by 10% to 20% and passenger vehicle traffic by 2% on days when equipment is mobilized or demobilized. However, due to the short duration of the increase in vehicle

traffic, the annual accident rate is not expected to increase appreciably. Fremont County Roads 34 and 36 are used to access the North Well, and will experience a substantial increase in traffic associated with the drilling operations. Currently County Road 34 is used only occasionally. This increase in traffic will result in an increase in noise, dust, and vehicle emissions over the current levels.

According to Sweetwater County, County Roads 34 and 36 are unimproved. The increased truck and vehicle traffic could have a detrimental impact on road conditions. Furthermore, County Road 34 runs along Trout Creek, a stream with a population of CRCT, which are a priority management objective for the Sage Creek portion of the Greater Red Creek ACEC.

Access to the South Well is via an existing BLM road. Adverse weather conditions periodically close both U.S. Highway 191 and Sweetwater County Roads 34 and 36. The primary cause of closures is windblown snow. The unimproved County Roads may also become impassable when the road becomes wet. In some cases these roads may be closed for days at a time. The unimproved roads can also become unsafe for traveling when wet or snow covered.

Devon has discussed the anticipated traffic on the Sweetwater County roads, resulting from drilling and completion operations, with the County Commissioner and the BLM RSFO. Devon has committed to working closely with the County and the BLM to ensure that the BLM and County Roads 34 and 36 are maintained, so that the public can continue to utilize these roads during Devon's operations and after they are completed.

4.16.2 No Action

Under the No Action Alternative, the Devon Baxter Proposal would be denied by the BLM. Since no construction and drilling operations would occur, there would be no increase in traffic or increase in accident risk above current levels.

4.16.3 Additional Mitigation

No additional mitigation measures are suggested.

4.17 LAND USE

4.17.1 Proposed Action

Land use in the area currently includes primarily recreation and livestock grazing. No resource extraction land use activities are currently occurring. This pattern of land use would change with the proposed exploratory well proposal. Because this proposal covers only two exploratory wells, with no production facilities included, the change in land use would be relatively minor. The impacts to other current land uses would be temporary and also relatively minor.

4.17.2 No Action

Under the No Action Alternative the Devon Baxter Proposal would be denied by the BLM. Since no construction or drilling operations would occur, there would be no change in land use.

4.17.3 Additional Mitigation

No additional mitigation is suggested.

4.18 FIRE

4.18.1 Proposed Action

Under the proposed action there would be an increase in potential for accidental fires. Potential ignition sources include sparks from machinery, contact between hot machinery and vegetation (e.g., vehicle exhaust systems), campfires, and cigarette butts. Adherence to the Resource Protection measures described in Section 2.1.10 would sufficiently mitigate and preempt any potential increases in fire risk. Any increase in fire risk is expected to be *de minimus.* Historically, well installations have not created fire risk problems on lands within jurisdiction of the Rock Springs, Kemmerer, and Pinedale Field Offices (Stephenson, BLM, pers. comm., March 2008). Due to the discontinuous nature of fuels on the proposed project sites, it is not anticipated there would be any noticeable benefit from removing fuels (Stephenson, BLM, pers. comm., March 2008).

4.18.2 No Action

Under the No Action Alternative the Devon Baxter Proposal would be denied by the BLM. Since no construction or drilling operations would occur, there would be no increase in fire risk. The ignition potential from humans would remain unchanged.

4.18.3 Additional Mitigation

No additional mitigation is suggested, other than the Applicant-committed Mitigation Measures provided in Section 2.1.13.

4.19 NOISE

4.19.1 Proposed Action

The EPA established an average 55 dBA noise level as a guideline for acceptable environmental noise (EPA 1974). The BLM, State of Wyoming, or Sweetwater County have not established noise laws and regulations. Therefore, the established EPA environmental noise level is used as a basis for evaluating noise effects when no other local, county, or state standard has been established. It is important to note that this noise level was defined by scientific consensus, developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public health and welfare. Additionally, this noise level is directed at sensitive receptors (residences, schools, medical facilities, certain recreational areas) where people would be exposed to an average noise level over a specific period of time. Finally, this noise level represents an average noise level over a period of time, e.g., 24 hours. Higher intermittent and short-term noise levels, e.g., a heavy truck passing a location, could occur during that period of time. However, the short-term higher noise levels would be balanced by lower noise during most of the period of time.

The context of public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance, as well as the absence of clinical symptoms, such as hearing loss or demonstrable physiological injury. Therefore, a 55 dBA noise level should not be viewed as a regulatory goal. Rather, the 55 dBA noise level 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 the identified effects of noise.

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 would be 64 dBA, and 58 dBA at 200 feet.

Noise has been measured as about 50 dBA at ¼ mile (1,320 feet) from a drill rig. At ½ mile from a drill rig, the noise level would be reduced to 44 dBA. During the summer/early fall season when construction and drilling operations would occur, the presence and noise associated with traffic, construction equipment and drilling rigs may cause individuals or small family groups of animals to be affected by the noise and possibly temporarily leave the immediate area of activity.

Wildlife would be affected by noise from drilling operations and potentially avoid the area, which could affect hunting success in the area. Since there is a lack of research documenting harmful noise levels to wildlife, the BLM uses 55 dBA as a maximum acceptable noise level allowable before there would be disturbances to wildlife. Noise levels from drilling rigs are expected to be less than 55 dBA within ¼ mile of well pads.

4.19.2 No Action

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal. Since no exploratory operations would occur, there would be no change the existing noise effects from current conditions.

4.19.3 Additional Mitigation

No additional mitigation measures are proposed.

4.20 AREA OF SPECIAL DESIGNATION

The Baxter Proposal consists of two exploratory wells referred to as the North Well and South well. The North Well is located in the Sage Creek portion of the Greater Red Creek Area of Critical Environmental Concern (ACEC) and the South Well is located within the Sugarloaf Basin Management Area.

Section 103 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) defines areas of critical environmental concern as "*areas within public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards*."

4.20.1 Proposed Action

4.20.1.1 North Well

The proposed North Well is located within one mile of Trout Creek. This creek serves as important habitat for the Colorado River cutthroat trout, a BLM sensitive species. The proposed action would result in surface disturbance of 4.7 acres from the well pad and new access road to the North Well. The proposed action could potentially impact this species as a result of erosion and sedimentation and accidental spills during drilling and completion operations. However, lease stipulations listed in Section 2.1.2 and Appendix D, and Applicant Committed Environmental Protection Measures listed in Section 2.1.13 would minimize any potential impact to the trout population. The proposed well is also within one mile of the historic Cherokee trail, which has high cultural and scenic values. The original location of the proposed well was moved to avoid impacting the cultural and scenic values of the Cherokee Trail.

The Greater Red Creek ACEC meets the Relevance Criteria 1, 2, 3, 4 and the Importance Criteria, described in Section 2.1.2.1 in this EA. Specifically this ACEC meets the relevance and importance criteria for unstable fragile soils, unique ecological features, watershed and cultural values, and sensitive species of regional, national, and international importance.

The Lease Stipulations (Section 2.1.2) and Applicant Committed Environmental Protection Measures (2.1.13) will result in avoidance or minimization of potential impacts from the Proposed Action, in order that the "relevance" and "importance" criteria (defined in Section 2.1.2.1) of the Greater Red Creek ACEC are not affected by the proposed action.

4.20.1.2 South Well

The South Well is located in the Sugarloaf Basin Management Area. The management objectives for the Sugarloaf Basin Management area are to: 1) improve watershed condition and enhance watershed values; 2) improve riparian areas to proper functioning condition, as a minimum; 3) provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives; and 4) maintain and protect important wildlife habitat. The Sugarloaf Basin Management Area is contains an important aquifer recharge zone. Protection measures in the SMA include limitation of road density, surface disturbing activities, and surface occupancy to maintain the area in healthy and functioning condition. Because of the importance of the area as a recharge area, the BLM AO required that "closed-loop drilling" be utilized. With the implementation of closed-loop drilling, a reserve pit is not needed, which eliminates or minimizes the potential of impacts to the groundwater recharge from reserve pits.

The Lease Stipulations (Section 2.1.2) and Applicant Committed Environmental Protection Measures (Section 2.1.13) will result in avoidance or minimization of potential impacts from the Proposed Action, so that the "relevance" and "importance" criteria (defined in Section 2.1.2.1) of the Greater Red Creek ACEC are not affected by the proposed action.

4.20.3 No Action Alternative

Under the No Action Alternative, the BLM would deny the Devon Baxter Proposal and no construction or drilling activities would occur. Because there would be no change from current conditions, no impacts from the Baxter Proposal would occur.

4.20.3 Additional Mitigation

With the implementation of the stipulations specified for the leases associated with the North and South wells and Applicant Committed Environmental Protection Measures, no additional mitigation measures are suggested. However, the BLM may consider additional mitigation measures for protection of the Sage Creek portion of the Greater Red Creek ACEC and Sugarloaf Basin Management Area, if needed.

4.21 CUMULATIVE EFFECTS

The National Environmental Policy Act, as amended (42 USC 4321, et seq.) requires the evaluation of direct, indirect, and cumulative effects of a federal action as part of the EA process.

"Cumulative impact" is defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (Section 1508.7 CEQ regulations).

The BLM has determined that the Cumulative Impact Assessment Area for the Baxter Proposal is 40 acres around each well. The rationale for this determination is the exploratory nature of the Baxter Proposal and that the proponent will shut in the two wells after testing. If the wells contain economic quantities of gas a project area encompassing future development will be evaluated and additional NEPA compliance will be required.

Past, present, or reasonably foreseeable future activities considered in this EA would include livestock grazing, hunting, OHV activities, other diffuse recreation activities, and potential oil and gas-related operations. Livestock grazing is an ongoing activity in the proposal area. There are no other oil and gas-related activities currently in the vicinity of the Baxter proposal area. However, if Devon's exploratory wells are economically viable, they may pursue gas development in the future. The area is a popular area for diffuse recreation, such as hunting, OHV use, and fishing. In the Little Mountain, Aspen Mountain, and Pine Mountain hunt areas, hunters spent more than 3,940 hunter days in these areas for hunting elk. In addition, a total of 2,860 hunter days were spent hunting for mule deer in the Black Butte and Aspen Mountain areas.

For this proposal, the surface disturbance from the two exploratory wells is estimated to be approximately 10.97 acres. Although this is a small area of disturbance, other future activities in the vicinity of the Baxter Proposal would cumulatively add to the impacts from the Baxter proposal and result in habitat fragmentation, which would impact wildlife species, including raptors, migratory birds, large and small game species, and small mammals.

The proposal would also result in an increase in traffic for a total of 110 days, an increase of air emissions from drilling, completion, and flaring operations, an increase in noise from construction, drilling and completion operations and vehicles, and potential damage to County Roads 34 and 36 from use of heavy equipment.

Devon is planning to conduct 3D seismic operations within the area of the South Well (#16-28-13-106). The seismic survey is anticipated to include approximately 24,000 acres of federal lands and last approximately 75 days. The seismic survey is anticipated to be initiated in July 2008.

Therefore, impacts from the Baxter Proposal would cumulatively add to impacts from livestock grazing, hunting, traffic, OHV use, and other past, present and reasonably foreseeable activities. However, implementation of lease stipulations and the Applicant Committed Environmental Protection Measures presented in Chapter 2, Section 2.1.13, would minimize the cumulative impacts to the human and natural environment.

4.22 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The Baxter Proposal would result in irreversible and irretrievable commitments of resources. Irreversible commitment of resources is the use of non-renewable resources, such as the gas that would be extracted as a result of the Baxter Proposal. Irretrievable commitments of resource would include lost production or use of renewable resources, such as timber, rangeland, or wildlife habitat. The temporary loss of approximately 10.97 acres of vegetation and soil from construction of access roads and well pads could be considered irretrievable, as it would take years for the vegetation to recover and result in the potential of weed invasion in the disturbed areas.

5.0 CONSULTATION AND COMMUNICATION

An EA aids a federal agency in making decisions on an action by presenting information on the physical, biological, and social environment of a Proposed Action and alternatives. The Council on Environmental Quality (CEQ) regulations requires that an early scoping process be conducted to determine the issues related to the Proposed Action and the alternatives that the EA should address.

5.1 PUBLIC PARTICIPATION

Public participation is a critical element in the scoping process. A Scoping Notice for the *Baxter Natural Gas Exploratory Proposal* was mailed to government agencies, government officials, public land user groups, private landowners, newspapers, radio stations, environmental organizations, and posted to the BLM website http://www.blm.gov/wy/st/en/info/NEPA/rsfodocs.html. The scoping process included two public comment periods. The first was a 10-day scoping period from December 5 to December 15, 2007. The second was a 30-day public comment period from January 10, 2008 to February 10, 2008. During the two comment periods 49 letters were received, which included a total of 353 comments. A list of agencies, organizations, and individuals that submitted comments along with a summary of comments and responses to those comments are provided in Appendix C.

5.2 PREPARERS AND REVIEWERS OF THE EA

This EA was prepared by TEC Inc., a third party contractor, for the BLM. The names and disciplines of the preparers are provided in Table 5-1. The BLM resource specialists who reviewed and approved the Baxter Proposal EA are provided in Table 5-2.

Table 5-1. List of Preparers of this EA

Resource(s)	Name	Company
Project Manager/Mineral Resources	Marion Fischel	TEC, Inc.

Resource(s)	Name	Company
Point of Contact for ERG, Rangeland Resources/noxious weeds	Sady Babcock	ERG Inc.
Coordinator public comments/responses, Surface Water, Transportation	Chris Rowe	TEC, Inc.
Cultural Resources	Joel Tyberg	TEC, Inc.
Geology/Minerals, Ground Water	Katie McDonald	ERG Inc.
Wildlife Biologist/Threatened and Endangered Species	Mike Hillis	ERG Inc.
Visual Resources/Recreation ACEC/SMA	Remy Pochelon	ERG Inc.
Socioeconomics	Hailey Hesseln	
Fire Management	Gibson Hartwell	ERG Inc.
Vegetation/wetlands	Greg Kennett	ERG Inc.
Soils	Jay Norton	ERG Inc.
Paleontology	Gus Winterfeld	Erathem-Vanir Geological
Air Quality	Jeani Adams	ERG Inc.
GIS	Melanie Smith	ERG Inc.
Technical Editor	Josie Jackman	TEC, Inc.

Table 5-2. List of BLM Reviewers

Resource(s)	Name	Office
BLM Project Manager, Fluid Minerals	Jeromy Caldwell	BLM Rock Springs
Acting Field Manager/Assistant Field Manager-Minerals & Lands	John MacDonald	BLM Rock Springs
Recreation/OHV/Visual Resources/Wilderness	Jo Foster	BLM Rock Springs
Cultural/Nat American/Trails	Colleen Sievers	BLM Rock Springs
Fisheries/Riparian/Wetlands	John Henderson	BLM Rock Springs
GIS	Douglas Kile	BLM Rock Springs
Hydrology	Dennis Doncaster	BLM Rock Springs
Livestock Grazing/Weeds	Jonathon Sheeler	BLM Rock Springs
Paleontology	Adam Day	BLM Rock Springs
Land Use Planning	Kathryn Lloyd	BLM Rock Springs
Realty	Carol Montgomery	BLM Rock Springs
Special Status Plants	Jim Glennon	BLM Rock Springs
Wildlife/T&E Species	Lorraine Keith	BLM Rock Springs
Wild Horses	Jay D'Ewart	BLM Rock Springs
Document Editing	Angelina Pryich	BLM Rock Springs
Assistant Field Manager-Resources	Bernie Weynand	BLM Rock Springs
Economist	Roy Allen	BLM Cheyenne

Resource(s)	Name	Office
Air Quality Specialist	John Zachariassen	BLM Cheyenne

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7.0 ACRONYMS

ACEC – Area of Critical Environmental Concern

ACHP – Advisory Council on Historic Preservation

AUM – Animal Unit Month

ANC – Acid Neutralizing Capacity

AO – Authorized Officer

APD – Application for Permit to Drill

bgs – blow ground surface

BLM – Bureau of Land Management

BMP – Best Management Practices

CEQ – Council on Environmental Quality

CERCLA – Comprehensive Environmental Response, Compensation and Liability Act

CFR – Code of Federal Regulations

cfs – Cubic Feet per Second

CO – Carbon Monoxide

CRCT – Colorado River Cutthroat Trout

CRF – Code of Federal Regulation

CWA – Clean Water Act

dbA - Decibel A-weighted filter

DEQ / WQD – Department of Environmental Quality, Water Quality Division

Devon – Devon Energy Production Company, L.P.

DOI – Department of the Interior

DOT – Department of Transportation

DR – Decision Record

EA – Environmental Assessment

EHS – Extremely Hazardous Substances

EIS – Environmental Impact Statement

EPA – Environmental Protection Agency

EO – Executive Order

ERP – Emergency Response Plan

ESA – Endangered Species Act

FERC – Federal Energy Regulatory Commission

FLPMA – Federal Land Policy and Management Act

FMU – Fire Management Unit

FONSI – Finding of No Significant Impact

FOOGLRA – Federal Onshore Oil and Gas Leasing Reform Act

GIS – Geographic Information System

gmp – gallons per minute

GST – Good Standing

HCPC – Historic Climax Plant Community

hp – Horsepower

KSLA – Known Sodium Leasing Area

mg/L – Milligrams per Liter

MLA – Mineral Leasing Act

MMPA – Mining and Minerals Policy Act

MSDS – Material Safety Data Sheet

NEPA – National Environmental Policy Act

NHPA – National Historic Preservation Act

NMMPRDA – National Materials and Minerals Policy, Research and Development Act

NO_2 – Nitrogen Dioxide

NOA – Notice of Availability

NRCS – Natural Resources Conservation Service

NRHP – National Register of Historic Places

NSO – No Surface Occupancy

NOAA – National Oceanic and Atmospheric Administration

NWI – National Wetlands Inventory

NWIS – National Water Information System

OHV – Off Highway Vehicle

ORV – Off Road Vehicle

OSHA – Occupational Safety and Health Administration

PFYC – Potential Fossil Yield Classification

PILT – Payment In Lieu of Taxes

PLS – pure live seed

$PM_{2.5}$ – Particulate Matter less than 2.5 Microns in Diameter

PM_{10} – Particulate Matter less than 10 Microns in Diameter

RCRA – Resource Conservation and Recovery Act

RMP – Resource Management Plan

ROS – Recreation Opportunity Spectrum

ROW – Right-Of-Way

RSFO – BLM Rock Springs Field Office

SAR – Sodium Absorption Ratio

SARA – Superfund Amendments and Reauthorization Act

SCADA – Supervisory Control and Data Acquisition

SHPO – State Historic Preservation Officer

SMA – Special Management Area

SO_2 – Sulfur Dioxide

SPCC – Spill Prevention, Control, and Countermeasure

SWPPP - Storm Water Pollution Prevention Plan

STORET – EPA Storage and Retrieval System

TDS – Total Dissolved Solid

TLS – Timing Limited Stipulations

TSS – Total Suspended Sediment

UNA – Unadjudicated

USDA – United States Department of Agriculture

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

VRM – Visual Resource Management

WAAQS – Wyoming Ambient Air Quality Standards

WDEQ – Wyoming Department of Environmental Quality

WDOT – Wyoming Department of Transportation

WGFD – Wyoming Game and Fish Department

WYOGCC – Wyoming Oil and Gas Conservation Commission

WSA – Wilderness Study Area

WSEO – Wyoming State Engineers Office