

ENVIRONMENTAL ASSESSMENT

LUMAN RIM NATURAL GAS DEVELOPMENT PROJECT In Sweetwater County, Wyoming

High Desert District - Rock Springs Field Office

**Bureau of Land Management
Rock Springs Field Office
Rock Springs, Wyoming**

WYW-128688

DOI-BLM-WY-040-EA10-139



The BLM multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-11/006+1310

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**BUREAU OF LAND MANAGEMENT
ROCK SPRINGS FIELD OFFICE
ROCK SPRINGS, WYOMING**

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December 2010

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CHAPTER 1: PURPOSE AND NEED

1.0 INTRODUCTION

Proposed Action Title/Type:

A project description for the Luman Rim natural gas development project was received by the Rock Springs Field Office (RSFO) in April of 2008. Yates Petroleum Corporation and Pinnacle Gas Resources, Inc. (the operators), propose to drill 58 additional natural gas wells in the Luman Rim area of northcentral Sweetwater County, Wyoming in Townships 23 and 24 North, Ranges 98 and 97 West, 6th Principal Meridian. The Luman Rim Project is on federal lands administered by the Bureau of Land Management (BLM) within the boundary of the BLM RSFO and on State of Wyoming lands administered by the Office of State Lands and Investments. Figure 1.1 provides a general location map showing the Luman Rim Project Area (LRPA) and its location in southwestern Wyoming. A more detailed map of the area and proposed project facilities can be found in Chapter 2 (Figure 2.1).

The Proposed Action involves development of the natural gas reserves in the Upper Cretaceous Lewis and Mesaverde Formations on variable spacing, ranging from 2 to 8 wells per section (80-acre spacing). The project will involve drilling 54 conventional natural gas wells on federal mineral estate and 4 wells on State of Wyoming mineral estate. Twenty-six wells have already been drilled in the LRPA and an additional seven wells have been permitted. In addition to drilling the natural gas wells, the project will involve construction of well pads, access roads, pipelines and related production facilities. No coal bed natural gas (CBNG) wells are planned as part of this project.

Access to the area is from Interstate Highway 80 along Sweetwater County Road 4-21 (Bar-X Road). The project area is about 33 miles north of the I-80 Bar-X Exit (Exit 152). Rock Springs is approximately 42 miles west of the Bar-X exit; Rawlins is approximately 60 miles east of the Bar-X exit.

The LRPA contains 19,548.26 federal surface and mineral estate acres and 1,280 State of Wyoming leases, by aliquot description. The actual GIS measured area within the project area is 21, 471.107 acres. There is no private land in the project area. Within the project boundary, the proposed action will involve approximately 879 acres of new short-term surface disturbance (3.6% of the project area) and approximately 226 acres (less than 1.4% of the LRPA) of long-term surface disturbance.

Location of Proposed Action:

The Luman Rim project is located in the following sections or portions of sections of Sweetwater County, Wyoming (Table 1.1):

Table 1.1 – Luman Rim Project Area

Township	Range	Section
24 North	98 West	7,13,14,15,16,17,20,21,22,23,24,25,26, 27,28,29,32,33,34,35,36
24 North	97 West	30,31
23 North	97 West	5,6
23 North	98 West	1,2,3,4,5,6,7,9,10,16

Applicant (if any):

Yates Petroleum Corporation and Pinnacle Gas Resources, Inc.

Subject Function/Lease/Serial/Case File No.:

The Luman Rim Project has been assigned National Environmental Policy Act (NEPA) reference number WY-040-EA10-139.

1.1 PURPOSE AND NEED

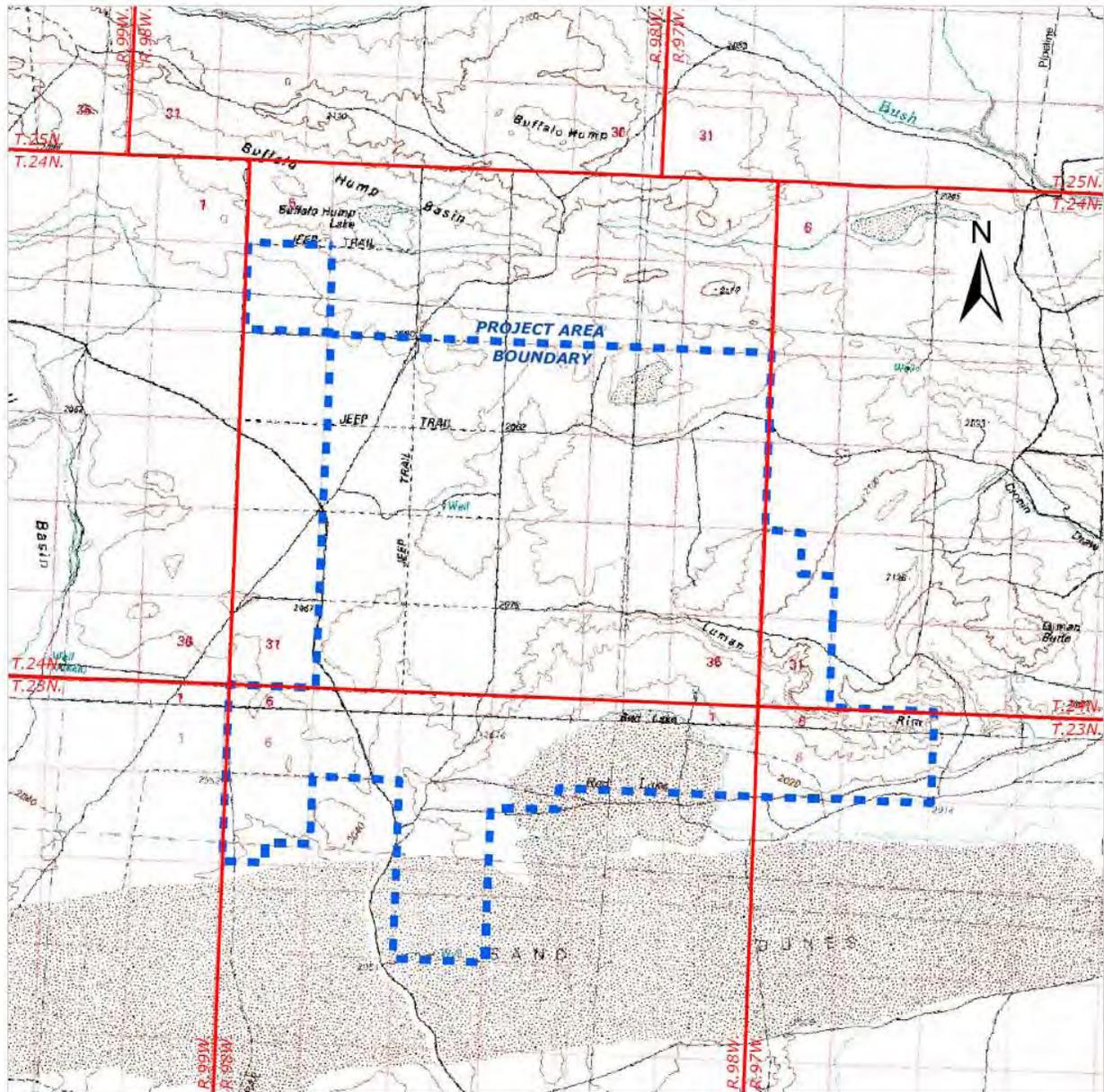
The purpose of the Proposed Action is development of the operators' federal and state oil and gas leases and the production of commercial quantities of natural gas from those leases. The BLM is considering approval of the Proposed Action because exploration and development of federal oil and gas leases by private industry is an integral part of the BLM oil and gas leasing program under the authority of the Mineral Leasing Act of 1920 (MLA), as amended, the Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management Act of 1976 (FLPMA), the National Materials and Minerals Policy, Research, and Development Act of 1980, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987. The intent of the MLA and its implementing regulations is to allow lessees to explore for and develop oil and gas or other mineral reserves on federally administered lands. FLPMA mandates that the BLM manage public lands on the basis of multiple use [43 U.S.C. § 1701(a)(7)]. Minerals are identified as one of the principal uses of public lands in Section 103 of FLPMA.

Exploration and production of natural gas is in accordance with the National Energy Policy Act of 2005. The policy calls for federal agencies "to develop a national energy policy designed to help the private sector, and, as necessary and appropriate, State and local governments, promote dependable, affordable, and environmentally sound production and distribution of energy for the future." Natural gas is an integral part of the U.S. energy future due to its availability, the presence of an existing market delivery infrastructure, and the environmental advantages of clean-burning natural gas.

The EA aids the agency in its compliance with the NEPA by documenting the analysis conducted on the Proposed Action and alternatives to identify environmental impacts and mitigation measures necessary to address those impacts. It should also provide the agency's authorized officer with the information needed to make a decision that is fully informed and based on factors relevant to the Proposed Action.

Decision to be made: The BLM will decide whether or not to approve the proposed development of the natural gas resource on the federal leases underlying federal lands within the project referred to as the Luman Rim Project, and if so, under what terms and conditions.

Figure 1.1: Location Map of the Luman Rim Project Area



LUMAN RIM PROJECT
 ENVIRONMENTAL ASSESSMENT
 PROJECT LOCATION
 SWEETWATER COUNTY, WYOMING

1.2 CONFORMANCE WITH LAND USE PLAN

BLM management decisions for lands within the LRPA are contained in the Green River Resource Management Plan (GRRMP). The Record of Decision for the GRRMP was signed August 8, 1997. The environmental analysis that supports the decisions made in the GRRMP is documented in GRRMP EIS (1996). Resource and management values described in the GRRMP that are applicable to the Proposed Action are described in Chapter 3, Affected Environment.

As described in the GRRMP, the objective for management of oil and gas in the RSFO is to “provide for leasing, exploration, and development of oil and gas, while protecting other values.” All public lands in the LRPA were considered in the GRRMP and found suitable for oil and gas leasing and development, subject to certain stipulations and appropriate mitigation measures (GRRMP 1997). All the lands in the LRPA have been leased. In accordance with 43 CFR 1610.5-3, the Proposed Action has been reviewed and has been found to be in conformance with the GRRMP.

The project area is located in the Red Desert Watershed Management Area (RDWMA). The objective described in the GRRMP for managing the Red Desert Watershed Area is to manage for all resource values “with emphasis on protection of visual resources, watershed values, and wildlife resources and to provide large areas of unobstructed views for enjoyment of scenic qualities.” This is to be accomplished through facility design and placement and using topography to shield activities, using neutral colors so facilities blend with the landscape, identification of backcountry byways, and providing viewing points for the public (GRRMP 1997).

Surface disturbing activities, including mineral exploration and development, are permitted in the RDWMA, subject to the guidelines and constraints found in the GRRMP. Many of those are expressed as stipulations attached to the oil and gas leases. All of the 18 leases being developed in the LRPA contain stipulations, these variously include:

- A Surface Disturbance Stipulation that prohibits surface disturbance a.) on slopes in excess of 25 percent; b) within important scenic areas (Class I and II Visual Resource Management (VRM) areas); c) within 500 feet of surface water and/or riparian areas; d) within a quarter mile or the visual horizon (whichever is closer) of significant sites along historic trails; e) with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.
- Timing Limitations (TL) for the protection of sage-grouse nesting areas.
- Controlled Surface Use (CSU) stipulations that prohibit occupancy within ¼-mile of a sage/sharp-tailed grouse lek unless a mitigation plan is approved; that prohibit occupancy in VRM I and II areas unless a mitigation plan is approved; that prohibit occupancy in the RDWMA unless a plan that mitigates watershed, visual, wildlife, and soils impacts is approved.
- A Lease Notice that any surface use or occupancy within the following areas is strictly controlled or, if absolutely necessary, prohibited: 1) slopes in excess of 25 percent; 2) within 500 feet of surface water and/or riparian areas; 3) where material is frozen or during periods when the soil material is saturated or when watershed damage is likely to occur; 4) within 500 feet of Interstate highways and 200 feet of other existing rights-of-way (i.e., U.S. and State highways, roads, railroads, pipelines, powerlines); or 5) within ¼ mile of occupied dwellings. The prohibition could require relocating proposed operations up to 200 meters, but not off the leasehold, and prohibiting surface disturbance activities for up to 60 days.

The RDWMA CSU stipulation, applicable to leases WYW153613 and WYW159713, requires an "acceptable plan" to mitigate anticipated impacts to watershed, visual, wildlife, and soils. Approved site specific planning documents i.e., Applications for Permit to Drill (APD), in association with the

applicable and appropriate mitigation prescribed in this EA would constitute an “acceptable plan to mitigate anticipated impacts to watershed, visual, wildlife, and soils.”

1.2.1 Supplemental Authorities

The NEPA is only one of many authorities that contain procedural requirements that pertain to treatment of elements of the environment when the BLM is considering a Federal action. The following list (Table 1.2) includes some of the other authorities that may apply to BLM actions.

The development of this project would not affect the achievement of the Wyoming Standards for Healthy Rangelands (August 1997). The Proposed Action is in conformance with the *State of Wyoming Land Use Plan* (Wyoming State Land Use Commission 1979), the Governor’s Greater Sage-Grouse Core Area Protection Strategy, executive Order 2010-4 (2010), the State Land and Investments Board Greater Sage-grouse Core Area Guidelines (2009) and the Sweetwater County Land Use Plan (Sweetwater County Board of Commissioners [SCBC] 1996) and complies with all other relevant federal, state, and local laws.

Table 1.1 provides an overview of major laws applicable to oil and gas development and an overview of the key regulatory requirements that would govern oil and gas project implementation. Additional approvals, permits, and authorizing actions may be necessary.

Table 1.2: Major Federal, State, and Local Permits, Approvals, and Authorizing Actions Applicable to Oil and Gas Development in Sweetwater County, Wyoming

Agency	Permit, Approval, or Action	Authority
United States		
Bureau of Land Management (BLM)	Rights-of-way (ROW) grants and temporary use permits for pipelines and central tank battery on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 185); Onshore Oil and Gas Unit Agreements: Unproven Areas, as amended (43 CFR 3180)
	Authorization for flaring and venting of natural gas on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 CFR 3162)
	Plugging and abandonment of a well on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 CFR 3162)
	Antiquities and cultural resource permits on BLM-managed land	Antiquities Act of 1906, as amended (16 U.S.C. 431-433); Archaeological Resources Protection Act of 1979, as amended (16 U.S.C. 470aa-47011); Preservation of American Antiquities, as amended (43 CFR 3)
	Approval to dispose of produced water on BLM-managed land	Mineral Leasing Act of 1920, as amended (30 U.S.C. 181 et seq.); Special Provisions, as amended (43 CFR 3164); Onshore Oil and Gas Order No. 7 as amended (58 Federal Register 47354)

Agency	Permit, Approval, or Action	Authority
Fish and Wildlife Service (USFWS)	Coordination, consultation and impact review of federally listed threatened and endangered (T&E) species	Fish and Wildlife Coordination Act (16 U.S.C. 661-666c); Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536); Bald Eagle Protection Act (16 U.S.C. 668-668dd)
	Migratory bird impact coordination	Migratory Bird Treaty Act (16 U.S.C. 704)
Environmental Protection Agency (EPA)	Spill Prevention Control and Countermeasures (SPCC) Plans	Oil Pollution Prevention, as amended (40 CFR 112)
State of Wyoming		
Department of Environmental Quality, Water Quality Division (WDEQ/WQD)	WYPDES permits for discharging waste water and storm water runoff	WDEQ-WQD Rules and Regulations, Chapter 18; Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311); Section 405 of the Federal Water Pollution Control Act (Clean Water Act) (codified at 33 U.S.C. 1345); EPA administered (40 CFR 122); State Program Requirements (40 CFR 123); EPA Water Program Procedures for Decision-making, as amended (40 CFR 124)
	Administrative approval for discharge of hydrostatic test water	Wyoming Environmental Quality Act, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
Department of Environmental Quality, Air Quality Division (WDEQ/ADQ)	Permits to construct and permits to operate	Clean Air Act, as amended (42 U.S.C. 7401 et seq.); Wyoming Environmental Quality Act, Article 2, Air Quality, as amended (W.S. 35-11-201 through 35-11-212)
Wyoming Board of Land Commissioners/Land and Farm Loan Office	Approval of oil and gas leases, ROWs for long-term or permanent off-lease/off-unit roads and pipelines, temporary use permits, and development on state lands	Public Utilities, W.S. 37-1-101 et seq.
Wyoming Oil and Gas Conservation Commission (WOGCC)	Permit to drill, deepen or plug back (APD process)	WOGCC Regulation, Chapter 3, Operational and Drilling Rules, Section 2 Location of Wells
	Permit to use earthen pit (reserve pit)	WOGCC Regulations, Chapter 4, Environmental Rules, Including Underground Injection Control Program Rules for Enhanced Recovery and Disposal Projects, Section 1, Pollution and Surface Damage (Forms 14A and 14B)

Agency	Permit, Approval, or Action	Authority
	Authorization for flaring or venting of gas	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 45 Authorization for Flaring or Venting of Gas
	Permit for Class II underground injection wells	Underground Injection Control Program: Criteria and Standards, as amended (40 CFR 146); State Underground Injection Control Programs, State-administered program- Class II Wells, as amended (40 CFR 147,2551)
	Well plugging and abandonment	WOGCC Regulations, Chapter 3, Section 14, Reporting (Form 4) Section 15, Plugging of Wells, Stratigraphic Toxic, Core, or Other Exploratory Holes (Form 4)
State Engineer's Office (WSEO)	Permits to appropriate ground water (use, storage, wells, dewatering)	W.S. 41-3-938, as amended (Form U.W. 5)
Wyoming Preservation Office (SHPO)	Cultural resource protection, programmatic agreements, consultation	Section 106 of National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et req.) and advisory Council Regulations on Protection of Historic and Cultural Properties, as amended (36 CFR 800)
County		
Sweetwater County	Mineral extraction permits	County Code
	Construction/use permits	County Code and Zoning Resolution
	Conditional use permits	County Code and Zoning Resolution
	Road use agreements/oversize trip permits	County Code
	County road crossing/access permits	County Code/Engineering Department
	Small wastewater permits	County Health Department
	Hazardous material recordation and storage	County Code
	Noxious weed control	County Code

1.3 ISSUES AND CONCERNS

In accordance with NEPA and CEQ regulations 40 CFR 1501.7, an early and open process for determining the scope of issues to be addressed is required and for identifying the significant issues related to a Proposed Action. In compliance with this procedural requirement, the BLM RSFO initiated a scoping period on May 21, 2008, for a 30-day review period. Ten comment letters were received. The scoping process led to the identification of the following land and resource management issues and concerns potentially associated with the Proposed Action:

- Protection of historic trails in the Luman Rim project area.

- Impacts to cultural resources, Native American Religious Concerns.
- Areas where exploration would be inappropriate because of nearby wilderness or historical values.
- Protection of sites within the project area with evidence of human occupation.
- The project area is located within the Red Desert Watershed Management Area, and is to be managed for protection of visual resources, watershed values, and wildlife resources and to provide large areas of unobstructed views for enjoyment of scenic qualities.
- Ensuring that the Luman Rim project does not conflict with wilderness values of the East Sand Dunes WSA and Red Lakes WSA.
- Conflict with wilderness values of the Red Lake Dunes Citizens' Proposed Wilderness.
- Indirect, connected, related, long-term and cumulative impacts on wildlife resources.
- Special Status Species Management, specifically greater sage-grouse, pygmy rabbit, and white-tailed prairie dog.
- Ensuring protection of ferruginous hawks and other raptors during nesting season.
- Sage grouse protections including protection in winter concentration areas and core areas.
- Protection for all big game winter ranges, not just critical winter ranges.
- Conflicts with wild horses.
- Ensuring compliance with the requirements of the Clean Water Act.
- Protection of area watershed values.
- Impacts on wetlands and riparian areas.
- Impact to ephemeral and intermittent drainages from erosion from disturbed sites
- Protection of native, rare, and special status plant communities, such as spinyleaf milkvetch, parry sedge, and mystery wormwood.
- Control of invasive, non-native species (weeds).
- Reclamation.
- Protect the largest active sand dune region in Wyoming, including the rare plant and animal species that subsist off of ponds in the area.
- Protection of sites of geological significance, including those that contain petrified wood, fossils, and fulgramites.
- Consideration of all air quality emission sources with a full summary of ambient air monitoring results from nearby monitors.
- Noise-related issues, including effects on wildlife and recreation.
- Impacts to recreation including hunters, open spaces.
- Impacts on grazing lessees and private land owners.
- Impacts to social/economic values.
- Impacts on resources from road layout and transportation planning.
- Use of alternative technologies, particularly multi pad or phased development.
- Consider "connected, cumulative and similar" actions, including the nearby Continental Divide-Creston fields.
- Conformance with LUP/Leases.
- Application and acquisition of appropriate permits.

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

2.0 INTRODUCTION

Yates Petroleum Corporation and Pinnacle Gas Resources, Inc. propose to drill 58 conventional oil and gas wells in the LRPA to develop gas reserves in the Upper Cretaceous age Lewis and Mesaverde Formations; 54 of these wells would be drilled into the federal mineral estate and four into the State of Wyoming mineral estate. Two alternatives are evaluated in detail in this EA. The Proposed Action is discussed in Section 2.1. The No Action Alternative is discussed in Section 2.2. Other alternatives were considered but eliminated from detailed analysis; these alternatives and the rationale for eliminating them from detailed analysis are discussed in Section 2.3.

2.1 THE PROPOSED ACTION

The operators have proposed to drill 58 natural gas wells in the Luman Rim area of north central Sweetwater County in Townships 23 and 24 North, Ranges 98 and 97 West, 6th Principal Meridian. The Luman Rim Project is on federal lands administered by the BLM within the boundary of the BLM RSFO and on State of Wyoming lands administered by the Office of State Lands and Investments. Fifty-four wells would be drilled on the federal mineral estate and four wells would be drilled on Wyoming mineral estate. The number of wells drilled on State lands could change in the future; State leases are not subject to NEPA review or BLM approval. Figure 2.1 provides a detailed map of the area and existing project facilities. Access to the area is obtained via Interstate Highway 80 and Sweetwater County Road 4-21.

Drilling fifty-eight additional wells is currently thought to be sufficient to develop the natural gas resources of the Mesaverde and Lewis Formations in the project area. The precise location of the proposed wells is not known at this time. Field development will be adjusted over time as additional exploratory wells are drilled, adding to the reservoir information needed to determine well placement going forward. For example, some areas of the Luman Rim Project Area will likely see little drilling activity, for example, the northeast. Alternatively, Sections 16 and, 35 and 36-24-98 are being developed on 80-acre spacing, as permitted by Wyoming Oil and Gas Conservation Commission (WOGCC) and approved by the BLM, due to their development and production potential. Wells crowding the State lease boundaries (Sections 16 and 36) have been approved by WOGCC and are covered by compensatory royalty agreements between the Operators and the Federal government. These areas represent areas of “cluster” development, directional drilling and pad drilling, making the Luman Rim project a hybrid of development scenarios based on reservoir characteristics and surface resource protection [Red Lake Wilderness Study Area (WSA)] as opposed to development by strict surface application of the WOGCC subsurface spacing order. If it is determined that a more dense spacing is required in other portions of the LRPA, the operators would seek new WOGCC spacing orders for the area.

All of the wells in the Luman Rim project would be conventional oil and gas wells. It is expected that the proposed 58 wells would be drilled over a five- to ten-year period. The actual pace of development will depend on natural gas prices and the success of the development wells. The operators anticipate that the wells would produce up to 30 years, the period considered the life-of-project.

The Proposed Action would require the construction of access roads, gathering pipelines and related production facilities (well pads, pump jacks, tank batteries, emergency pits, etc.). No compression facilities are proposed at this time for the Luman Rim project. The project area, here defined as the sections directly affected by the Proposed Action and enclosed by lease boundaries, encompasses approximately 21,471.1 acres. The acreage discrepancy between the Scoping Notice (20,828.26 acres)

(Appendix A of this EA) and the information provided in this Environmental Assessment is due to calculating the project areas using AutoCAD rather than aliquot (Section-Township-Range) description.

2.1.1 Construction

Following is a general discussion of proposed construction techniques to be used by the operators during project implementation. These construction techniques would be generally applicable to all drill sites, pipelines, and access roads within the project area, but may vary in detail between the individual well sites. Estimates of anticipated surface disturbance were generated from the development that has occurred in the LRPA to date. The disturbance anticipated from the development of the LRPA is shown in Table 2.1. Total short-term project disturbance is estimated at 879 acres, about 4.1% of the total project area. After successful interim reclamation, long-term disturbance is estimated at 226 acres, approximately 1.0% of the project area.

Table 2.1 - Project-Related Surface Disturbance (acres)

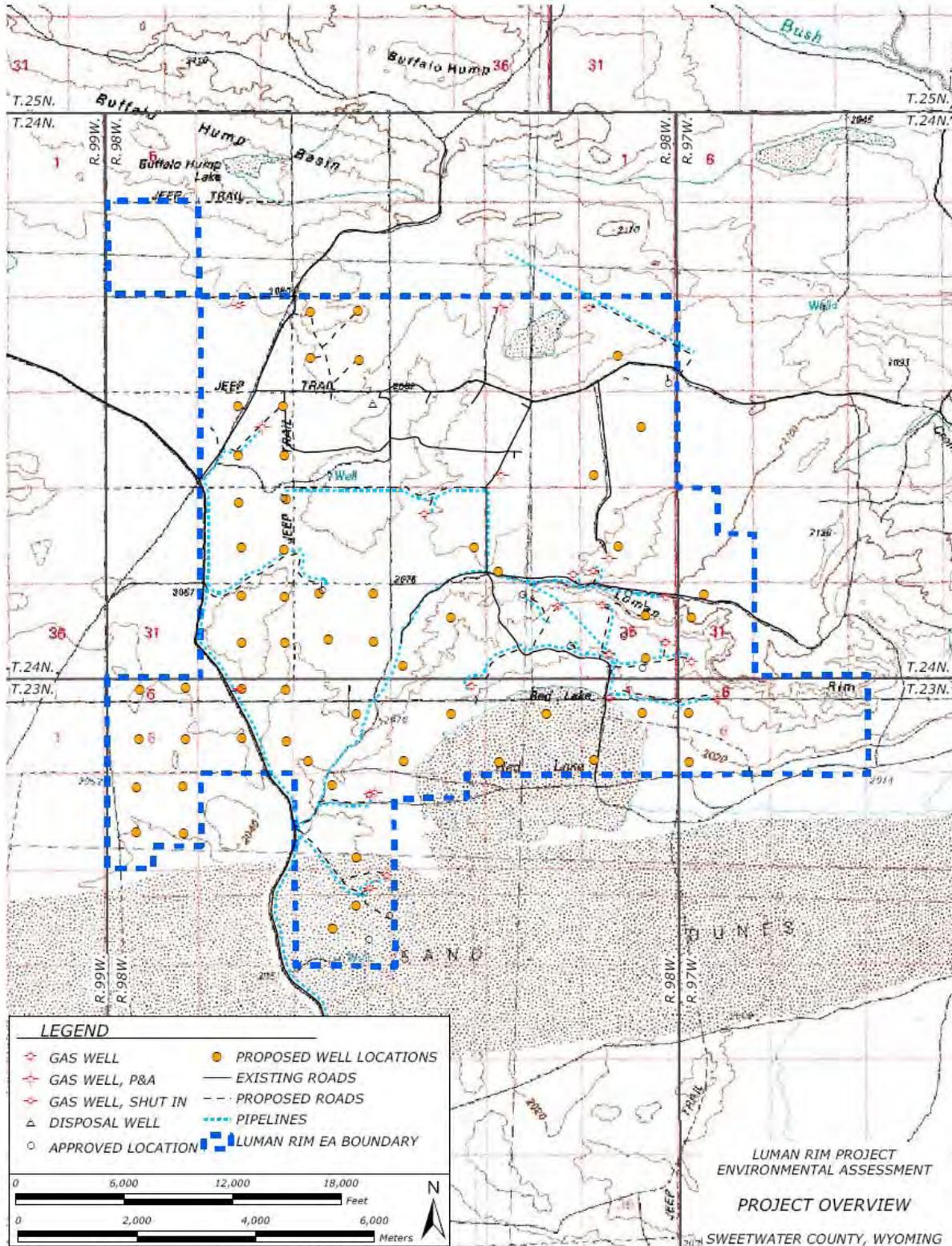
Proposed Locations	Well-Sites	Access Roads	Pipelines	Total
<i>Average per well</i>				
Short-Term Surface Disturbance	4.39	4.8	5.97	15.16
Long-Term Surface Disturbance	2.19	1.7	0.00	3.89
<i>Total (58 wells)</i>				
Short-Term Surface Disturbance	254.54	278.4	346.52	879.46
Long-Term Surface Disturbance	127.27	98.6	0.00	225.87

2.1.1.1 Well Pad Construction

Well pads would be prepared by clearing an area approximately 490 feet by 390 feet, a total of 4.4 acres including cut-and-fill. Well locations would be cleared of vegetation and topsoil as appropriate and determined in the Reclamation Plan (Appendix B). Recovered topsoil would be stockpiled for future use in reclamation. The well location would be leveled using standard cut-and-fill construction techniques. Once drilling operations have been completed and production ensues, well pads would be partially reclaimed, resulting in life-of-project disturbance of 2.2 acres per well. See Appendix C (Master Surface Use Plan of Operations, MSUOP.) for a typical well site layout. If the well drilled was not successful, the entire well pad and access road would be reclaimed and seeded according to the prescribed Reclamation Plan (Appendix B).

Components of the well pad include an earthen reserve pit lined with a liner having a permeability less than 10⁻⁷ cm/sec., generally described as 12-mil reinforced poly, to contain drilling fluids, cuttings, and water produced during drilling and completion operations. Venting of any gas produced would be over an unlined emergency pit. These emergency pits are unlined as they serve as backdrop to any flaring necessary for safety during the operations. All pits would be constructed in accordance with BLM requirements. The reserve pits would be approximately 200 feet long by 85 feet wide and 12 feet deep. One side of the pits would be ramped with a 2:1 slope. The reserve pit would be fenced on three non-working sides during drilling; the fourth side would be fenced at the time the rig is removed.

Figure 2.1: The Luman Rim Project Area



2.1.1.2 Road Construction and Transportation

The operators propose to use existing crowned and ditched roads to and within the project area to the extent possible and to construct or create new roads only as needed. Construction of new roads in the LRPA is estimated to total 58 miles, assuming 1.0 mile of improved road needed per well site.

The project map (Figure 2.1) indicates existing and proposed road locations. Due to the size and weight of vehicles expected to regularly travel roads in the project area, all roads will be crowned and ditched, with a 14- to 16-foot driving surface, turn-outs and a 50-foot initial disturbance width. Culverts and low water crossings would be installed where necessary and approved in well specific APDs. Once a well is determined to be productive gravel surfacing would be installed where needed. All disturbances related to active access roads would then be reseeded with the exception of the driving surface. Details of the proposed road construction and transportation plan can be found in Appendix C, MSUOP.

Proposed roads would be established as follows:

- Use of existing Collector Roads (multi-purpose, upgraded roads)
- Construction of Resource Roads to access well roads
- Development of Special Purpose roads to access one or more wells

An estimate of workforce and traffic for the Proposed Action is found in Table 2.2. Traffic would include:

- Equipment needed for road and well site construction activities
- Drilling rigs and associated equipment
- Water trucks for drilling
- Traffic associated with well completion activities
- Construction traffic associated with interim well site, road and pipeline reclamation operations
- Traffic associated with occasional workover activities
- Haul truck traffic associated with condensate and produced water hauling
- Light truck traffic would include the use of pickup trucks to visit each well daily

The Operators would prohibit travel during periods when severe rutting (creation of ruts in excess of 4” deep) or resource damage might occur. Snow removal equipment would be equipped with shoes to keep the blade six (6) inches above the natural ground surface. Locations of snow stockpiles, if needed, would be designated in advance by the Authorized Officer.

The locations of the proposed roads have been placed to maximize transportation efficiency and reduce redundancy. Roads would be closed and reclaimed by the Operators when they are no longer required for operations, unless otherwise directed by the BLM.

Project related roads would be maintained by the operators. The operators and Sweetwater County would work cooperatively to maintain the county roads.

Roads and pipelines on BLM-administered public lands constructed in association with the Proposed Action would require BLM right-of-way authorizations and/or Sundry Notices, which could include additional mitigation to further minimize environmental impacts.

2.1.1.3 Pipeline Construction

Pipelines would be installed to productive wells only, following well completion and testing. In areas of known production with existing pipeline access “green completions” are used to the extent possible.

Pipelines would be constructed, by the third party gas gathering company, currently Anadarko Mid-Stream, to transport gas from the well site to the existing gas gathering system or trunk lines. Pipelines from the individual wells would be constructed within a 50-foot-wide construction ROW, generally parallel to the access roads.

Pipeline construction would involve a standard sequence of operations: pipe stringing, trench excavation, pipe bedding, pipe lowering, pipe padding, and trench backfilling. All materials, equipment, and techniques, including quality assurance/control checks, would be to industry standard and DOT regulation. The pipeline trench would be excavated mechanically with a track excavator to a depth that allows at least 3.5 feet of material to be placed on top of the pipeline. Trench width would be approximately 36 inches. Soil would be backfilled promptly into the trench following installation. Site regrading would occur where necessary. Reclamation of the pipeline construction right-of-way would be initiated according to BLM requirements.

2.1.2 Drilling

Following construction of the access road and well pad, a drilling rig would be transported to the well site and erected on the prepared well pad. Additional equipment and materials needed for drilling operations would also be trucked into the well site.

Drilling would begin by digging a rectangular pit, called a cellar, where the hole would be drilled. The cellar would provide space for the casing head spools and blowout preventers that would be installed under the rig. The rat- and mouse- holes are also drilled under the rig. Drilling operations normally include (1) keeping a sharp bit on the bottom drilling as efficiently as possible, (2) adding a new joint of pipe as the hole deepens, (3) tripping the drill string out of the hole to put on a new bit and running it back to the bottom, and (4) casing installation and cementing in the hole.

The wells are expected to be approximately 12,500 feet in depth. The average time from spud to completion is approximately 60 days, with drilling occurring for 10 to 15 of those days. The time required for completion activities is highly variable depending on testing, geology, availability of equipment and the economics of the well in question. Individual well site drilling and completion operations could be delayed due to site specific timing stipulation compliance. Well control systems would be designed to meet the conditions likely to be encountered in the boreholes and would be in conformance with BLM and State of Wyoming requirements. Drilling and completion operations would be permitted through the State of Wyoming Department of Environmental Quality, Air Quality Division.

Water used for drilling would come from a variety of approved water wells, including:

- NENE Sec 11-T24N-R97W
- Sec 36-T23-R97
- NENE Sec 26-T24N-R97W
- Sec 28-T23N-R96W
- Sec 31-T24N-R97W
- NWNW Sec 36-T24-R98W (Yates Permit #UW 166912)

Approximately 15,000 barrels of water would be needed for drilling each well with another 10,000 bbl needed for construction, dust control and completion over the life of the well. The actual water volume used in drilling operations would be dependent upon the depth of the well and any losses that might occur during drilling. The BLM has estimated that 3.2 acre feet of water would be needed over the life of each well drilled or approximately 186.9 acre feet for the Proposed Action. Appendix C contains greater detail on the drilling procedures.

Drilling mud would consist of fresh water, native clays, and bentonite gel. As hole conditions dictate, various additives and/or salts may be added for hole cleaning and clay stabilization. During drilling and completion operations, certain wastewaters would be generated, including frac fluids, in addition to any produced formation water. After logging the well, all drilling, frac and formation fluids would be circulated back to the reserve pit.

During drilling operations a reserve pit is fenced on three sides; once the rig is moved off location the pit would be fenced on all four sides to prohibit wildlife or livestock from entering the pit. After the drilling pit is completely dry, the pit would be backfilled. As an alternative to air drying and burial, reserve pit fluids may be recycled to other drilling locations or hauled to Wyoming Department of Environmental Quality (WDEQ) approved disposal facilities.

Well sites would be reclaimed according to Operating Order Number 1 (BLM 2007d), "Earthwork for interim and final reclamation must be completed within 6 months of well completion or well plugging (weather permitting). All pads, pits, and roads must be reclaimed to a satisfactorily revegetated, safe, and stable condition, unless an agreement is made with the landowner or Surface Managing Agency to keep the road or pad in place. Pits containing fluid must not be breached (cut) and pit fluids must be removed or solidified before backfilling. Pits may be allowed to air dry subject to BLM or FS approval, but the use of chemicals to aid in fluid evaporation, stabilization, or solidification must have prior BLM or FS approval. Seeding or other activities to reestablish vegetation must be completed within the time period approved by the BLM or the FS."

Hazardous materials, as defined by OSHA, may be used in the drilling and completion of the Luman Rim Project. Routine drilling, completion and production operation wastes are exempt from the hazardous waste regulations found in Resource Conservation and Recovery Act (RCRA) (40 CFR 261.4). It is not anticipated that materials or chemicals considered hazardous under Superfund Amendment and Reauthorization Act of 1986 as amended, the RCRA or extremely hazardous wastes as defined in 40 CFR 355 would be used in the proposed action. If a hazardous waste were to be generated as the result of an unusual operation it would be segregated for appropriate disposal. Hazardous Materials that may be utilized during project development and production operations are identified in Appendix D.

2.1.3 Well Completion

Well completion methods isolate aquifers and hydrocarbon-containing formations with surface and production casing and cement to prevent condensate, gas and/or water movement from formation to formation and isolate the production zones. Completion operations also stimulate well bores through fracturing, perforating, acidizing or other activities appropriate to the reservoir characteristics. All well casing and cementing operations on these wells would be conducted in compliance with applicable rules and guidance and with BLM Onshore Oil and Gas Order No. 2 and the Wyoming Oil and Gas Conservation Commission (WOGCC) rules. Individual well site completion operations could be delayed due to site specific timing stipulation compliance.

During completion and testing, any gas flow would be vented or flared over the un-lined emergency pit. Venting or flaring at oil and gas facilities is regulated by two agencies, the WDEQ Air Quality Division (WDEQ-AQD) and the Wyoming Oil and Gas Conservation Commission (WOGCC). Each agency regulates these activities with a slightly different objective. The WDEQ is concerned about the emission of regulated pollutants and the WOGCC is concerned about the loss or waste of the natural gas resource. Both parties are concerned about safety of the public with regard to the venting of H₂S gas. No H₂S has been encountered in the development of the Luman Rim area. Testing would also include an evaluation of the formation for fracture stimulation design purposes.

“Green completions” are used to the extent possible in areas of known production with pipeline access; natural gas that cannot be captured and sold is flared for safety reasons. The WOGCC and WDEQ-AQD rules for natural gas well completions are constantly evolving to address emissions issues; the Operators are required to comply with the existing rules and regulations and changes made to them. In general, venting natural gas from a wellhead does not release any regulated pollutants. Luman Rim natural gas is approximately 87% methane (CH₄), 6.5% ethane (C₂H₆), 2% propane, 3% carbon dioxide (CO₂), with the remainder made up of other hydrocarbons and free nitrogen (N₂).

2.1.4 Production

Artificial lift systems (ALS), including beam pumping units, have been used at existing wells in the Luman Rim field to facilitate removal of formation water and enhance natural gas production. It is anticipated that newly completed wells will also require ALS.

Installed surface production facilities would include, as applicable and appropriate, the wellhead, ALS, separation unit, dehydrator, condensate and produced water tankage, gas-metering facility, connection to the gas gathering system, and a free-standing solar electric-powered computerized monitoring, control, and telemetry panel. Together these units would occupy about 2.2 acres. In areas of “cluster,” or concentrated, development centralized production facilities may be considered, if appropriate considering royalty accounting issues.

It is assumed that the natural gas production rate for each well be highest in the first few years, then gradually decline. The produced gas stream requires separating water in a two-phase separator and dehydrator at the well site that would yield gas, condensate and produced water. Following separation, the gas is filtered, metered, and introduced into the gathering system for transport to a compressor facility. Condensate and produced water are stored in on-site tankage until sufficient volumes have been collected for transport to sales or disposal, as appropriate. Separation equipment and tankage would be situated within containment dikes and covered by a Spill Protection Countermeasure and Control (SPCC) Plan. Gathering systems for the produced water or condensate are not proposed due to the relatively limited volumes of fluids produced by the wells.

Separated, produced water would be transported via truck to approved disposal sites. Disposal of produced water would be in accordance with a plan approved by the BLM as provided for in Onshore Oil and Gas Order No. 7, Disposal of Ground Water. Produced water disposal operations are regulated by WDEQ and or the WOGCC, as appropriate. Condensate would be transported via truck to a sales point.

2.1.5 Operations and Maintenance

After gas production had been initiated, routine production operations would occur on a year-round basis, weather and site conditions permitting. Maintenance of the various mechanical components of gas production would occur at intervals recommended by manufacturers, or as needed based on telemetry and on-site visits.

A well-facility operator would visit the well pad daily to ensure that equipment is functioning properly. All operations would be conducted in accordance with industry standards for safe and efficient operation. All project roads and wells would be inspected periodically by the Operators and the BLM. The Operators would be responsible for maintaining access roads to minimize any resource damage or loss and ensure safe operating conditions. Field maintenance would typically include gravel additions and/or blading. Winter maintenance would include blading to remove snow from the access roads and the well pads.

No ancillary facilities, such as field office, equipment yard, etc., are proposed.

2.1.6 Workforce and Traffic

The expected traffic levels associated with the Proposed Action are addressed in Table 2.2, which provides a conceptual representation of types and maximum frequencies of typical traffic that could be expected during the various construction, drilling and production phases. The ‘Trip Type’ column lists the various service and supply vehicles associated with this type of activity and tends to demonstrate a maximum activity level. The ‘Round-Trip Frequency’ column includes the number of trips, both external (i.e., to/from each project area) and internal (within each project area).

Table 2.2 - Luman Rim Project Traffic Estimates

Trip Type	Round-Trip Frequency
<i>Construction (roads and well sites)(estimate 4 days per well)</i>	
Two ton truck	2/day
Pick-up trucks	3/day
Seed Driller and tractor	1/day
Rubber tired backhoe	1/day
Trackhoe	1/day
Dozer	2/day
Road grader	2/day
Water wagon/water truck	2/day
Scraper	2/day
Belly dump tractor and trailer	3/day
<i>Drilling (15 days per well)</i>	
Rig move	10 trucks/well
Rig supervisor	1/day
Rig crews	2 vehicles/day
Engineers	2/week
Mechanics	1/week
Supply delivery	2/week
Water truck	1/week
Mud trucks	1/week
Drill bit/tool delivery	2/week
Pipe/tubulars	1/wk
Fuel	
<i>Completion (three weeks per well completion)</i>	
Small truck mounted rig/crew	1/day
Cement crew	3 trucks/2 trips
Consultant	1/day
Well loggers/Perforators	1 trip/well
Fracing/stimulation equipment	1 /day
Fracing/stimulation crews	1 /day
Power systems placement	2/day
Other field development	3/day
Testing and operations	2/day
Fuel	1/wk
<i>Construction (pipelines) (4 days/mile)</i>	
Two ton welding trucks	2/day
Pick-up trucks	4/day
Seed driller and tractor	1/day

Trip Type	Round-Trip Frequency
Rubber tired backhoe	1/day
Trackhoe	1/ day
Trencher	1/ day
Side boom	1/ day
Dozer	1/ day
Fuel	1/wk
<i>Production</i>	
Equipment installation	10 trips
Workover rigs	1/5 years
Condensate and produced water haul trucks	2/mo
Pumpers/pick-up trucks	3/wk

The drilling and completion operations normally require a large number of people on site at any one time, but may range from five to seven people to 25 to 30 at a time, depending on the task being undertaken.

2.1.7 Reclamation and Abandonment

The seed mixes for reclamation will be recommended by the BLM based on the recommendations found in the Luman Rim Project Area Reclamation Plan (Appendix B). These recommended seed mixes are based on both the pre-existing vegetative community and the soil types found in specific sites within the project area. Seeding rates are assumed for drill seeding. Seeding rates would be doubled if seed were broadcast. Reclamation success criteria would be based on attainment of 50% of pre-disturbance cover in three years and 80% of pre-disturbance cover in five years. These identified seed mixes could be modified or added to by the BLM, as needed or required to meet the BLM objectives for reclamation. Refer to the project level seed mix detailed in Table 2.3. The BLM uses the Wyoming Reclamation Plan as a guide in developing acceptable project level reclamation plans.

Weed control is integral to the success of project reclamation; the RSFO Weed Management Plan found in Appendix E will be followed. Forbs and shrubs may be seeded after grasses have become established and weedy species are under control. A variety of forbs and shrubs and their seeding rates can be found in the LRPA Reclamation Plan (Appendix B).

In the event drilling is non-productive at any given site, all disturbed areas associated with that site, including the well site and access road, would be reclaimed to the approximate landform existing prior to construction. Following construction, all areas not occupied by Proposed Action features would be reclaimed in the next growing season, or as directed by the agency. Remaining disturbed areas would be reclaimed following abandonment of project components. Stockpiled topsoil would be replaced as part of the seedbed preparation. Reclamation and site stabilization techniques would be applied as specified in the Luman Rim Project Area Reclamation Plan (Appendix B). Unnecessary or redundant road segments may be cooperatively reclaimed by the BLM and the Operators.

Table 2.3 - Luman Rim Project Permanent Seed Mix*

Grasses—USE ALL		
Thickspike wheatgrass		6 LBS/ACRE
Indian ricegrass		2
Sandberg bluegrass or bluebunch wheatgrass ⁶		
Bottlebrush squirreltail		2
Shrubs—USE TWO, (IN WINTER RANGE—USE BIG SAGEBRUSH)		
Basin or Wyoming big sagebrush*	1 LBS/ACRE	
shadscale (esp. important on winter range)	1	
winterfat		2
Gardners saltbush	2	
Four wing saltbush		2
Forbs—USE TWO		
scarlet globemallow		½ LBS/ACRE
lupine		½
blue flax	¼	
Rocky Mountain penstemon		½

*Notes: All seed tags must be sent to the BLM Natural Resource Specialist.
 The Wyoming Reclamation Policy Plan and the Wyoming Weed Plan will be followed.
 PLS = Pure live seed

The BLM seed mixes currently being used in the Luman Rim area are similar to those found in the Reclamation Plan and are determined by soil type.

Any mulch applied to areas with high soil erosion potential, or where use is otherwise indicated, would be free from mold and noxious weed seeds. Site preparation may include ripping or chiseling to break up compacted soils, increase water penetration, promote root growth, and control erosion. Soil amendments may be recommended depending on soil type and reclamation potential.

Implementation of the Proposed Action would result in surface disturbance. Estimates of that disturbance are found in Table 2.1. Interim reclamation of individual well sites would result in LOP disturbance of 2.2 acres per well. During the project development phase the access road driving surface, turn-outs, drainage structures and installation of storm water best management practices could result in full use of a 50-foot right-of-way. The adjacent 50-foot pipeline construction ROW would also be disturbed. However, use of the full right of way would be limited to the construction phase. Reclamation would be necessary on the pipeline ROW and 34 feet of the access road right of way. For the analysis, a 100-foot wide area of short-term disturbance was assumed for the roads and adjacent pipelines with an 84-foot reclamation width resulting in a 14- to 16-foot wide LOP disturbance.

2.1.8 Committed Practices and Requirements

2.1.8.1 Air Quality

1. The operators would adhere to all applicable local, state, and federal air quality regulations and standards. The operators would adhere to all applicable ambient air quality standards, permit requirements (including preconstruction, testing, and operating permits), motorized equipment and other regulations, as required by the State of Wyoming, Department of Environmental Quality, Air Quality Division (WDEQ-AQD).

2. The operators would not allow burning garbage or refuse at well locations or other facilities. Any flaring would be conducted under the permitting provisions of Chapter 6, Section 2 (Oil and Gas Production Facilities Permitting Guidance) of the Wyoming Air Quality Standards and Regulations and the WOGCC rules.

2.1.8.2 Soils

1. Implement established BLM road standards practice to minimize offsite impacts and provide for the safety of operations.
2. Locate pipelines immediately adjacent to roads to avoid creating separate areas of disturbance and to reduce the total area of disturbance.
3. Frozen soils will not be used as construction material.
4. No construction activities in areas of steep slopes over 25%.
5. Design cut slopes in a manner that will allow retention of topsoil, use of surface treatment such as mulch, and subsequent revegetation.
6. Topsoil will be salvaged from all disturbed areas.
7. Where possible, minimize disturbance to vegetated cuts and fills on existing improved roads.
8. Install runoff and erosion control measures such as water bars, berms, and interceptor ditches as needed and in accordance with the Wyoming Department of WDEQ Storm Water Pollution Protection Plan.
9. Install culverts for ephemeral and intermittent drainage crossings.
10. Upon completion of construction activities not specifically required for production operations, restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites; replace up to six inches of topsoil or suitable plant growth material over all disturbed surfaces; apply fertilizer as required; seed; and mulch as directed by the Luman Rim Reclamation Plan (Appendix B).

2.1.8.3 Water Resources

Other mitigation measures listed in the Soils, and Vegetation and Wetlands sections of this EA would also apply to Water Resources. Any changes in the produced water disposal method or location must have written approval from the BLM before the changes take place.

1. Limit construction of all drainage crossings to no-flow periods or low-flow periods.
2. Minimize the area of disturbance within drainage channel environments.
3. Prohibit construction of well sites and other non-linear features within 500 feet of surface water and/or riparian areas or within 100 feet of the inner gorge of ephemeral channels. Possible exceptions

to this will be granted by the BLM for linear features based on an environmental analysis and site-specific mitigation plans.

4. Construct channel crossings by pipelines such that the pipe is buried a minimum of four feet below the channel bottom.
5. Case wells during drilling and case and cement all wells in accordance with Onshore Order No. 2 and WOGCC rules to protect all high quality water aquifers. High quality water aquifers are aquifers with known water quality of 10,000 TDS or less. Include well casing and welding of sufficient integrity to contain all fluids under high pressure during drilling and well completion. Wells will adhere to the appropriate BLM cementing policy.
6. Construct the reserve pits in cut rather than fill materials. Compact and stabilize fill material, as needed. Inspect the subsoil material of the pit to be constructed in order to assess soil stability and permeability and determine whether reinforcement is required. The reserve pit will be lined with reinforced synthetic liner, minimum 12 mil thickness with permeability less than 10^{-7} cm/sec. and a bursting strength of 175 x 175 pounds per inch (ASTMD 75179) or according to stipulation.
7. Maintain two foot of freeboard on all reserve pits to minimize the risk of overflowing. Shut down drilling operations until the problem is corrected if leakage is found outside the pit.
8. Extract hydrostatic test water used in conjunction with pipeline testing and all water used during construction activities from sources having sufficient quantities and appropriation permits approved by the State of Wyoming.

2.1.8.4 Noise

1. Muffle and maintain all motorized equipment according to manufacturers' specifications.
2. In any area of operations (drill site, etc.) where noise levels may exceed federal OSHA safe limits, the operators will require the use of proper personnel protective equipment by employees.
3. No compression facilities are proposed for this project.

2.1.8.5 Transportation

1. Existing roads will be used whenever possible. Standards for road design will be consistent with BLM guidance.
2. Project roads not required for routine operation and maintenance of producing wells and ancillary facilities will be reclaimed and revegetated.
3. Areas with important resource values, steep slopes, and fragile soils will be avoided.
4. The operators will be responsible for preventive and corrective maintenance of roads in the project area throughout the duration of the Proposed Action. This may include shallow grading, cleaning ditches and drainage facilities, dust abatement, noxious weed control, or other requirements as directed by the BLM or the Sweetwater County Road and Bridge Department.
5. Except in emergency situations, access will be limited to dry conditions to prevent severe rutting (creation of ruts in excess of 4" deep) of the road surface. If rutting occurs all processes will cease

until the roads are of proper condition. All road damage will be fixed by grading. Culverts will be installed where needed to allow drainage in all draws and natural drainage areas. Onsite reviews will be conducted with BLM personnel for approval of proposed access prior to any construction.

2.1.8.6 Health and Safety

Measures listed under Air Quality, Water Quality and Noise also apply to Health and Safety.

1. Sanitation facilities installed on the drill sites and any resident campsite locations (should they be proposed) will be approved by the WDEQ and authorized officer.
2. To minimize public exposure to hazardous situations, the operator will comply with all existing applicable rules and regulations (i.e., Onshore Orders, OSHA requirements, etc.) that will preclude the public from entering hazardous areas and place warning signs alerting the public of truck traffic, if required by the BLM.
3. Haul all garbage and rubbish from the drill site to a state-approved sanitary landfill for disposal. Collect and store any garbage or refuse materials on location prior to transport in containers approved by the BLM.
4. Spill Prevention Control and Countermeasure Plans (SPCC) will be written and implemented as necessary, in accordance with 40 CFR 112. Spills of oil, gas, or any other potentially hazardous substance will be reported immediately to the BLM and WDEQ, and will be mitigated immediately, as appropriate, through cleanup or removal to an approved disposal site.

2.1.8.7 Vegetation/Wetlands/Noxious Weeds

Other mitigation measures under Soils and Water Resources of this EA will also apply to vegetation and wetlands.

1. File noxious weed monitoring forms with the BLM and implement, if necessary, a weed control and eradication program developed in association with the Sweetwater County Weed and Pest. The Noxious and Invasive Weed Management Plan for Oil and Gas Development Areas will be followed in the BLM Rock Springs Field Office.
2. On BLM-administered public lands, an approved Pesticide Use Proposal will be obtained before the application of herbicides or other pesticides for the control of noxious weeds.
3. Evaluate all project facility sites for occurrence and distribution of surface water, special aquatic sites, and wetlands. All project facilities will be located out of these sensitive areas. If complete avoidance is not possible, minimize impacts through modification and minor relocations.
4. Disturbed areas will be seeded and stabilized in accordance with BLM-approved reclamation guidelines and the Luman Rim Project Area Reclamation Plan (Appendix B).

2.1.8.8 Wildlife and Fisheries

No fisheries mitigation is needed beyond that indicated under **Water Resources** and **Special Status Species**.

1. Minimize surface disturbance.

2. During reclamation, establish a variety of forage species that will return the land to a condition approximate or equal to that which existed prior to disturbance.
3. Prohibit unnecessary off-site activities of operational personnel in the vicinity of the drill sites. Inform all project employees of applicable wildlife laws and penalties associated with unlawful take and harassment.
4. Crucial winter range for elk is identified in the southern portion of the project area. A Timing Limit Stipulation (TLS) is in effect from November 15 through April 30 for the protection of wintering elk.
5. Conduct a raptor survey within 1 mile of the project activity areas prior to construction if activities will be conducted between February 1 and July 31. No permanent aboveground structures will be constructed within 400 meters (~1312 ft) of a Ferruginous Hawk nest, 600 meters (1968 feet) of a Golden eagle nest or within 250 meters (~820 feet) of all other raptor species.
6. Surface-disturbing activities will be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all active raptor nests, except for Ferruginous Hawk nests, which will have a 1.0-mile seasonal buffer. Active nests are described as any active within the past 3 years. Such restriction will not apply to routine maintenance activities. When an “active” raptor nest is within ½ to 1 mile (depending on species and line of sight) of a proposed well site, construction activities will be restricted to limit disturbance to nesting raptors. No above ground structures or roads are allowed within the NSO setback distances provided in (5), above (BLM Wyoming State Guidelines).
7. Protection for breeding Greater Sage-Grouse will include No Surface Occupancy within 0.25 mile of a lek. Construction of low profile facilities or performance of temporary disruptive activities will be avoided where possible, but exceptions may be requested from the authorizing officer, in accordance with the GRRMP ROD.

Protection for Greater Sage-Grouse nesting habitat within appropriate distances from leks will include avoidance of such habitat and/or restriction of seasonal activities within those areas. The TLS for sage-grouse leks is in effect March 1 – May 15 from 8 pm – 8 am within ¼ mile of the lek. Sage-grouse brood rearing TLS is in effect March 15 – July 15 within designated habitat or up to 2 miles radius of the lek. Exceptions to the Sage-grouse TLS can be requested, and may be granted depending on current weather and habitat conditions as well as animal presence.

8. Mountain plover will be protected by restricting or avoiding construction activities in mountain plover nesting and brood-rearing habitat during breeding periods (April 10 through July 10). Seed mixes for plants 6 inches high or less will be used in mountain plover habitat, or as otherwise directed by an authorized officer. Sightings of Mountain Plover will be reported to the BLM. Observances of mountain plover nest, eggs, or chick will be immediately reported to the BLM and USFWS.
9. If threatened, endangered, candidate, or proposed species (TECP) are discovered at any time during construction, all construction activities will halt and the BLM will be immediately notified. Work will not resume until a Notice to Proceed is issued by the BLM.

2.1.8.9 Cultural, Historic, and Paleontological Resources

1. If cultural, historical or paleontological resources are discovered at any time during construction, all construction activities in the discovery area will halt and the BLM will be immediately notified. Work will not resume until a *Notice to Proceed* is issued by the BLM.

2.1.8.10 Socioeconomics

1. Coordinate project activities with ranching operations to minimize conflicts involving livestock movement or other ranch operations. Establish effective and frequent communication with affected ranchers to monitor and correct problems and coordinate scheduling.
2. Coordinate country road maintenance activities with Sweetwater County Road and Bridge. Establish effective and frequent communication to correct problems and coordinate scheduling.

2.2 NO ACTION ALTERNATIVE

CEQ regulations at 40 CFR 1502.14(d) require that an environmental analysis include the alternative of No Action. Under the No Action alternative, the Proposed Action would not take place. Inclusion of the No Action alternative allows the comparison of the environmental effects of taking no action with those of permitting the proposed activity or an alternative activity to go forward.

Consideration of the No Action alternative is required even if the federal agency is under legislative command to act. In the case of the Luman Rim project, the operators possess oil and gas leases that grant the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (Form 3110-2). While the BLM can constrain development of the leases according to lease stipulations and can condition proposed development activities so they are pursued in ways that avoid, minimize or mitigate environmental impacts, it does not have authority to deny the development entirely. The principal purpose of the No Action alternative is to provide a benchmark, enabling the public and the decision maker to compare the relative magnitude of the environmental effects of the action alternatives.

For analytical purposes, the Luman Rim No Action alternative means that none of the wells proposed on federal surface or mineral estate would be drilled; the associated well pads, roads and pipelines would not be constructed, production facilities would not be installed, and the associated production activity would not take place. Existing wells and facilities would continue to produce and operate and already permitted drilling activity would continue as would development and production activity on State leases.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

In accordance with 40 CFR 1502.14(a), the BLM is required to explore and evaluate all reasonable alternatives. The following alternatives were considered by the BLM but found to be unreasonable for reasons provided. Thus, these alternatives were eliminated from detailed study.

Multi-well Pad Development: Multi-well pad drilling refers to directionally drilling numerous wells from a single location, thereby reducing the total number of well pad locations and access roads necessary to develop the resource. Directional drilling is generally used to gain access to a part of an oil and/or gas reservoir that is not directly below the surface well location. It is also generally used in areas where surface locations are expensive or prohibited due to natural resource conservation concerns. The greater the number of wells drilled per pad the larger the pad becomes due to safety and rig lay out constraints. Multi-well pad drilling is done in areas where the geology and reservoir characteristics allow. These characteristics include adequate reservoir pressure to transport the hydrocarbon (oil or gas) to the surface without artificial lift, geological environment that is conducive to directional drilling (without significant folding and faulting), and a resource production potential that would make the additional expense of directional drilling economical. Directional drilling and completions are accomplished at a significantly

greater cost than the drilling and completion of vertical wells. The Operators have included some elements of multiple well pad directional drilling in the Proposed Action, where applicable and appropriate.

One comment letter requested the BLM consider multiple-well pad drilling as an alternative. Requiring multi-well pad directional drilling in the Luman Rim Project would render much of the project technologically infeasible, given the distances needed to get from a surface location to the WOGCC subsurface spacing location (at least a ¼ mile horizontal reach), the relatively low gas production anticipated (necessitating the use of artificial lift systems), the tight gas reservoir and the complexity of the geology. Because of these factors, a multi-well pad directional program was found to be unreasonable and was not carried forward for more detailed analysis.

Phased or Paced Development: Phased development was also suggested as an alternative development scenario for the Luman Rim Project. Under a phased development alternative, the BLM would limit construction and drilling activity in a given time-period and would allow additional development only according to a pre-defined annual rate or as determined by a cap on surface disturbance. Given the lease rights granted to the operators in the Luman Rim Project Area, the BLM does not possess the authority under either the standard lease terms and conditions or under the additional stipulations attached to the lease to limit activity to a pre-defined pace. Other than seasonal restrictions in specified habitats, the BLM can only delay drilling for periods of up to 60 days. For this reason, a phased development alternative was not carried forward for more detailed analysis.

CHAPTER 3 - AFFECTED ENVIRONMENT

3.0 INTRODUCTION

This chapter describes the existing conditions of the affected environment for the proposed LRPA. See Chapter 2 for details of the proposed project components and the area involved. The Supplemental Authorities, identified in Chapter 1, will be addressed as appropriate in the following discussion of the Affected Environment. Figure 2.1 shows the area involved in the proposed project and possible project component locations.

3.1 GEOLOGY AND MINERALS

3.1.1 Physiography, Topography, and Landforms

The analysis or project area is located in the Red Desert Watershed Area which is in the western portion of the larger Great Divide Basin (Love & Christiansen 1985). The Great Divide Basin is so named in that all drainages are interior and flow neither west to the Pacific Ocean nor east to the Gulf of Mexico and the Atlantic Ocean, thus forming an interior hydrographically closed basin.

Luman Rim is the predominant topographic feature in the area, running east-west across the southern third of the LRPA, the Red Lake area lies on the southern border of the project area.

3.1.2 Structure

The PA lies in the Great Divide structural basin as a downwarp between the Rock Springs Uplift to the west, the Wamsutter Arch to the South, the Wind River Mountains on the North, and the Rawlins Uplift to the east. The basin formed during the Laramide Orogeny while continental drift occurred as the U.S. Plate overrode the Pacific Plate. Regional dip in bedrock geology is from southwest to northeast.

3.1.3 Stratigraphy

Case (1998) describes the surficial geology (Figure 3.1) as predominantly residuum and eolian deposits. The rock slope on Luman Rim is formed by eolian material as it washes from the higher plain on the north down into the Red Lake area to the south. Love & Christiansen (1985) show that the bedrock geology (Figure 3.2) beneath the recent sand dune and playa deposits consist of the main body of the Tertiary Wasatch Formation. Table 3.1 illustrates the sequence of formations penetrated by oil and gas wells in the LRPA.

Table 3.1 - Geological Formations

Formation	Thickness	Description
Wasatch	1900-2600'	light to medium colored fluvial, lacustrine sands & shales
Fort union	3800'	vari-colored sands, dark shales and coals
Lance	1450'	fluvial coarse to medium sands, coals and shales
Fox hills sandstone	90'	light grey medium sandstone
Lewis shale	1075'	dark grey marine shale with interbedded turbidite sands
Mesaverde	1746'	consists of Almond, Ericson, Rock Springs & Blair formations
Almond	415'	marine sands over coal and sand and shale
Ericson	290'	predominately coarse fluvial sand
Blair	1070'	interbedded thin medium colored sand and shale

The primary zones of interest in the proposed action are the sandstones of the Mesaverde Almond and Rock Springs sandstones.

3.1.4 Mineral and Energy Resources

The predominant mineral resource found in the Luman Rim area is the oil and gas found in the Mesaverde Formation sandstones. There are currently 26 wells drilled in the LRPA, 16 of which are currently producing. The area has also been analyzed for methane extraction from the Wasatch Formation coals; these efforts appear to have been suspended.

The Metallic and Industrial Minerals Map of Wyoming (1985) and the Industrial Minerals and Construction Materials Map of Wyoming (2004) shows that surface deposits of Na₂SO₄ (Sodium Sulfate) are present in the playa areas. No mines or commercial development is indicated.

3.1.5 Geologic Hazards

Geologic hazards such as landslides and active faults are not known to be present in the LRPA. Landslide deposits do not appear on the surficial geology map Figure 3.1. No active faults were observed on the Wyoming Geological Survey website map showing active fault areas. Earthquakes have not occurred in the area according to Case (1999).

Sand dunes can be considered geologic hazards. Both the surficial and the bedrock geologic maps indicate sand dunes in the southern part of the LRPA. The Eastern Sand Dunes Wilderness Study Area is located on the southwestern boundary of the project area; sand dunes are also found within the Red Lake WSA. Hazards occur when facilities are placed in the path of migrating dunes or if surface disturbance destroys a stabilized area of the dune field.

In summary, potential geologic hazards in the LRPA is low except for the sand dune areas. However, these areas are primarily confined to the Wilderness Study Areas along the southern boundary of the area. Section 16 of T23N-R98W is a Wyoming State section and is the only dune covered area within the LRPA. Operations in this Section are subject to the jurisdiction of the Wyoming Oil and Gas Conservation Commission as opposed to the BLM.

3.2 PALEONTOLOGY

In October, 2007, the new Potential Fossil Yield Classification (PFYC) System replaced the Condition Classification System from BLM Handbook H-8270-1 and is to be used for all paleontological surveys. Vertebrate fossils or scientifically significant invertebrate or plant fossils and their relative abundance,

together with their sensitivity to adverse impacts, are classified based on the geologic units in which they are preserved. Class 1 (very low) indicates geologic units very unlikely to contain recognizable fossil remains, with the scale ranging up to Class 5 (very high) which indicates highly-fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils.

A review of previously documented paleontological localities within the Luman Rim Area was completed in October 2008. The entire Luman Rim EA Area is underlain by the bedrock of the Luman Member of the Green River Formation (Class 3) and the Wasatch Formation (Class 3 to 4). Soils and Quaternary deposits are generally less than 100 cm deep in the project area, and large portions of the proposed project area have exposed outcrops in the formations mentioned above. The LRPA is relatively unexplored for paleontological resources. A fossil record search revealed that no fossils have been found inside of the project area. This however, does not preclude the “moderate to high” probability of fossils to be found in the area. These same formations and members which are classified as “moderate to high” because of fossil vertebrates found in areas nearby the proposed project area have produced ostracods, mollusks, plants, reptiles and mammals.

3.3 CLIMATE

The LRPA is located in a semiarid (dry and cold), mid-continental climate regime. The area is typified by dry, windy conditions with limited rainfall and long, cold winters. The region has cool temperatures, with average daily temperature ranging between 7.3°F and 28.6°F in January to between 48.8°F and 84.6°F in July. Extreme temperatures have ranged from -40°F (1979) to 105°F (1897). The frost free period generally occurs from mid-May to mid-September. The nearest meteorological measurements were collected at Wamsutter, Wyoming (1897-2004) (WRCC 2010). Because of the wide variation in elevation and topography within the study area, site-specific climatic conditions vary considerably.

The annual average total precipitation at Wamsutter, Wyoming is 6.91 inches, with annual totals ranging from 3.8 inches (1979) to 13.6 inches (1983). Precipitation is greatest from mid-spring to early fall, tapering off during the winter months. An average of 25.3 inches of snow falls during the year (annual high 40.1 inches in 1992), with the majority of the snow distributed evenly between November and March.

The closest comprehensive wind measurements are collected at the WDEQ-AQD meteorological monitoring station located approximately 2.5 miles west-northwest of Wamsutter, Wyoming within the LRPA. The annual mean wind speed is 11.94 miles per hour (mph). The frequency and strength of winds greatly affect the transport and dispersion of air pollutants. Because of the strong winds in the region, the potential for atmospheric dispersion is relatively high, although nighttime cooling enhances stable air, inhibiting air pollutant mixing and transport.

3.4 AIR QUALITY

The Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS) are health-based standards which define the maximum concentration of air pollutants allowed at all locations to which the public has access. EPA criteria air pollutants for which standards exist are carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter less than 10 microns in effective diameter (PM₁₀), particulate matter less than 2.5 microns in effective diameter (PM_{2.5}), and sulfur dioxide (SO₂). Fugitive dust is comprised of regulated particulate emissions as well as larger sized particles. Fugitive dust is also an esthetic consideration that may affect visual resources, see section 3.12.

Air quality monitoring has been conducted near the LRPA at the Wamsutter, Wyoming monitoring site since March 2006 for NO₂, O₃, PM₁₀, and SO₂. CO and PM_{2.5} are not currently monitored in the area, and regional monitoring results are reported here for these pollutants. CO has been monitored at Murphy Ridge in Uinta County near the Wyoming-Utah border. PM_{2.5} has been monitored at Lander, Wyoming.

The monitored concentrations described above are considered ambient air background concentrations, and are used as an indicator of existing conditions in the region. These concentrations are assumed to include emissions from industrial sources in operation and from mobile, urban, biogenic and other non-industrial emissions sources. They are considered by Wyoming Department of Environmental Quality Air Quality Division (WDEQ-AQD) to be the most representative of background conditions within the LRPA, and are compared to the WAAQS and NAAQS in Table 3.2. The LRPA is designated as attainment for all criteria pollutants.

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 Prevention of Significant Deterioration (PSD) Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. Incremental increases in PSD Class I areas are strictly limited, while increases allowed in Class II areas are less strict. The project area and surrounding areas are classified as PSD Class II. Mandatory Federal PSD Class I areas within 100 miles of the project are Bridger Wilderness Area (48 miles) and Fitzpatrick Wilderness Area (82 miles). The Dinosaur National Monument is classified by the State of Colorado as a Class I Area for SO₂, and is located 91 miles from the project area. These sensitive areas have the potential to be impacted by project and cumulative sources.

Table 3.2 - Monitored Air Pollutant Background Concentrations and Wyoming and National Ambient Air Quality Standards (µg/m³)

Pollutant	Monitoring Site	Averaging Time	Measured Background Concentration	Wyoming and National Ambient Air Quality Standards	Incremental Increase Above Legal Baseline	
					PSD Class I	PSD Class II
Carbon Monoxide (CO)	Murphy Ridge ¹	1-hour	1035	40,000	n/a	n/a
		8-hour	805	10,000	n/a	n/a
Nitrogen Dioxide (NO ₂)	Wamsutter ²	Annual	11.3	100	2.5	25
		1-hour ⁷	40.0	188 ⁶	n/a	n/a
Ozone (O ₃)	Wamsutter ²	8-hour ⁴	125.4	157	n/a	n/a
Particulate matter (PM ₁₀)	Wamsutter ²	24-hour ⁵	47	150	8	30
		Annual	15	50(WAAQS)	4	17
Particulate matter (PM _{2.5})	Rock Springs ³	24-hour ⁶	18.9	35	n/a	n/a
		Annual	7.2	15	n/a	n/a
Sulfur Dioxide (SO ₂)	Wamsutter ²	3-hour	15.7	1,300	25	512
		24-hour	5.3	365(NAAQS) 260(WAAQS)	5	91
		Annual	2.6	80(NAAQS) 60(WAAQS)	2	20

¹ Background data collected at Murphy Ridge, Wyoming during 2007, WDEQ.

² Background data collected near Wamsutter, Wyoming, 2008, WDEQ.

³ Background data collected in Rock Springs, Wyoming during 2008, WDEQ.

⁴ Highest, fourth highest monitored value (2008).

⁵ Highest, second highest monitored value (2008).

⁶ 98th percentile monitored value.

⁷ 8th highest 1-hour monitored value (2008).

Visibility impairment is measured in terms of change in light extinction or change in deciview (dv). Potential changes to regional haze are calculated in terms of perceptible “just noticeable change in visibility” when compared to background conditions. Visual range, referred to as standard visual range (SVR), is the farthest distance at which an observer can just see a black object viewed against the horizon sky; the larger the SVR, the cleaner the air. Visibility conditions can be measured in SVRs (miles). Visibility for the region is considered very good, with an average SVR of over 200 km (VIEWS 2010).

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems, and it is reported as the mass of material deposited on an area per year (kg/ha-yr). Air pollutants are deposited by wet deposition (precipitation) and dry deposition (gravitational settling of pollutants).

The National Acid Deposition Program (NADP) and the National Trends Network station monitors wet atmospheric deposition and the Clean Air Status and Trends Network (CASTNET) station monitors dry atmospheric deposition at a site near Centennial/Brooklyn Lake. Figures 3.3 and 3.4 show the total annual background deposition (wet and dry) reported as total nitrogen (N) and total sulfur (S) deposition for these sites for the monitoring period of record through 2005.

Total deposition levels of concern (LOC) for atmospheric deposition have been established for sensitive areas in the LRPA region. The “red line” LOC represents an estimate of the total pollutant loadings that each sensitive area can tolerate. If an analysis done under Federal Land Managers' Air Quality Related Values Work Group guidelines indicates loading above these values, it may be suggested that the land manager recommend a reduction of emissions from new sources unless data are available to indicate that no AQRVs in the PSD Class I area are likely to be adversely affected. The “green line” LOC represents the total pollution loadings (current plus proposed new source contribution) below which a land manager can recommend a permit be issued for a new source, unless data are available that indicate otherwise.

Information from the Centennial CASTNET Site indicates the wet and dry nitrogen deposition values are at the lower levels of the “green line,” while the wet and dry sulfur deposition values are well below the green line at the Centennial/Brooklyn Lake site.

The concept of “global climate change” is premised on the concept that carbon based air emissions are residual in the environment and the effects realized for decades, if not longer. Green House Gases (GHGs) are carbon based and could be emitted from the project. Methane (CH₄), carbon dioxide (CO₂), and nitrous oxide (N₂O) would be the primary GHGs emitted, and would occur predominantly during well completion.

3.5 SOILS

Soils in the LRPA predominantly formed from residuum on bedrock-controlled uplands and alluvium in playas (BLM 1999). All soils within the project area have a frigid temperature regime and precipitation across the LRPA ranges from 7 to 9 inches (USDA-NRCS 1995). Soil texture is a mix of fine, fine-loamy, coarse-loamy, and sandy materials. Slopes are generally level to undulating (0 to 10 percent) and are separated by areas with steeper slopes (10 to 40 percent) to vertical slopes (rock outcrops). The majority of the project area is used as rangeland for domestic livestock grazing, wildlife habitat, and recreation (Texas Resource Consultants 1981; Wells et al. 1981).

Two soil inventories were previously completed by the BLM, in cooperation with the Soil Conservation Service [now known as the Natural Resources Conservation Service (NRCS)] for an area directly southeast of the LRPA, referred to as the Overland Area, Wyoming (Texas Resource Consultants, 1981; Wells, et al. 1981). Information from the Overland Area soil inventories was used in conjunction with soil mapping conducted by KC Harvey, Inc. to delineate and describe LRPA soils. Preliminary map unit boundaries were delineated using 2005 NAIP aerial imagery and then verified in the field during August 2008. The field verification was conducted by sampling the soils to a depth of 60 inches using a Giddings probe (Giddings Machine Company, Windsor, Colorado). Observed map units were then matched with existing descriptions and interpretative data from the Overland Area soil inventories.

A map of the LRPA soils is provided in Figure 3.1. A total of 15 soil complexes, associations, and variant map units occur within the 21,471 acres that comprise the LRPA. A total of 22 soil series are included within the 15 map units. The LRPA contains soil orders of inceptisols, mollisols, and aridisols.

3.5.1 General Description of Major Soil Types

Soils in the LRPA were formed from erosion of bedrock exposed at the surface and from lacustrine, alluvium, loess, and eolian deposits (BLM 1999). The soil parent material in the LRPA is dominated by tertiary shales and sandstones and uplifted cretaceous sedimentary rock (Munn and Arneson 1998). Soils developed from the tertiary bedrock are poorly developed with little clay accumulation. Sandy soils occur on stabilized sand dunes and in areas with active dunes. Clayey, saline soils exist in playas, and sodic soils occur on alluvial fans derived from high sodium parent materials.

3.5.2 Soil Limitations

To assess the potential limitations of the LRPA soils, four areas of concern were addressed. Water erosion, wind erosion, runoff potential, and reclamation potential were evaluated using soils information from the Overland Area, Wyoming soil inventories (Texas Resource Consultants 1981; Wells et al. 1981).

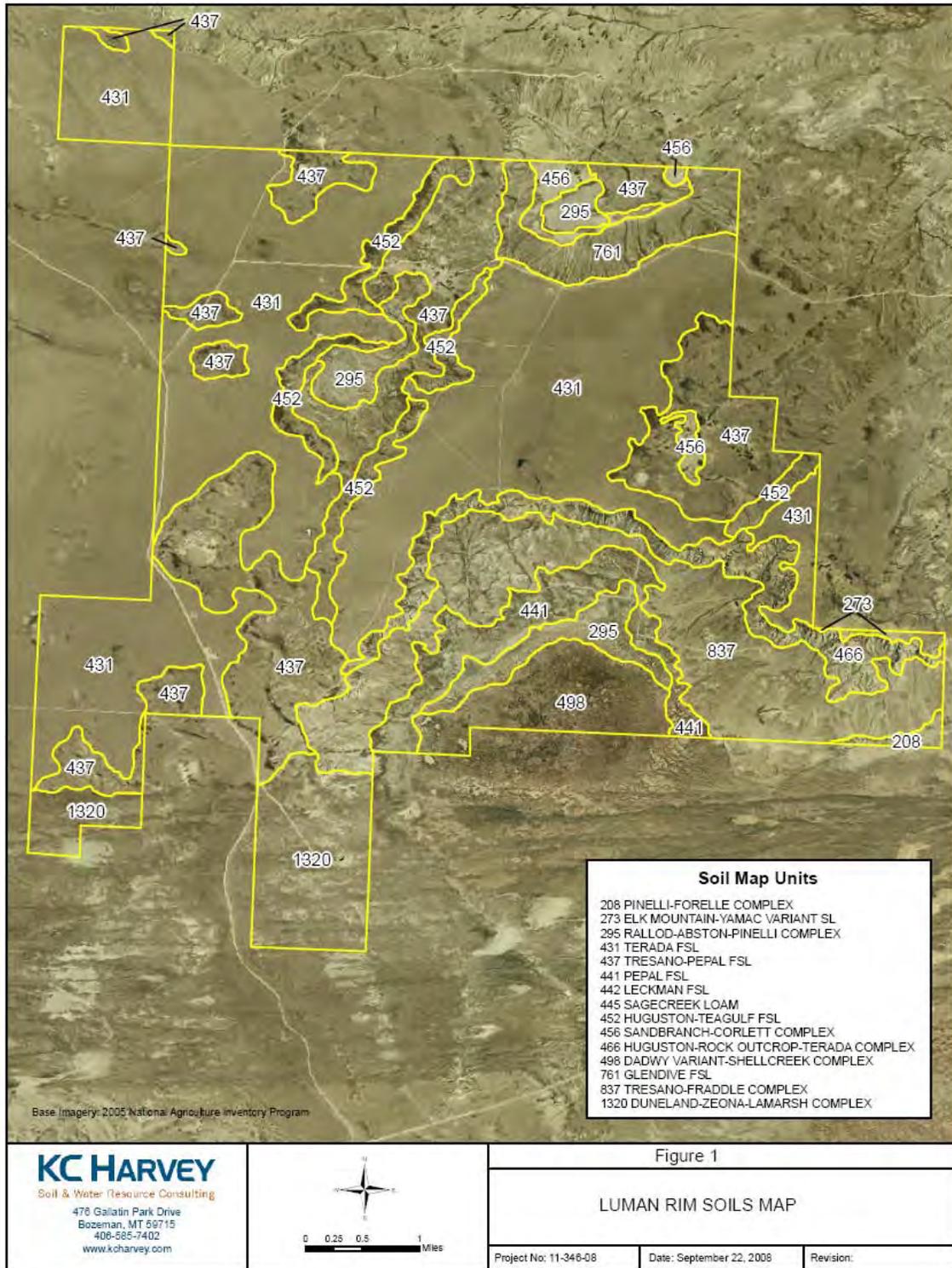
Information from individual soil map units was used to evaluate the soil limitations. If multiple soil series existed within a single map unit, rankings were assigned based on the soil series that comprised the greatest acreage within the unit. By using the relative size of the included soil series, the most unbiased ranking assignment was made.

Overall, the susceptibility to water erosion in the LRPA is slight, with 17,813 acres or 86 percent of the project area rated as having a slight water erosion potential. Only Soil Unit 295, Rallod-Abston-Pinelli Complex (Figure 3.1), which consists of 742 acres or 3.6 percent of the LRPA, is rated as having a severe water erosion potential.

The potential for wind erosion in the LRPA is moderate, with 19,337 acres or 93 percent of the project area ranked as having a moderate wind erosion potential. Only Soil Unit 1320, Duneland-Zeona-Lamarsh Complex (Figure 3.1), which consists of 1,247 acres or 7.2 percent of the LRPA, is rated as having a severe wind erosion potential.

Surface runoff potential in the LRPA is predominantly moderate with 89 percent of the project area, or 18,569 acres, considered to have a moderate runoff potential. Only Soil Unit 498, Dadwy Variant-Shellcreek Complex (Figure 3.1), which consists of 768 acres or 4 percent of the LRPA, is rated as having a high runoff potential.

Figure 3.1 - Soils in Project Area and Vicinity



3.5.3 Reclamation Potential

Reclamation is the construction of topographic, soil, and plant conditions following disturbance to allow the area to fully function as part of the ecosystem (Munshower 1994). The BLM long-term objective of final reclamation is to set the course for eventual ecosystem restoration, including the restoration of the natural vegetation community, hydrology and wildlife habitats. In most cases, this means returning the land to a condition approximating or equal to that which existed prior to the disturbance. The operator must achieve short-term stability, visual, hydrological, and productivity objectives of the surface management agency and take steps to ensure long-term objectives will be reached through natural processes (USDI and USDA, 2006).

To determine the reclamation potential of LRPA soils, the topsoil rating was obtained from Texas Resource Consultants (1981) and Wells et al. (1981). The reclamation potential of the LRPA is variable, with 11,447 acres or 55 percent of the total project acreage, rated as having a good reclamation potential (Figure 3.2). Thirty-one percent, or 6,556 acres, of the LRPA is considered to have a fair reclamation potential, and 14 percent, or 2,825 acres, of the LRPA has a poor reclamation potential. The main limitations to reclamation in the LRPA are from soils that contain excess salt, have a high clay content, or a high sand content.

3.6 WATER RESOURCES

3.6.1 Surface Water

The Luman Rim project area is within the Great Divide Basin (Hydrologic Unit Code 140402) in northeast Sweetwater County, as shown on Figure 3.3. The basin is essentially closed topographically, with large areas of sand dunes and playa lakes. The playa lakes are fed by localized incised drainages. There are no developed streams within the project area (Figure 3.3).

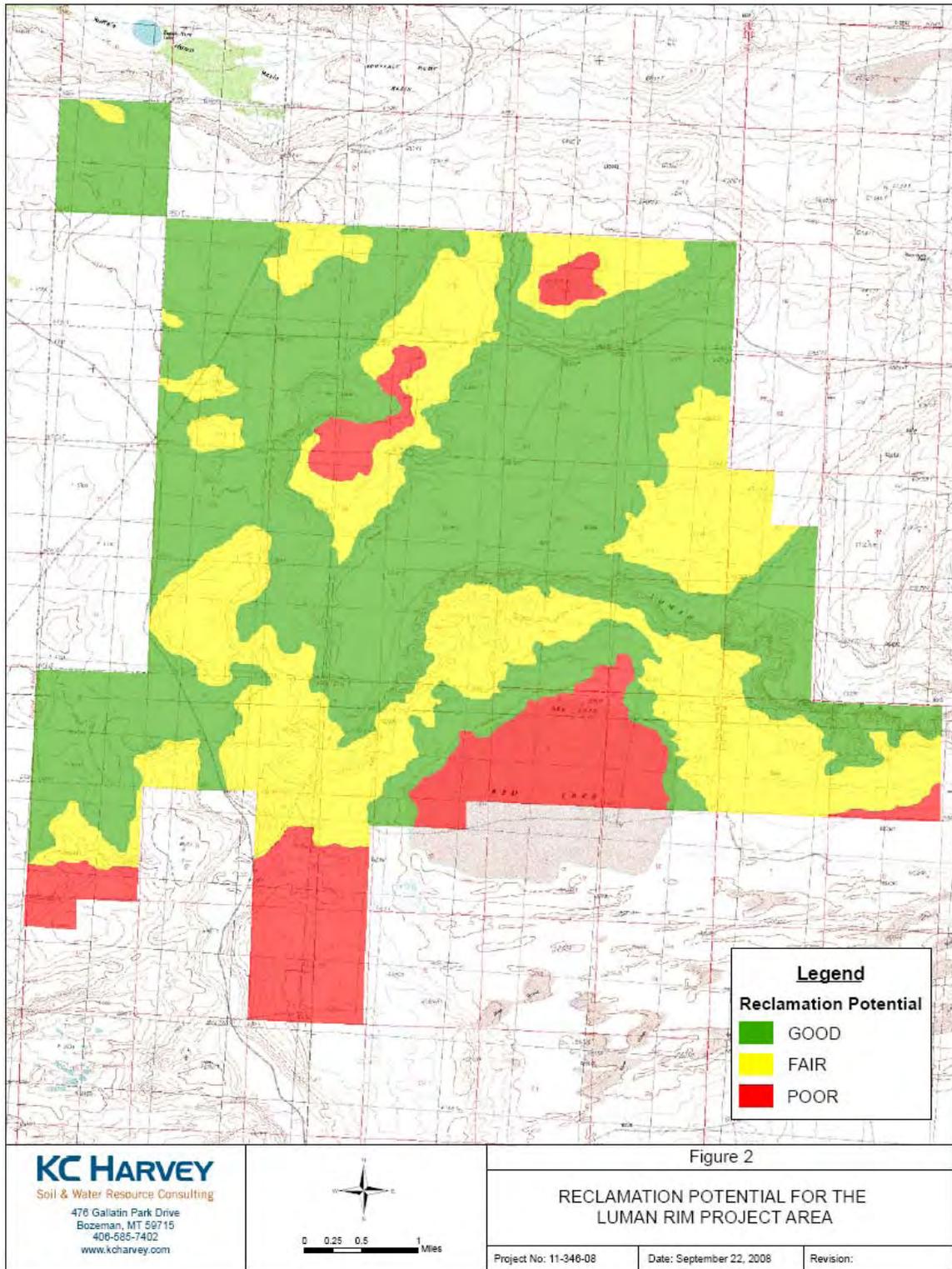
There is one large playa lake (Red Lake) and four smaller playas within the project area (Figure 3.3). These features are a product of the Great Divide Basin's internal drainage and arid climate (Mason and Miller 2005).

The flows in drainages and playa water accumulations are largely dependent on seasonal storms and snowmelt runoff. The majority of the runoff occurs during the spring and early summer and is generated by melting of the winter snow pack. During the late summer, thunderstorms may produce severe floods in these features.

The Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD 2000) classifies Wyoming surface water resources according to quality and degree of protection. Red Lake is the only water resource within the Luman Rim project area that has been classified by the Wyoming Department of Environmental Quality and has been classified as a Class 3A water resource.

Class 3. Those surface waters, other than those classified as Class 1, that because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning.

Figure 3.2 - Reclamation Potential for Luman Rim Project Area



Stream Classification and Water Use

Surface Water Quality

The water quality characteristics of surface waters generally reflect the chemical nature of precipitation in the region and the geologic strata over which the water flows. Water sampling results are often compared to a numerical standard defined for protection of drinking water, aquatic organisms, and other beneficial water uses. There are no surface water quality data available for Red Lake, an ephemeral water body that occasionally dries out due to a lack of precipitation and surface runoff.

Surface Water Rights

No permanent surface water rights exist within the project area.

Waters of the U.S.

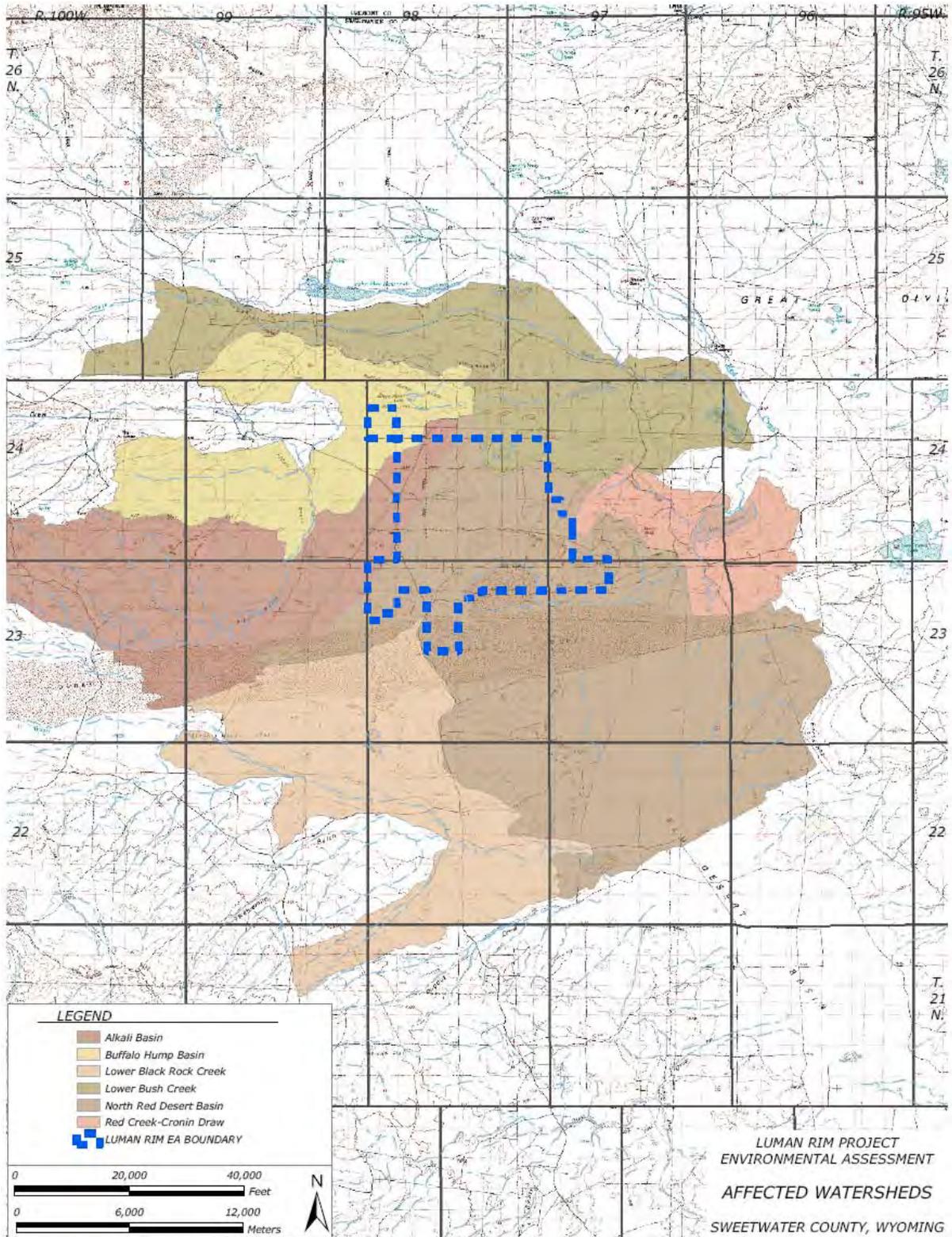
Waters of the U.S. is a collective term for all areas subject to regulation by the U.S. Army Corps of Engineers (COE) under Section 404 of the Clean Water Act (CWA). Waters of the U.S. include the territorial seas; interstate waters; navigable waterways (such as lakes, rivers, and streams); special aquatic sites; and wetlands that are, have been, or could be used for travel, commerce, or industrial purposes; tributaries; and impoundments of such waters. All channels that carry surface flows and that show signs of active water movement are Waters of the U.S. Similarly, all open bodies of water (except ponds and lakes created on upland sites and used exclusively for agricultural and industrial activities or aesthetic amenities) are Waters of the U.S. (EPA 33 CFR § 328.3(a)). Such areas are regulated by the COE and EPA. Any activity that involves discharge of dredge or fill material into or excavation of such areas is subject to regulation by the COE pursuant to Section 404 of the CWA. The playa lakes within the project area (as identified from USGS topographic maps) may exhibit wetland characteristics but are considered non-jurisdictional wetlands or non-jurisdictional waters of the U.S. by the COE. The COE reviewed the scoping notice for the Lower Bush Creek CBNG project and determined that any wetlands or other waters in the project area are isolated and are not longer considered to be 'waters of the U.S.' under Section 404 of the Clean Water Act (COE March 22, 2002 response to T. Deakins, re scoping notice for the Kennedy Oil Pilot Exploratory Coal Bed Methane Project). As the Lower Bush Creek CBNG project was located immediately north of, and within, the LRPA this jurisdictional determination is applicable to the Luman Rim project and is incorporated by reference.

Any special aquatic sites and wetlands present on the project area are discussed in greater detail in the Vegetation Section (Section 3.7).

3.6.2 Groundwater

Water-bearing zones within and adjacent to the project area exist under water table (unconfined) and artesian (confined) conditions. Under water table conditions, permeable material extends from the land surface down to the saturated zone, allowing vertical movement of water (Mason and Miller 2005). Aquifers within the unconfined zone include alluvium, wind-blown, lacustrine, and gravel deposits in the Quaternary hydrologic unit. Alluvial deposits within the Great Divide Basin probably yield small quantities of water with highly variable dissolved-solid content (Welder and McGreevy 1966). Little, if any, alluvial deposits occur within the project area.

Figure 3.3 - Affected Watersheds in Luman Rim Project Area



Generally, the Great Divide Basin is lacking in high quality and quantity shallow ground water aquifers. Eolian (wind-blown) sands are found in all parts of the Great Divide Basin; these deposits have a wide range of thicknesses, generally ranging between 0 and 70 ft. They are areas of recharge for underlying aquifers (Mason and Miller 2005). Playa lake and other lacustrine deposits are also found throughout the Basin; thickness ranges between 0 and 25 ft and are unlikely to yield usable groundwater in most areas (Welder and McGreevy 1966). Gravel deposits within the Great Divide Basin are widely distributed. Water development from these deposits is likely poor since they are typically high and well drained (Mason and Miller 2005).

Tertiary hydrogeologic units contain the most abundant and widely used shallow aquifers in the Sweetwater County. More than 20 Tertiary-age geologic formations, members, and tongues are present (Mason and Miller 2005). In general, water quality in the Tertiary hydrogeologic units deteriorates with increasing depth. The Wasatch sands may be fed or recharged by up gradient creeks and snow melt. These sands are not part of the Platte River system because the creeks crossing this area drain into the Red Desert Basin or Continental Divide Basin which only has interior drainage (WSEO 2010).

Groundwater discharge from the Wasatch zone of the Wasatch-Fort Union aquifer in the Great Divide Basin likely leaves the basin by flowing east out of the east-central part of the basin, while some groundwater flows south out of the basin over the Wamsutter Arch and into the Washakie Structural Basin (Mason and Miller 2005).

Water from the wells listed below has been used in the drilling and completion of the existing wells in the LRPA. The operators plan to use these wells in the development of the proposed project; both of these wells are completed in the Wasatch-Fort Union formation:

Wold State #2 Water Well	U.W. 166912	NWNW 36-24-98	Depth 310' to 410'
Hi-Line Unit #15 Water Well	U.W. 173543	NWNE 22-24-99	Depth 320' to 420'

Groundwater Quality

As indicated above, groundwater quality in Sweetwater County is highly variable, even within a single hydrogeologic unit. Water quality tends to be better near outcrop areas where recharge occurs and deteriorates as the distance from these areas increases. Water quality also tends to deteriorate with depth (Mason and Miller 2005). Hydraulic fracturing could be considered a threat to groundwater quality. In the LRPA hydraulic fracturing would likely occur at depths exceeding 10,000 feet where water is produced in conjunction with condensate and natural gas. Therefore it is unlikely that formations suitable for drinking water production would be impacted. Hydraulic fracturing will not be discussed further in this analysis. WOGCC regulations regarding “frac’ing” would be followed by the Operators.

A search of the Wyoming Water Resources Data System (WRDS 2008) was conducted for the analyses of groundwater samples collected from springs and wells located within and near the project area. The WRDS database contained water quality information on only one well (Well 24-098-21cd01) within the project area. This well was completed to a depth of 52 ft. Table 3.3 provides summaries of water quality analyses for samples collected at the three wells discussed above.

Table 3.3 - Summary of Groundwater Quality Analyses in the Luman Rim Area

Parameters	Standards		Summary Statistics		
	General Water Quality Indicators				
	Drinking Water ¹	Livestock ¹	Value	Value	Value
			Well 24-098-21cd01	Hi-Line Unit #15	Wold State #2
Temperature (°C)			9.0	26.6	26.6
Specific Conductance (umho/cm)			1,630.0	--	--
pH (standard units)	6.5-8.5	6.5-8.5	8.2	7.33	7.21
Total Hardness (mg/L)			42.0	340	140
Total Dissolved Solids (mg/L)	500.0	5,000.0	1070.0	19047	5251
	Ionic Constituents				
Calcium (mg/L)			6.8	120	16
Magnesium (mg/L)			6.1	10	24
Sodium(mg/L)			360.0	7048	1846
Potassium(mg/L)			3.9	NT	NT
Chloride (mg/L)	250.0	2000.0	7.7	10200	2400
Bicarbonate (mg/L)			311.0	1659	854
Nitrate + Nitrite (mg/L)	--	100.0	--	--	

¹ WDEQ/LQD Quality Standards for Wyoming Groundwaters (WDEQ/WQD 2008b)

All proposed gas wells would be completed in the Mesaverde formation at a depth of approximately 10,000 ft. Outcrop areas of the Mesaverde aquifer are the only places where fresh water can be found; the water becomes very saline away from these areas. According to USGS studies, water samples taken from the areas near outcrops were suitable for livestock use and many were suitable for domestic and irrigation uses. In contrast, produced-water samples from greater depths from the Mesaverde aquifer were of much poorer quality. The TDS concentrations of samples collected mainly from water wells and springs was 960 mg/L, compared to 13,400 mg/L in the (gas well) produced-water samples (Mason and Miller 2005). The TDS concentration is an indication of salinity.

Springs

No springs are known to occur in the project area.

Groundwater Rights

Existing groundwater rights within the project area consist of 10 wells permitted for miscellaneous use. There are 49 well permits on file for CBNG development. There are no stock or domestic wells in the area.

3.7 VEGETATION, SPECIAL STATUS PLANT SPECIES, WETLANDS, NOXIOUS WEEDS

The LRPA lies within the Great Divide Basin and consists of the Rolling Sagebrush Steppe and the Salt Desert Shrub Basin (Level IV) ecoregions. Each of these ecoregions is a part of the larger Wyoming

Basin (Level III) ecoregion (Chapman 2004). The LRPA encompasses a total of 21,471 acres with elevation ranging from 6,600 to 6,900 feet.

The Great Divide Basin is encircled by the Great Divide forming an endorheic, desert basin. The landscape of the LRPA varies from sagebrush dominated grasslands and rocky bluffs, to alkali playa. The annual average total precipitation at Wamsutter, Wyoming is 6.91 inches; precipitation is greatest from mid-spring to early fall, tapering off during the winter months. Temperatures range from an approximate average high of 85°F in July to an average low of approximately 7°F in January. Given the low precipitation rates at the LRPA, an arid, desertic climate regime exists which defines the dominant vegetation within the study area. Soils range from sand dunes in the south of the project area to fine textured clays and clay loams within the playa portion of the Red Lake.

3.7.1 Vegetation Cover Types

Vegetation cover types were delineated and mapped using 2002 color infrared aerial photos and 2005 NAIP imagery along and then verified during a field survey conducted in August 2008. Seven major vegetation communities exist within the LRPA (Figure 3.4) and are defined as:

- Wyoming Big Sagebrush/Mixed Grass Steppe
- Wyoming Big Sagebrush/Desert Shrub Cover Type
- Saltbush/Wyoming Big Sagebrush Cover Type
- Greasewood/Wyoming Big Sagebrush/Saltbush Cover Type
- Scarp Slope/Rock Outcrop Cover Type
- Greasewood/Playa Cover Type
- Saltbush/Bud Sagebrush Saline Flats

There were no observable wetlands or riparian areas within the project area.

Each cover type is highly dependent on landscape position and soil type. Vegetation cover types will be discussed in order of greatest habitation throughout the project area.

3.7.1.1 Wyoming Big Sagebrush/Mixed Grass Steppe

The Wyoming Big Sagebrush/Mixed Grass Steppe is the dominant cover type within the LRPA, composing approximately 40% of the total project area. The Wyoming Big Sagebrush/Mixed Grass Steppe consists of 10 to 20%, by canopy cover, Wyoming big sagebrush (*Artemisia tridentata ssp. Wyomingensis*) and 5 to 10% needle-and-thread (*Hesperostipa comata*) and Indian ricegrass (*Achnatherum hymenoides*), the two most common grasses within the project area. Typical landscape position for this cover type is atop the bench of Luman Rim, with little to no topographic relief, and along gently sloping sideslopes (5 to 10% slope) throughout the project area. Soils of this cover type are predominantly carbonaceous loamy sands and sandy loams.

3.7.1.2 Wyoming Big Sagebrush/Desert Shrub Cover Type

The Wyoming Big Sagebrush/Desert Shrub Cover Type is the second most prevalent cover type within the LRPA and encompasses approximately 30% of the total project area. This cover type is dominated by shrub species with Wyoming big sagebrush the dominant species with a canopy cover ranging from 20 to 40%. Dominant grasses are needle-and-thread and Indian ricegrass with a canopy cover less than or equal to 5%. Soils range from carbonaceous sandy loams and loams to sandy clay loams. Finer textured soils have greater water holding capacity, which would encourage higher shrub densities. Landscape position is similar to that of the Wyoming Big Sagebrush/Mixed Grass Steppe, consisting of bench positions of

low relief and gently sloping side slopes. The Wyoming Big Sagebrush/Desert Shrub Cover Type is also present along drainages and within swales where increased moisture is available.

3.7.1.3 Saltbush/Wyoming Big Sagebrush Cover Type

Gardner's saltbush and Wyoming big sagebrush dominate the Saltbush/Wyoming Big Sagebrush Cover Type. Sagebrush cover ($\leq 5\%$) is lower than in other Wyoming big sagebrush communities and there is an increased presence of Gardner's saltbush (5 to 15%). The common grass species of the steppe and desert shrub communities decrease in cover. This cover type is located along the sideslope/toeslope of Luman Rim and appears to be a transitional zone from the upper summit and bench sagebrush communities to the bottom, more saline/alkaline tolerant Greasewood communities. Soil textures are finer and predominantly consist of sandy loams, sandy clay loams, loams and clay loams.

3.7.1.4 Greasewood/Wyoming Big Sagebrush/Saltbush Cover Type

Greasewood (*Sarcobatus vermiculatus*), Wyoming big sagebrush, and saltbush are the principal species in the Greasewood/Wyoming Big Sagebrush/Saltbush Cover Type. This cover type occurs along alluvial fans, toeslopes and within the basin of Luman Rim in areas of sediment accumulation downslope of low topographic relief. This cover type consists of the big sagebrush/mixed grass steppe with a heavy encroachment of greasewood and greater shrub density. Soils are fine textured and saline, with apparent surface salt accumulation. Weedy species of the Chenopodiaceae family are patchy throughout.

3.7.1.5 Scarp Slope/Rock Outcrop Cover Type

The Scarp Slope/Rock Outcrop Cover Type is influenced by steep, rocky slopes with little to no soil formation. Vegetative cover is low, though diversity of species is relatively high. Erosional features such as pedestalling and rilling are common. The ground surface is usually covered with gravel and cobbles. Soils are predominantly loamy sands and sandy loams where depth is suitable for sampling.

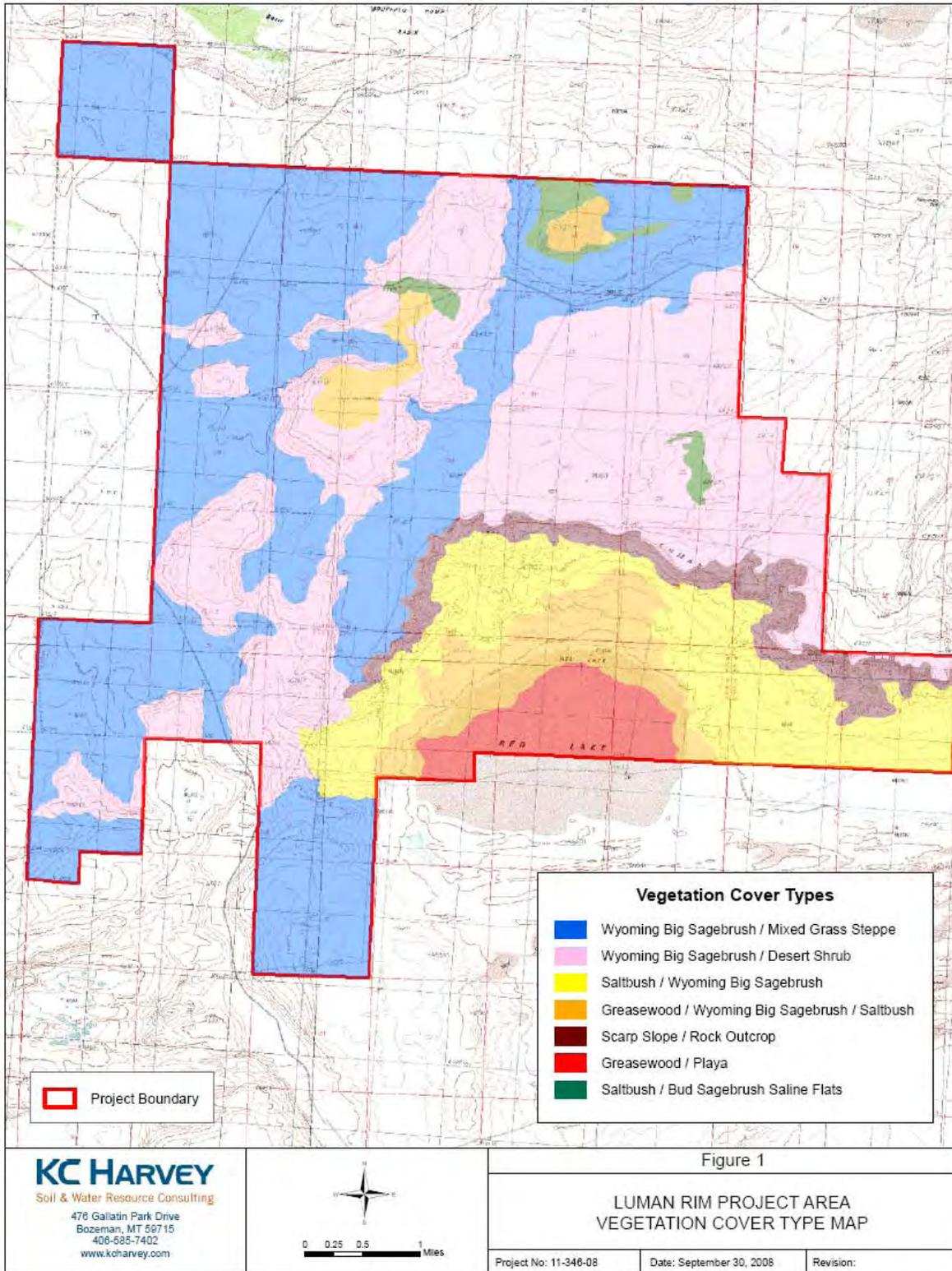
3.7.1.6 Greasewood/Playa Cover Type

Greasewood is the principal species in the Greasewood/Playa Cover Type; the only other species observed within this cover type was Nuttall's povertyweed (*Monolepis nuttalliana*). This cover type occurs within the Red Lake playa. Soil textures associated with this cover type are clay loams, clays and silty clays. Salt accumulation is high resulting in saline/alkaline soils in which only salt tolerant plant species occur. Barren patches are common throughout this cover type.

3.7.1.7 Saltbush/Bud Sagebrush Saline Flats

Saltbush and bud sagebrush dominate this cover type. Other species observed were bottlebrush squirreltail, Hood's phlox and halogeton (*Halogeton glomeratus*). This cover type occurs in lowland saline flats with little to no topographic relief. Solis consist of loams and clay loams. Vegetation is sparse, with bare ground often composing 60 to 70% of the canopy cover. This cover type is spread throughout the project area and can be observed in saline soil outcrops along the sideslopes of Luman Rim within the Wyoming Big Sagebrush/Saltbush Cover Type.

Figure 3.4 - Vegetation Types Found in Project Area and Vicinity



3.7.2 Threatened and Endangered, Candidate and BLM Sensitive Plant Species

Bastard draba milkvetch (*Astragalus drabelliformis*), found within the Scarp Slope/Rock Outcrop Cover Type, is considered a rare species within the State of Wyoming and is listed on the BLM and the USGS Northern Prairie Research Center's Wyoming Rare Plant List (Fertig, 1994). Federal status is listed as C2 - Notice of Review, Category 2: taxa for which current information indicates that proposing to list as endangered or threatened is possible, but appropriate or substantial biological information is not on file to support an immediate rulemaking. This was the only species observed within the LRPA that was determined to be a listed rare species.

Two federally listed plant species were identified by the U.S. Fish and Wildlife Service as potentially present in the general area (USFWS letter of 6/20/2008). Ute Ladies' tresses (threatened) occurs in seasonally moist soils and wet meadow drainages below 7000 feet elevation. While some isolated wetland areas may occur in the project area, no suitable habitat was identified in the Luman Rim Area during the August 2008 field surveys (KC Harvey Inc. 2008).

Blowout penstemon (endangered) has been documented along the Killpecker Sand Dunes near Rawlins. Neither of these species was found within the analysis area for the Lower Bush Creek CBNG environmental assessment which included portions of the LRPA (BLM 2003); thus, the BLM made a "no effect" determination. Neither of these species was observed during a field survey conducted for the Luman Rim project in August 2008 (KC Harvey Inc. 2008).

3.7.3 Noxious Weeds/Invasive Species

President W.J. Clinton signed Executive Order 13112 on February 3, 1999, to "prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species can cause." Invasive species are generally very versatile species, able to out-compete native species for available resources, and thus capable of turning a once diverse native landscape into the likes of a monoculture. This in turn limits production of desirable forage, thus hindering ecosystem function and stability.

Wyoming has designated 25 species as noxious throughout the state, while there are currently 4 additional species considered noxious weeds within Sweetwater County (Jerup 2008). None of these species were observed during the field survey at the LRPA (KC Harvey Inc. 2008), though it should be noted that the project area in its entirety was not evaluated due to time and access constraints. However, some species observed but not included on the designated lists that could be of concern and are aggressive on newly disturbed areas are Halogeton (species), Russian thistle (*Salsola kali*) and lambsquarters (*Chenopodium alba*). While not abundant, these species were noted to occur along roadways, pipeline ROWs and existing well pads. Proper construction and reclamation techniques should be employed to minimize the spread and success of these species and to ensure that other undesirable species are not encouraged.

3.7.4 Wetlands and Riparian Areas

The National Wetlands Inventory map (EPA 2010) indicates very limited wetlands habitat within the Luman Rim project area, including scattered areas of "freshwater emergent vegetation" along the north edge of Red Lake and a scattering of polygons identified as "palustrine, unconsolidated shore." The 2007 EA prepared for the Red Desert Livestock Conversion (BLM 2007) states, "there is only one naturally occurring riparian area present (Bear Creek) in the Red Desert Allotment." Otherwise, the Luman Rim area, located in the Red Desert Watershed, is a closed basin with very limited surface water and associated wetlands vegetation. During the August 2008 project level vegetation survey, there were no observable wetlands or riparian areas within the project area.

3.8 RANGE RESOURCES AND OTHER LAND USES

The Luman Rim project is located entirely within the Red Desert Allotment (#13012). At the time the GRRMP was written (1997) the allotment was considered found to be in compliance with Wyoming standards for rangeland health, in satisfactory condition and trending upward. The Red Desert allotment extends to the east in the Rawlins Field office jurisdictional area. The allotment “consists of 243,676 acres of public land, 12,839 acres of state land, and 999 acres of private land, for a total of 257,514 acres and is located in the northeast corner of the Rock Springs Field Office area, spanning Townships 22-26 and Ranges 97-101” (BLM 2007). The allotment can be used for grazing cattle or sheep as provided in the allotment management plan and its revisions (Table 3.4) (BLM 2007).

Table 3.4 – Red Desert Allotment Current Licensed Livestock Use*

ALLOTMENT	OPERATOR	LIVESTOCK		GRAZING PERIOD		% PL	TYPE USE	AUMs
		NUMBER	KIND	BEGIN	END			
Red Desert	Bar X Sheep Company	517	Cattle	05/15	10/14	88	Active	2,289
	Blair & Hay Land & Livestock Company	602	Cattle	05/01	12/15	92	Active	4,171
	Hellyer Limited Partnership	3,660	Sheep	05/01	05/06	100	Trailing	144
		2,300	Sheep	05/01	12/15	91	Active	3,152
							<i>TOTAL:</i>	<i>9,758</i>

* Red Desert Allotment Livestock Conversion Environmental Assessment (BLM 2007).

In 2002, the RFO reported (BLM 2002) that this allotment was in compliance with all six of the standards and guidelines, stating, “At the present, the review of upland vegetation conditions in the Great Divide Basin reveals generally good overall community health. Natural ecological and biological processes appear to be functioning adequately overall, although concerns about current, and especially near-future, functionality of certain community types remain (BLM 2002).” According to the Red Desert Allotment Livestock Conversion EA (BLM 2007), “Average actual use in the Red Desert Allotment annually has been around 20%,” this EA goes on to report, “For the five grazing years immediately preceding the Standards evaluation (1994 -1998), average licensed use in the allotment was 826 AUMs (Animal Unit Months) or 8% of total active use. This level of use was considered to be “current grazing practices” and was instrumental to the allotment meeting the Standards for Rangeland Health,” and “There are 8.4 miles of stream in Proper Functioning Condition (PFC) in the Red Desert Allotment.”

The Red Desert Allotment is made up of six pastures; the LRPA lies in three of these. Within this 257,000-acre allotment there is one natural perennial water source and 14 artificial water sources available for livestock, wildlife and wild horses; one artificial water source lies within the LRPA. Assuming good condition rangeland for forage production these types of range sites produce about 1 AUM for every 13 acres. The suitable acreage would have available 10,197 AUMs of forage (132,565 acres/13 acres/AUM) for wildlife, cattle, sheep and wild horses (BLM 2007).

This allotment is quite diverse and includes a variety of other uses including oil and gas production, recreation and existing rights-of-way (e.g., roads, pipelines) associated with on-going mineral-related activity in and adjacent to the project area.

3.9 WILDLIFE/SPECIAL STATUS ANIMAL SPECIES

Wildlife Habitat

The Luman Rim project is located within Great Divide Basin and is within Intermountain semi-desert eco-region, a high altitude prairie which is characterized by low annual precipitation, short summers and long winters, and generally sparse vegetation. The primary habitat type in the area is classed as the Wyoming big sagebrush steppe which includes sagebrush/saltbush steppe and greasewood wildlife habitats. Observed plants in the project area include Wyoming big sage, gray horsebrush, winterfat, Indian ricegrass, spiny hopsage, Gardner saltbush, rabbitbrush, greasewood, prickly pear cactus, grasses, and forbs.

Wildlife habitats that could be affected by the project include areas which would be physically disturbed by well, road, pipeline and production facility construction. Zones of influence are those areas surrounding a given human activity which could also affect wildlife use. These disturbance areas vary with wildlife species and kind of human activity.

General Wildlife

Many species of birds, mammals, amphibians, and reptiles may be found within the Great Divide Basin. The most common large game animals found in the study area are pronghorn antelope, mule deer, and elk. Other mammals include coyote, fox, skunk, badger, white-tailed prairie dog, whitetail jackrabbit, and a variety of small rodents. The area also contains Greater Sage-grouse. Raptors found in the area include Ferruginous Hawk, Golden Eagle, Prairie Falcon, and Burrowing Owl.

Reptiles found in the study area include Northern sagebrush lizard, Short-horned lizard, and Great Basin gopher snake. Tiger salamander and the Leopard frog may be found in the geographic area, but are not expected to occur in the project area. The proposed development is not expected to impact the common species found in the project area; therefore, they are not considered in this analysis. Those species considered in this document include Threatened, Endangered or proposed for listing status, big game species, raptors, and BLM sensitive species.

Information regarding the occurrence of species included in this analysis was obtained from several sources. Greater Sage-grouse lek locations, seasonal big game range designations, raptor nest locations, and locations for threatened and endangered species were obtained from the Wyoming Game and Fish Department's (WGFD) Wildlife Observation System, the BLM GIS database, the Wyoming Natural Diversity Database (WYNDD) and field surveys. Management of wildlife in Wyoming is split between the WGFD, which is responsible for species management, and the land manager, who has responsibility for the habitat. In the LRPA, which comprises mostly public land, the BLM is the primary land manager.

3.9.1 Big Game Species

Elk (*Cervus elaphus*), pronghorn antelope (*Antilocapra americana*), and mule deer (*Odocoileus hemionus*) occur on the project area during various times of the year. Big game populations are managed by the WGFD within designated "herd units." The BLM manages habitat on federal lands and split estate lands where the surface remained with the federal government.

Big game seasonal habitats are designated by the WGFD as winter, yearlong, winter/yearlong, crucial winter, crucial winter/yearlong, spring/summer/fall and out (non-use areas). Winter ranges are used by a substantial number of animals from mid November through April. Winter/yearlong ranges are occupied throughout the year but during winter, additional animals from other areas migrate there. Yearlong

ranges are occupied throughout the year and usually do not increase in population through the winter season. Crucial winter and crucial winter/yearlong describes a seasonal range that has been documented as a determining factor in a population's ability to maintain itself at or above population objective over the long term.

Spring/summer/fall ranges are used before and following conditions of freezing temperatures, deep snow and other winter attributes. If an area has little or no recorded use of big game activity, it is designated as "out."

Elk

The Luman Rim project falls within the Steamboat Elk Herd Unit 426 and Elk Hunt Area 100 (Figure 3.5). The Steamboat elk herd is a unique component of the wildlife resources of southwestern Wyoming. This elk herd exists in the sagebrush desert ecosystem, which contains very little conifer or aspen cover (BLM 2007). Although unregulated hunting extirpated most elk in the region by the early 1900s, the Wyoming Game and Fish Department successfully transplanted 408 elk between 1946 and 1967 (Sawyer et al. 2007). The population objective for this herd was initially set at 500 animals. Since then, the elk population has steadily increased, and today it is managed for 1,200 animals (Sawyer et al. 2007). The population of the herd, in 2007, was estimated at approximately 1,300 elk (BLM 2007). A modest harvest of 250 head is planned for 2010.

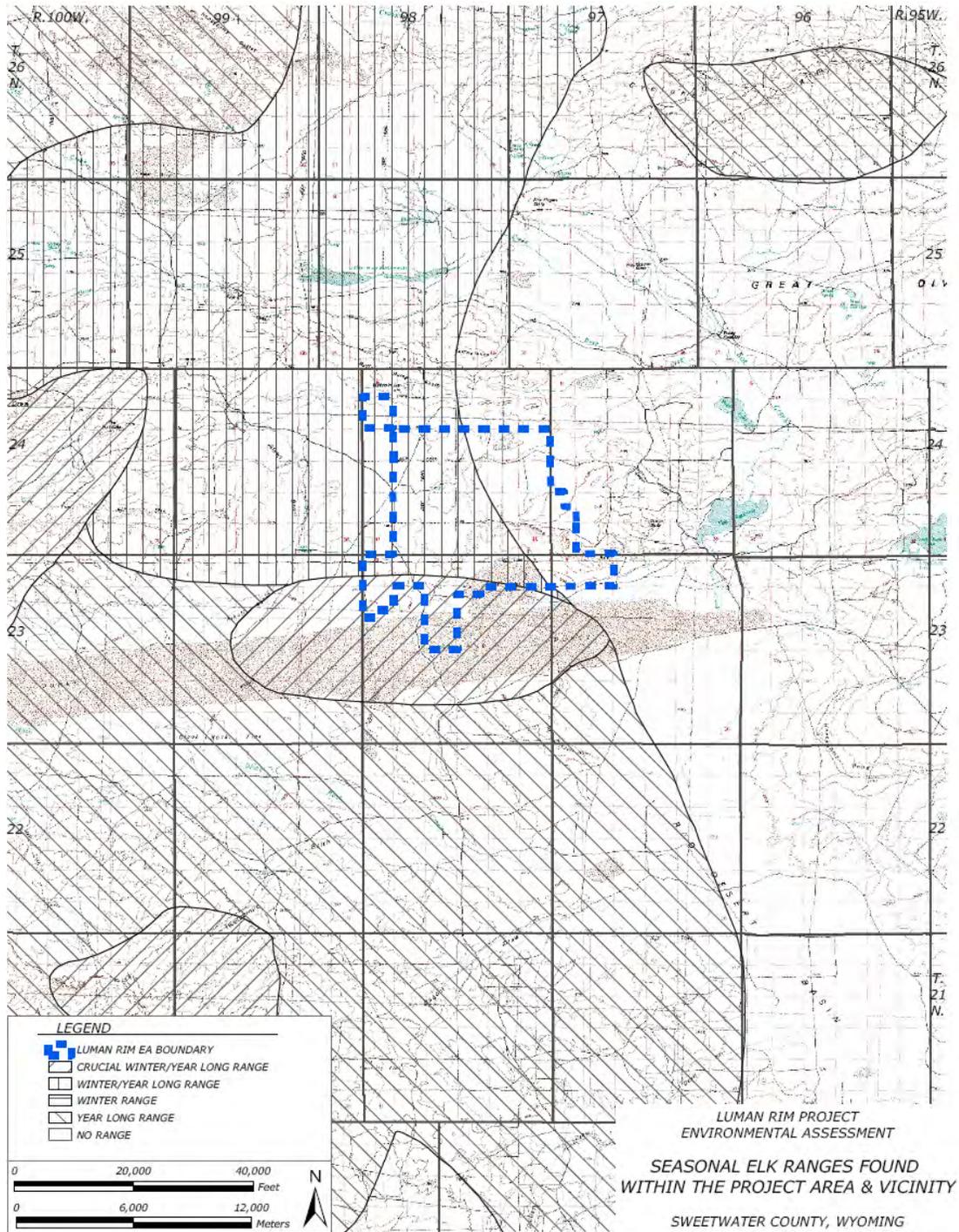
The BLM and WGFD, through the University of Wyoming Wildlife Cooperative Research Unit, gathered elk movement information on this herd, using GPS collar technology, in the early 2000's. This information better defines seasonal use areas and habitat preferences for the Steamboat elk population. Elk are seen sporadically in the Luman Rim project throughout the year but are documented as consistently using the southern portions of the project in the winter (Sawyer et al. 2005). WGFD has designated elk crucial winter range, approximately 25,214 acres, in the southern portion of the project area which includes the Red Lake and Alkali Draw/East Sand Dunes WSAs (BLM 2007).

Pronghorn Antelope

The project area is within the Red Desert Antelope Herd Unit 615 which includes Hunt Areas 60, 61 and 64 (Figure 3.6). The entire Herd Unit population objective is 12,000 animals. For the purpose of this analysis, the portion of the herd unit analyzed is limited to the Luman Rim project area. Luman Rim lies entirely within Hunt Area 60 and accounts for 20% of that Hunt Area; Luman Rim comprises less than 1% of the Red Desert Herd Unit.

Pronghorn antelope usually occupy this area and are commonly seen from early March through mid-November. Preferred pronghorn habitat may be characterized by a sagebrush/rabbit-brush plant community with an open view. The WGFD has not designated any crucial winter range for antelope in the project area or vicinity.

Figure 3.5 – Elk Herd Management Unit



Mule Deer

The project area is within the Steamboat Deer Herd Unit 430 (Figure 3.7). This Unit occupies the area between the Green River and the east side of the Great Divide Basin, south of Highway 28, and north of I-80. The Luman Rim project takes in deer Hunt Area 131, which includes the entire Herd Unit. Statistical figures for populations, harvest and mortality are relatively meaningless relative to this project as Luman Rim represents less than 8% of the Hunt Area and has few desirable deer habitat attributes. The population objective for the herd unit is 4,000. The model estimate for the 2008 population was 4,770; harvest was proposed at 10% resulting from issuing 1300 licenses (WGFD 2007).

Some mule deer are known to occupy the area around Hay Reservoir, east of the project, yearlong. Small herds of deer migrate from Jack Morrow Hills and the Steamboat area to Joe Hay Rim, Bush Rim and out to the Pinnacles. If the winter is relatively mild, some of these deer continue moving east into the project area during winter and early spring. Forage quality and diversity and poor shelter from the elements and competition with elk are factors limiting deer use in the area. No crucial ranges for this species are found in or around the Luman Rim project.

Other Mammals

Luman Rim is home to many species of non-listed, non-sensitive wildlife, including coyote (*Canis latrans*), white-tailed jackrabbit (*Lepus townsendi*), Desert cottontail (*Sylvilagus audubonii*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), various species of rodents, and bats. There are no anticipated effects to other mammals from the proposed action and these species will not be discussed further. Species that are Threatened, Endangered, Proposed and Candidate under the Endangered Species Act (ESA) are discussed in Section 3.9.4; BLM Special Status Species are discussed in Section 3.9.5.

The cottontail rabbit is the only species of “small game” occurring within the project area. The species which is found in the project area is the Desert cottontail (*Sylvilagus audubonii*) (Cerovski et al. 2004). Usually seen during early morning and late afternoon, they are generally inactive during mid-day. As with most cottontails, they occupy tall vegetation, rock outcrops, and where escape cover may be found.

Figure 3.6 – Pronghorn Herd Management Unit

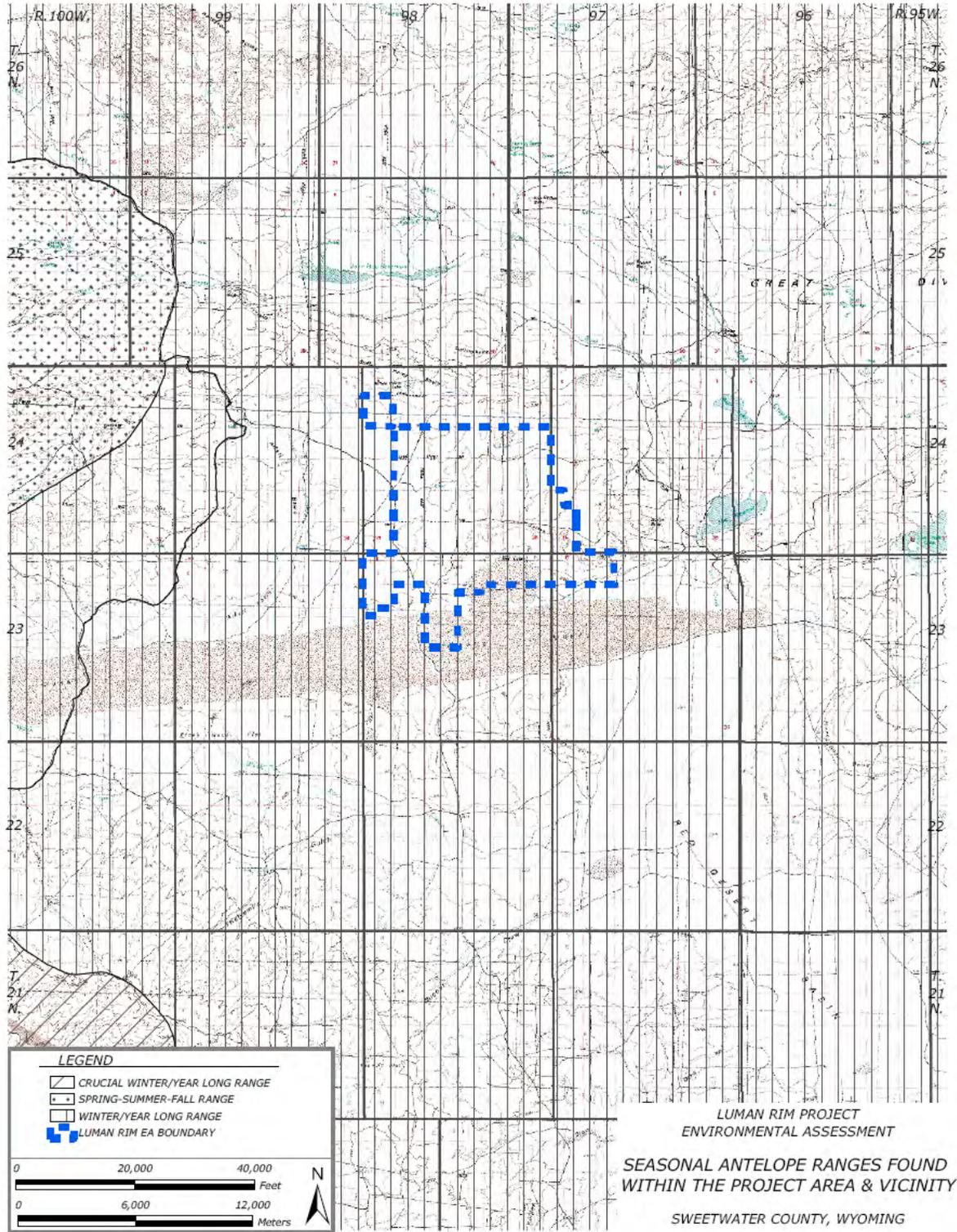
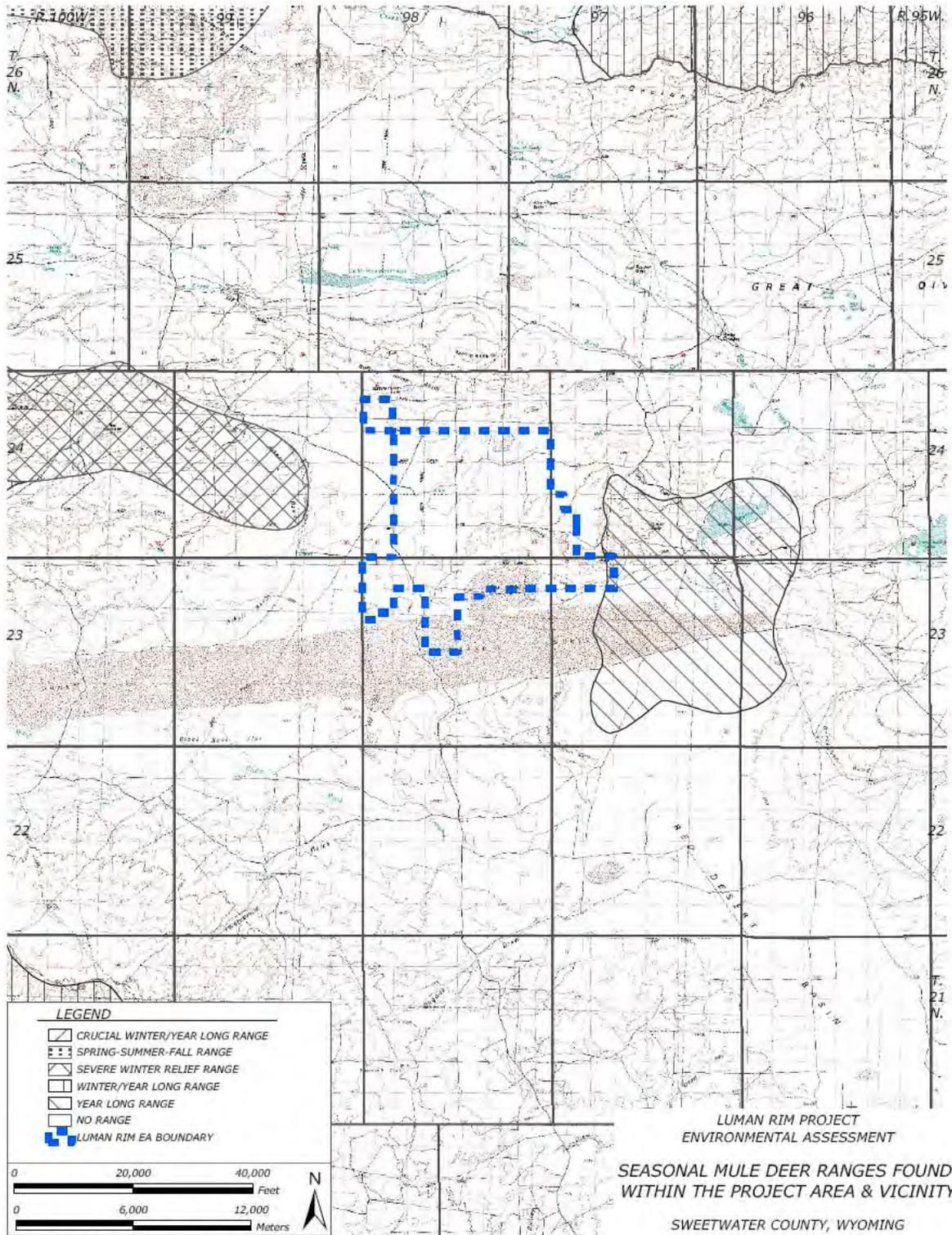


Figure 3.7 - Mule Deer Herd Management Unit



3.9.2 Upland Game Birds

Greater Sage-grouse (*Centrocercus urophasianus*) and mourning dove (*Zenaida macroura*) are the only upland birds which occur within the project area. Greater Sage-grouse is discussed in Section 3.9.4.

Mourning Dove

This species is relatively common in the Luman Rim area from mid-April through early September. They are usually associated with taller sagebrush communities, mountain shrub and greasewood habitats associated with water. Nests are commonly found a few feet off the ground in sagebrush, greasewood and other indigenous shrubs. Doves may nest more than once each season depending on arrival date, weather, nesting success and other factors. General lack of available surface water and riparian habitats in the Luman Rim project, limits the amount of dove activity which occurs in this area. Doves were found nesting in Cronin Draw, on the east side of Red Lake and tall sagebrush near Luman Butte during project level wildlife surveys conducted in 2008 and 2009.

3.9.3 Raptors

At least nine raptor species are known to occur in and around the project area during various seasons of the year. Raptor surveys of the Luman Rim project area were conducted in the spring of 2008. Nesting habitat was identified for golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), American kestrel (*Falco sparverius*), great-horned owl (*Bubo virginianus*) and burrowing owl (*Athene cunicularia*). One active American kestrel and two ferruginous hawk nests were located during the 2008 surveys (Table 3.5 and Figure 3.8). Raptors of casual occurrence include prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), Northern harrier (*Circus cyaneus*), and rough-legged hawk (*Buteo lagopus*). Other raptor species such as the sharp-shinned hawk (*Accipiter striatus*, a forest species) and short-eared owl (*Asio flammeus*, a wetland/forest species) may be seen here during spring and or fall migration. The GRRMP does not identify any raptor seasonal use areas in the project area although a number of the project area leases contain raptor stipulations. Bald eagle habitat does not exist within the Luman Rim project area.

The Luman Rim project area does not provide significant cliff or stick-nest habitat to support some of the species discussed above. Ferruginous hawks have the advantage of nesting on the elevated rock features, plateaus and poorer substrates that occur in the area. Four small prairie dog colonies and many badger burrows are known to occur in the project, providing ample nesting habitat for burrowing owls. Great-horned owl pellets are found along Luman Rim and they appear to be nesting somewhere in the area.

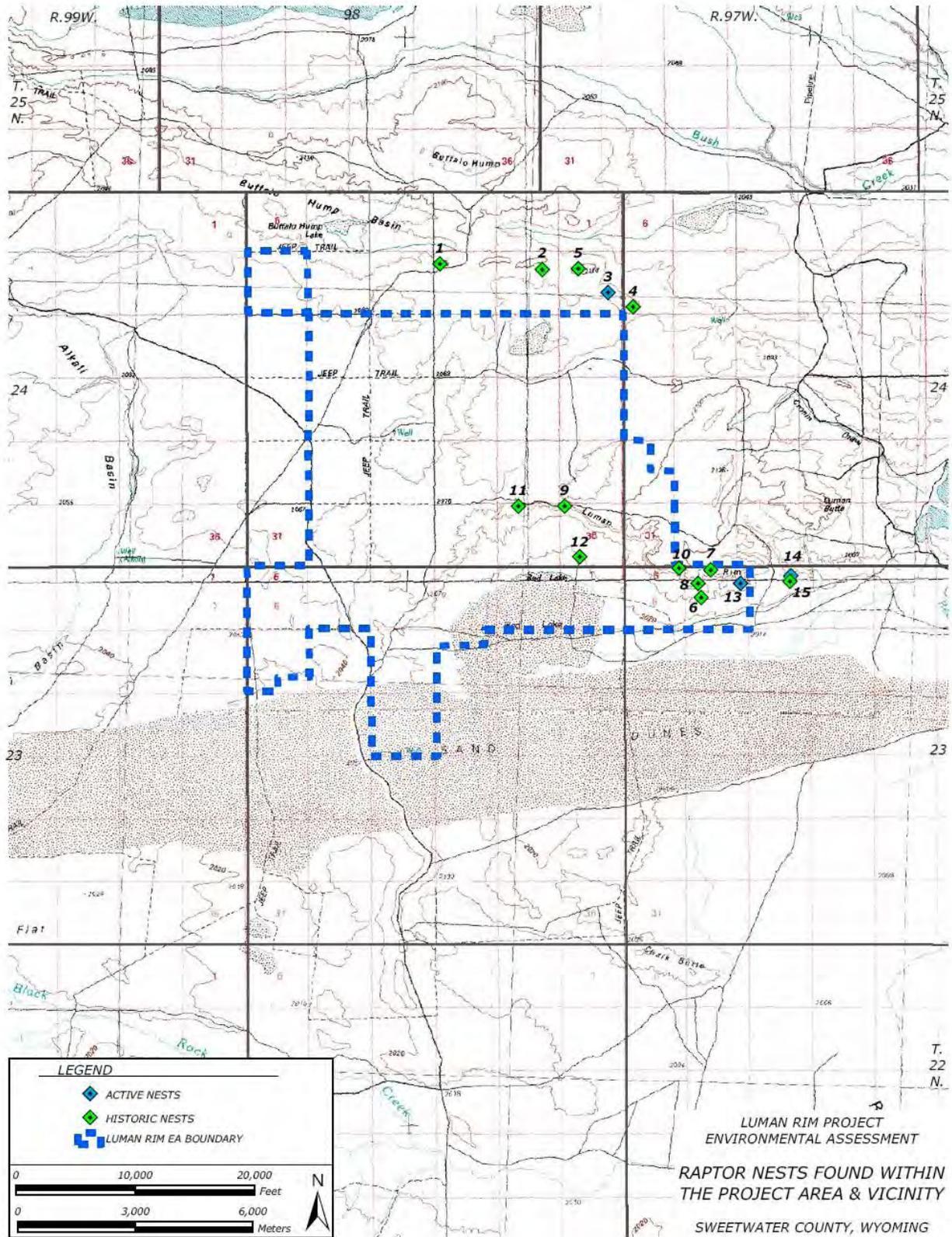
Table 3.5 - Luman Rim 2008 Raptor Nest Survey

Species	Map ID	Status	Qtr-Qtr	Section	TWN	RNG	UTM E+	UTM N
FH*	1	historic	NWNW	10	24	98	707615	4660911
FH	2	historic	SWNE	11	24	98	710233	4660842
FH	3	active	NESE	12	24	98	711917	4660299
FH	4	historic	SWSW	7	24	97	712571	4659934
FH	5	historic	SENW	12	24	98	711142	4660882
FH	6	historic	CW ½	5	23	97	714507	4652576
FH	7	historic	NENW	5	23	97	714731	4653288
unknown	8	historic	SWNW	5	23	97	714416	4652920
FH	9	historic	NWNW	36	24	98	710956	4654815
FH	10	historic	NENE	6	23	97	713916	4653300
FH	11	historic	NENW	35	24	98	709780	4654783
FH	12	historic	SESW	36	24	98	711377	4653517
Kestrel	13	active	SENE	5	23	97	715503	4652961
FH	14	active	NWNE	4	23	97	716769	4653187
unknown	15	historic	NWNE	4	23	97	716754	4653058

* Ferruginous Hawk

* coordinates are UTM, NAD 83, Zone 12

Figure 3.8 – Raptor Nests in the Luman Rim Area



3.9.4 Threatened and Endangered Wildlife Species

The U.S. Fish and Wildlife Service suggests that this analysis examine the habitat for the federally designated threatened, endangered, proposed or candidate wildlife species which may occur in the project area. The statuses of these potentially affected federally designated species are summarized in Table 3.6.

Table 3.6 - Threatened and Endangered Wildlife Species Possible in Project Area

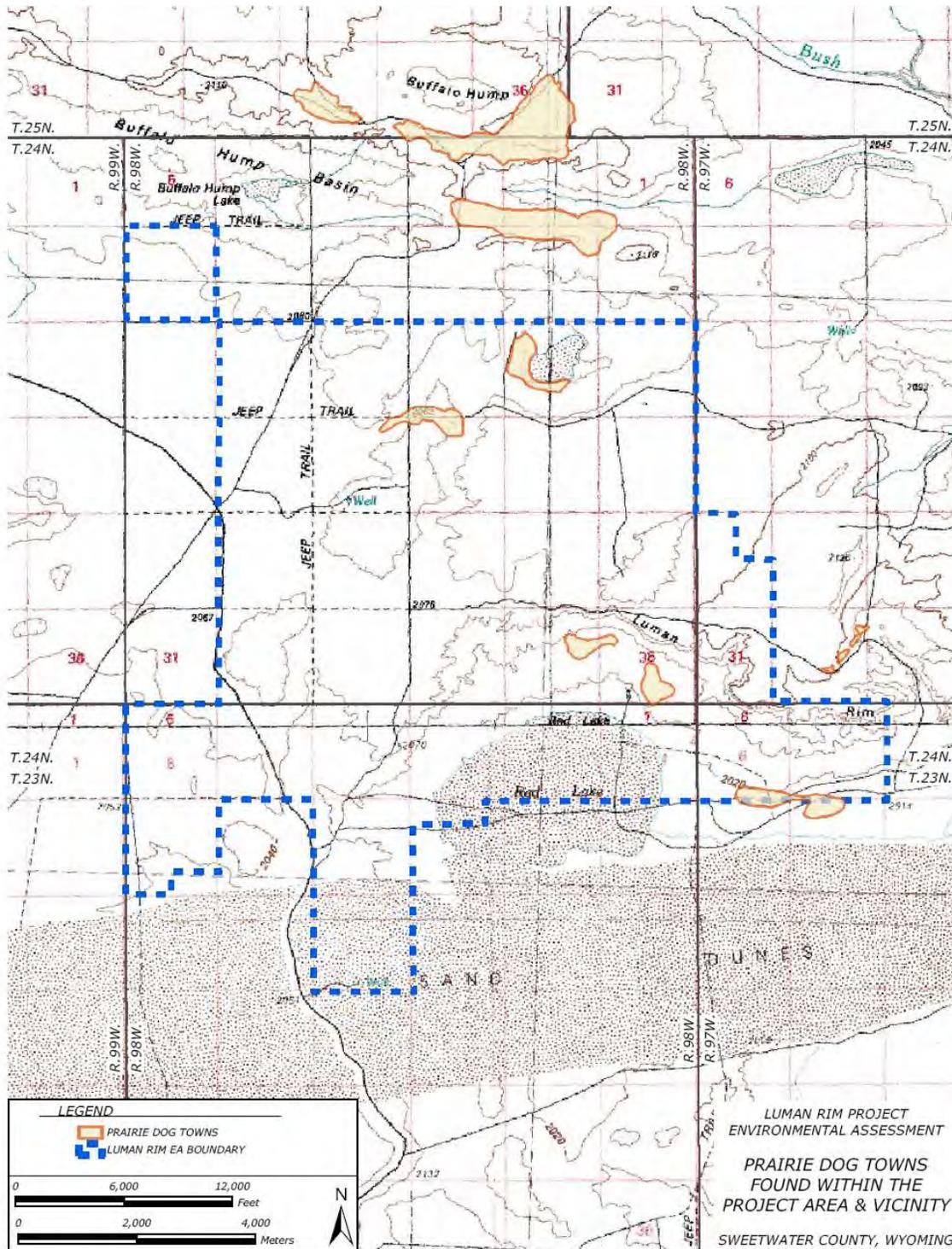
Species	Status *	Habitat	Status in Project Area/Comments
Black-footed ferret	E	Prairie dog colonies	Four known in project. Under 200 acres in complex. Not likely to adversely affect determination. Sweetwater complex block cleared (WGFD 2004).
Colorado River Species	E	Perennial tributaries	No perennial streams to the Green River. No effect determination.
Greater Sage-grouse	Warranted but Precluded	Sagebrush steppe	Known active and inactive leks within LRPA; available associated seasonal habitat.
Mountain Plover	Proposed	Areas of low vegetation	Have been observed in and around the LRPA over the years.

* **T** - threatened, **E** - endangered, **P** – proposed for listing

Black-footed ferrets have the potential to exist in the general area. The project area contains four white-tailed prairie dog towns (Figure 3.9) which meet the density requirements to provide habitat for the black-footed ferret. The total complex acreage is estimated at less than 200 acres. Several documents have analyzed the affected environment of the Black-footed Ferret in the planning area. The 2005 Statewide Programmatic Biological Assessment for Black-footed Ferrets (BLM 2005) indicates historic ferret observations north and south of the Luman Rim project area, “4 records from the Great Divide Basin (1 from Red Desert Basin near Red Lake in 1983, 1 from Bar-X Road near I-80 in 1983, 1 from around Oregon Buttes on the Continental Divide in 1950, and 1 between the Buffalo Hump and John Hay Reservoir in 1972).”

In order to better understand the white-tailed prairie dog distribution in the area, Veritas Geophysical funded an aerial inventory of their Hay Reservoir Geophysical project for prairie dog colonies in May 2002. White-tailed prairie dog colony locations were GPS point-plotted. These maps are on file at the Rock Springs and Rawlins Field Offices (BLM 2003c). Black-footed ferret surveys conducted for the Lower Bush Creek Coal Bed Methane Exploratory Pilot Project (BLM 2003a), which partially overlaps the Hay Reservoir project area. This survey effort did not find any evidence of ferrets in the area (BLM 2003a). These ferret surveys included two relatively large prairie colonies just north of the Luman Rim project. No evidence of black-footed ferret activity was found. This survey report is on file in the BLM office. When analyzing the Red Desert grazing allotment conversion (BLM 2007e), the BLM determined that the prairie dog towns in the allotment “were being incapable of supporting black-footed ferrets (*Mustela nigripes*) by the WGFD in 2003. That assessment was accepted by the U.S. Fish and Wildlife Service (FWS) in 2003. Therefore, the Fish and Wildlife Service has declared there is “no potential habitat” for the black-footed ferret and a “no effects” determination for this species in this area. In 2004, the WGFD recommended that the Sweetwater Complex of white-tailed prairie dogs be considered “block cleared” and be relieved of any additional black-footed ferret surveys (WGFD 2004). Based on prairie dog colony acreage, colony distribution and prior studies, black-footed ferrets are unlikely to occur in the project area.

Figure 3.9 – White-tailed Prairie Dog Colonies in Luman Rim Project Area



Colorado River Fishes/Water Depletions to the Colorado River System: The U.S. Fish and Wildlife Service identified certain fish species as potentially affected by water depletions in the Colorado River System including the endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*) and the razorback sucker (*Xyrauchen texanus*). The Endangered fish species associated with the Colorado River were once found in the Green River and its tributaries with perennial water. Many of the species became extirpated in Wyoming after Flaming Gorge Dam was completed and the gates on the dam were closed in 1964. The listed fish species require permanent water and specialized habitats for reproduction.

The Luman Rim project area is located entirely within the Great Divide Basin which, in terms of surface water, is a hydrologically closed basin (WSEO 2003). Geologic studies have determined that groundwater flow is generally to the east and therefore related to flows in the Platte River. The distance between the project site and the Platte River suggests that there is not a direct hydrologic connection to the Platte River. Activities occurring within this basin should not lead to depletions of the Colorado or Platte River systems and should not affect the endangered species therein.

Greater Sage-Grouse

Greater Sage-grouse are considered year-long residents of this portion of the Great Divide Basin and the Red Desert. The Luman Rim project area provides suitable habitat for sage-grouse strutting, nesting and brood rearing. Mating birds aggregate on leks (display grounds) which are generally bare or grassy patches within large sagebrush shrub lands. Leks are important as they are used over many years for courtship, mating and socializing, which includes male sage-grouse drumming and strutting. These activities attract females for mating. The strutting period for sage-grouse in southwest Wyoming is from late February to mid May. Nesting habitat for females is dense sagebrush that provides hiding cover. Approximately 50% of females nest within 2 miles of their breeding ground (Holloran 2005), although nesting may occur up to seven miles from the nearest lek. Juvenile grouse feed on forbs and insects, and are often found in more mesic habitat. In winter this species utilizes areas with sagebrush that is available above snow cover.

The WGFD sage-grouse database identified seven leks within two miles of the Luman Rim project area (Figure 3.10). Of these, only two leks, one of which was newly identified, have data entries indicating that males were observed in 2009 (WGFD 2009); the other leks have been classified as either unknown or abandoned in the WGFD database. Lek surveys conducted in the area in 2008 and 2009 resulted in few sage-grouse observations. Springtime surveys of this species have occurred here regularly since the year 2000, and a general decline of bird attendance at strutting grounds was noted.

Although no single or combination of causes have been proven, the decline in Greater Sage-grouse populations is thought to be attributed to a multitude of factors which include but are not limited to: drought; fluid mineral development and associated infrastructure; power lines; mammalian and avian predators; and a decline in the quantity and quality of sagebrush habitat resulting from livestock grazing, range management treatments, and development activities (Connelly, et al. 2000). The emergence of West Nile Virus in southwestern Wyoming (Naugle, et al. 2004) is also a threat to the species.

Greater Sage-grouse are on both the Level I MBHFI and special status species lists. In response to petitions to list the greater Sage-grouse under the ESA, the USFWS conducted a status review of this species throughout its range and on March 5, 2010, determined that it did warrant protection under the ESA but was precluded from listing by higher priorities. As a result of this decision the Greater Sage-grouse is considered a “candidate” species.

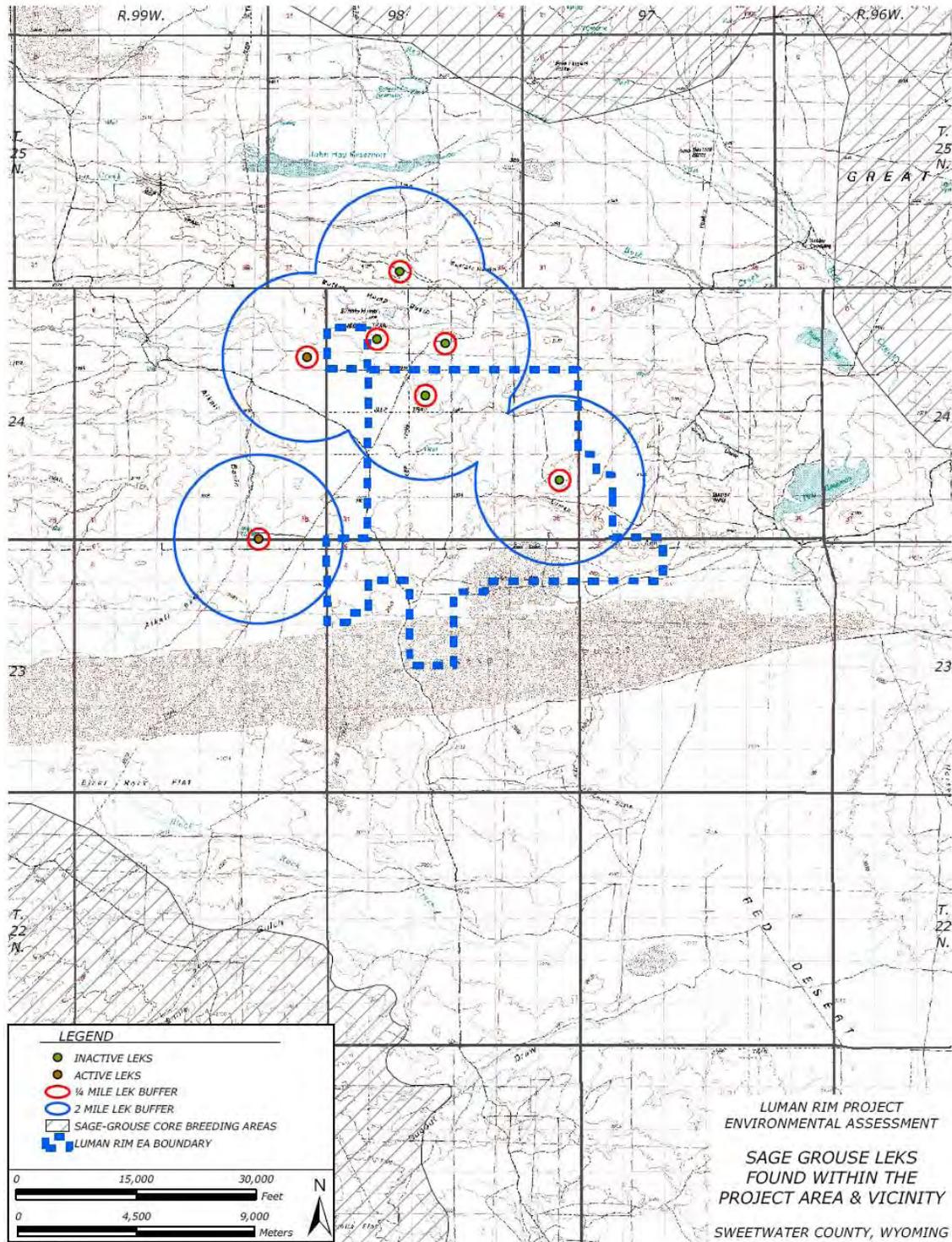
The Governor of Wyoming has issued an Executive Order (EO) establishing “Core Breeding Areas” for Greater Sage-grouse (WGO 2010). The EO provides a management strategy designed to protect sage-grouse habitat and populations, and in short, to demonstrate that effective conservation is ongoing in Wyoming and that ESA listing is not necessary or appropriate to protect the species. Stipulations or operating conditions were established for each energy sector that potentially occurs on sage-grouse habitat, as outlined in Stipulations for Development in Core Sage-Grouse Population Areas (WGO 2010). The Governor’s office, through the WGFD, encourages the voluntary application of these operating standards on private and federal lands and has written them into State lands mineral leases. The Luman Rim project is located between the Northeast Rock Spring and South Pass Core Breeding Areas, as defined by the Sage-Grouse Core Breeding Areas Version 3 Map (WGFD 2010). The BLM Wyoming issued Instruction Memorandum WY-2010-012 (BLM 2009) for sage-grouse conservation in December 2009 that mirrors and expands on the protections provided by the State Core Area concept.

In addition to the protections provided by the Core Area Concept and BLM Instruction Memorandum wy-2010-012, the leases held by the operators contain the standard stipulations for the protection of the Greater Sage-grouse habitat on BLM-administered lands. The GRRMP identifies three leks in the project area (T24N-R98W). The GRRMP and places timing and spatial limitations on disturbance to Greater Sage-grouse leks, breeding behavior and nesting sites:

- There can be no surface occupancy within one-quarter mile of any sage-grouse lek, although the RMP also provides that some activities may be granted exceptions to this restriction, under certain circumstances.
- Disruptive activities will avoid occupied sage-grouse leks from 8:00 pm to 8:00 am daily, usually from March 1 and June 15, within ¼ to ½ mile, to be determined on a case-by-case basis.
- Seasonal restrictions will apply within appropriate distances (up to two miles) and time frames (from March 1 through July 15 to protect breeding, nesting and early brood rearing birds). Exceptions can be requested and may be granted dependent on current weather and habitat conditions as well as animal presence.

The BLM Instruction Memorandum (BLM 2009) provides that winter habitats are protected from surface-disturbing and disruptive activities from November 15 to March 15, annually. Most of the leases within the project area also contain a stipulation stating “No surface use is allowed (this does not apply to operations and maintenance of production facilities) from February 1 to July 31, for protection of sage-grouse nesting habitat.” Sage-grouse protective measures have evolved over time, resulting in some variability in the precise language contained in the LRPA lease stipulations. These would be evaluated by BLM staff on a case-by-case basis when making site-specific, project-level decisions.

Figure 3.10 – Greater Sage-Grouse Leaks in the Luman Rim Project Area



Mountain Plover are considered to be arriving at nesting habitats sometime around April 10. Luman Rim surveys for this species began on April 21 and continued through May 19, 2009.

Suitable habitat for this bird is generally considered flat grasslands with sparse, low growing vegetation and bare ground. Habitats where prairie dogs are found offer much of the needed requirements. Preferentially, plover nests are found on slopes seldom exceeding 5% during nesting, but during fledging, the clutch and adult may be found utilizing denser vegetation and steeper terrain.

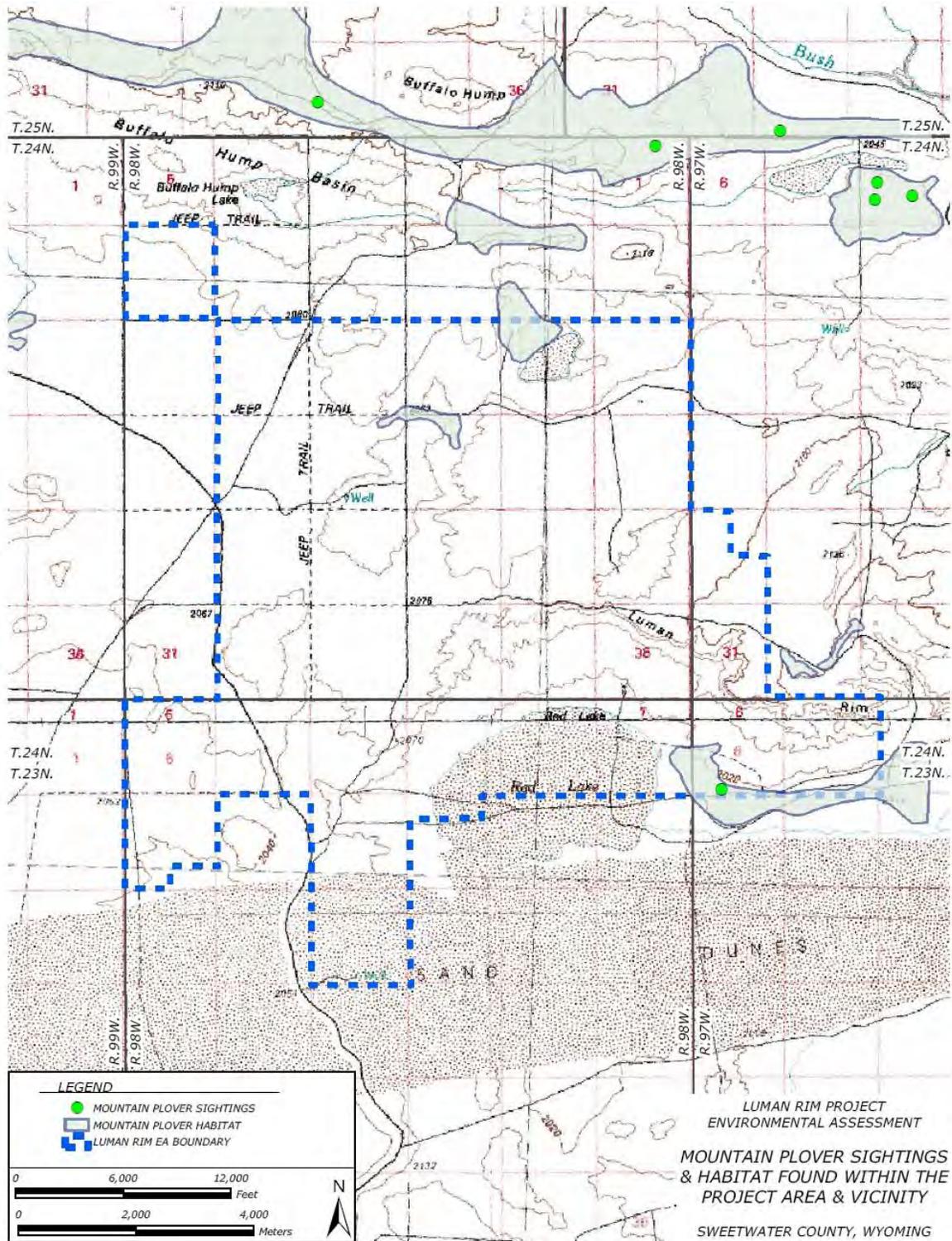
The survey identified potential mountain plover nesting habitat within and outside the project area. Much of this habitat was searched with spotting scope and binoculars multiple times. All habitats were driven through at least once when access permitted. Where vehicle access was unavailable, the area was walked and searched with binoculars and spotting scope. Just prior to noon on May 19, 2009, a mountain plover was just south of the project area. No further assessment was made of this sighting. The habitat in which this bird was observed, begins in Section 6 and extends south and east nearly to the Luman Ranch. Some of this 1700-2000 acre area is occupied with low density prairie dogs and has a small component of sandy soils. In 2005, a mountain plover was found nesting in Section 6, indicating that at least part of that broad acreage is occupied each year.

Information in the BLM files provides the following information regarding plover sightings near the LRPA. Dr. Mayo Call (BLM avian biologist) took photos of nesting mountain plover in gravelly habitat west of Buffalo Hump and also north of the Luman Rim project in Spring of 1976. Three mountain plover nests were located that day in habitats around Buffalo Hump. Since then, mountain plover have been observed within and all around the Luman Rim project, including observations on a sparsely vegetated greasewood flat a few miles southwest of this project in June 1999, and in spring of 2001, mountain plover were documented in fairly dense, tall grass, seven miles northeast of the Luman Rim project. This was not a nesting bird.

Of the many thousands of acres of mountain plover habitat available in and around the Luman Rim project, perhaps only 20-25 percent has a gravel or sandy component. Habitats of 40 acres or less were only casually checked for the presence of birds, especially if they were a distance from larger acreages of suitable habitat. Fine sands occur within an area of suitable habitat outside of the project to the west. This area is also sparsely populated with prairie dogs on slopes falling between 0 and 12 percent. No plover were observed here during an early morning survey, but they are known to have nested here in the recent past. Another large area of suitable habitat between Buffalo Hump and the project was not surveyed in 2009, but has been recently occupied by mountain plover (Greystone 2003). Soils in the Buffalo Hump habitat area vary from clay, sandy clay to moderately coarse gravel and extend east and northeast for several miles (Figure 3.11). Prairie dogs occupy a portion of that habitat. Since the species is known to occupy habitat in and around the Luman Rim project, it is anticipated that some birds will be found here each year through the nesting and brood rearing season.

The FWS is currently re-evaluating their September 2003 decision to withdraw the proposed rule to list the species as a threatened species (FWS 2010e); therefore this species is currently considered proposed for listing under the ESA.

Figure 3.11 – Mountain Plover Habitat in the Luman Rim Area



3.9.5 BLM Sensitive Wildlife and Fish

The assessment area for sensitive wildlife species is the LRPA boundary. The BLM Wyoming sensitive species and management policy (BLM 2010) emphasizes planning, management, and monitoring of sensitive species and directs management of these species to avoid or minimize adverse impacts. It is not the intent of the policy to create severe restrictions on activities such that other multiple use activities cannot occur. The policy goals of this policy are to:

- Maintain vulnerable species and habitat components in functional BLM ecosystems
- Ensure sensitive species are considered in land management decisions
- Prevent the need for species listing under the Endangered Species Act 1973
- Prioritize needed conservation work with an emphasis on habitat.

Twelve special-concern species of wildlife occur or potentially occur in the project area (Table 3.7). They are the Wyoming pocket gopher, pygmy rabbit, white-tailed prairie dog, swift fox, ferruginous hawk, Greater Sage-grouse, burrowing owl, sage thrasher, loggerhead shrike, Brewer’s sparrow, sage sparrow, and Great Basin spadefoot toad. Because of changes in census techniques, it has been determined that the dwarf shrew (*Sorex nanus*) is not as rare as once believed and has been dropped from the BLM Wyoming Sensitive list (BLM 2010) and will not be further addressed in this document. Table 3-7 describes the potential habitats of the analysis area.

Table 3.7 – BLM Sensitive Wildlife Species

Common Name	Scientific Name	Habitat
Mammals		
Long-eared myotis	<i>Myotis evotis</i>	Conifer and deciduous forests, caves, and mines
Fringed myotis	<i>Myotis thysanodes</i>	Elevations less than 7,500 feet in forests and shrublands
Spotted bat	<i>Euderma maculatum</i>	Desert and coniferous habitats
Townsend’s big-eared bat	<i>Corynorhinus townsendii</i>	Coniferous forest; desert shrubland
Pygmy rabbit	<i>Brachylagus idahoensis</i>	Dense sagebrush
White-tailed prairie dog	<i>Cynomys leucurus</i>	Plains
Wyoming pocket gopher	<i>Thomomys clusius</i>	Dry ridge tops; gravelly, loose soil; greasewood
Idaho pocket gopher	<i>Thomomys idahoensis</i>	Stony, shallow soil
Swift fox	<i>Vulpes velox</i>	Shortgrass prairie
Avian		
Bald eagle	<i>Haliaeetus leucocephalus</i>	coniferous forests, cottonwood/riparian near large lakes and rivers. Forages in open habitats during the winter
Ferruginous hawk	<i>Buteo regalis</i>	Basin-prairie shrub, grassland, rock outcrops
Northern Goshawk	<i>Accipter gentilis</i>	Conifer and deciduous forests

Common Name	Scientific Name	Habitat
Peregrine falcon	<i>Falco peregrinus</i>	Tall cliffs
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	Basin-prairie shrub, mountain-foothill shrub
Long-billed curlew	<i>Numenius americanus</i>	Grasslands, plains, foothills, wet meadows
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Open woodlands, streamside willow and alder groves
Burrowing owl	<i>Athene cunicularia</i>	Grasslands, basin-prairie shrub
Sage thrasher	<i>Oreoscoptes montanus</i>	Basin-prairie shrub, mountain-foothill shrub
Loggerhead shrike	<i>Lanius ludovicianus</i>	Basin-prairie shrub, mountain-foothill shrub
Brewer's sparrow	<i>Spizella breweri</i>	Basin-prairie shrub
Sage sparrow	<i>Amphispiza billineata</i>	Basin-prairie shrub, mountain-foothill shrub
Trumpeter swan	<i>Cygnus buccinator</i>	Lakes, ponds and rivers
White-faced ibis	<i>Plegadis chihi</i>	Marshes, wet meadows
Reptiles		
Midget faded rattlesnake	<i>Crotalus viridis</i>	Mountain foothills shrub, rock outcrop
Amphibians		
Great Basin spadefoot toad	<i>Spea intermontana</i>	Springs; seeps; permanent and, temporary waters
Northern leopard frog	<i>Rana pipiens</i>	Beaver ponds, permanent water in plains and foothills
Columbian spotted frog	<i>Rana luteiventris</i>	Ponds, sloughs, and small streams in foothills and montane zones.

Source: BLM 2010.

Wyoming Pocket Gopher (*Thomomys clusius*) is restricted to a portion of southcentral Wyoming (Clark and Stromberg 1987, WYNDD 2010), probably extending slightly into northern Colorado. Little is known regarding Wyoming pocket gophers; much of their life history is assumed similar to that of the northern pocket gopher (*T. talpoides*). Wyoming pocket gophers are small, with fur that has a distinctive yellow cast, and may prefer to occupy dry and gravelly ridge tops, as opposed to the valley bottoms with deeper soils that are typically associated with *T. talpoides* (Clark and Stromberg 1987). Due to soil type constraints, the Wyoming pocket gopher is not likely in the Luman Rim project area; further, the WYNDD December 2010 Draft Model of Possible *Thomomys clusius* Distribution indicates that the majority of the LRPA consists of mostly low probability habitat with some areas of medium and high probability habitat (WYNDD 2010).

In April 2010, the FWS announced a determination that the Wyoming Pocket Gopher was not warranted for listing under the Endangered Species Act, and discussed in potential impacts from energy development, including oil and gas development, as, “We have no information that additional energy

development activity will fragment habitat in a way that will significantly limit dispersal, movement, or genetic interchange. Using the best available information, we conclude that these habitat alterations do not constitute a threat to the Wyoming pocket gopher now or in the foreseeable future” (FWS 21010a). This species will not be discussed further in this document.

Pygmy Rabbit (*Brachylagus idahoensis*) digs its own burrows and is typically distributed in dense stands of big sagebrush growing in deep loose soils. Big sagebrush dominates their diet throughout the year, but the relative proportion varies by season, with more consumed during winter than other seasons. Grasses and forbs constitute the remainder of their diet. The density and height of sagebrush requirements for pygmy rabbits vary and they may be found in mixed sagebrush/rabbit brush communities or sagebrush/saltbush mixed communities. Such habitat is somewhat limited in the project area. Sightings of the rabbit have occurred just south and east of Steamboat Mountain and north of Interstate 80 along Smiley Draw.

Luman Rim pygmy rabbit surveys entailed map assessment of sagebrush habitats which generally meet requirements of the rabbit (Figure 3.12). Both expansive acreages of big sagebrush and small acreages in swales and behind sand hummocks were evaluated. Luman Rim has no alluvial fans with big sage as suggested in pygmy rabbit survey protocol in which to begin investigations. The following map indicates suitable pygmy rabbit habitats which were evaluated for presence of the species. A general search for this species in 2008 did not locate evidence of pygmy rabbits in the project area. During the 2009 survey, pygmy rabbit pellets of recent origin and several burrows were found, along with cottontail rabbits and their pellets, in habitat just south of Buffalo Hump and outside the Luman Rim project. Tall sagebrush on the south side of Buffalo Hump and Buffalo Hump Lake were also searched. Numerous other habitats which appeared suitable were surveyed, with no evidence of pygmy rabbit activity being found. The determination of the species in the project area is not definitive. The WYNDD pygmy rabbit distribution model indicates that the species may not currently be present in the LRPA (WYNDD 2004), while the FWS historic distribution map indicates the species may have been present in the project area historically (FWS 2010b). In September 2010, the FWS announced a determination that the species does not warrant protection under the Endangered Species Act. The Service acknowledged that the species continues to inhabit areas of disturbance, stating, “Despite the loss and modification of sagebrush habitat across the pygmy rabbit’s range, the species continues to occur in areas where these various activities are present across the landscape” (FWS 2010c). This species will not be discussed further in this document.

White-Tailed Prairie Dog (*Cynomys leucurus*) is a rodent which typically lives in towns or colonies established in short grass and sage steppe habitat. This special status species is present in the project area. In June 2010 the FWS announced a determination that the white-tailed prairie dog did not warrant protection under the Endangered Species Act, noting, “We know that white-tailed prairie dog colonies exist in areas with long-term oil and gas development. Some of the largest and most robust colonies are located near areas of intense oil and gas development” (FWS 2010d). Refer to Figure 3.9 and the previous discussion on black-footed ferrets (3.9.4) for information about this species.

Swift Fox (*Vulpes velox*) is a housecat size fox usually found in short grass and mid-grass prairies. It prefers to build its dens near ridge tops situated with broad views. Their prey includes small rodents, rabbits, birds, eggs, and a variety of small prey including insects. This species has been studied in Wyoming by Cutter, Olson and Woolley and found to be more widely distributed than previously thought. Woolley’s studies documented their occurrence in northeastern Sweetwater County. Swift fox has the potential to occupy the project area (WYNDD 2003).

Ferruginous Hawks (*Buteo regalis*) are raptors found in sagebrush, juniper, and cliff habitats. This species is a common desert dweller which nests on anything from a windmill, juniper tree, barren hilltop, or artificial nest structure. They presently nest on the John Hay Reservoir catwalk north of the project

area, on a rock outcrop within the project area, and on Luman Rim (Figure 3.8). A one-mile radius from the nest is protected from human activity during the nesting and fledgling rearing season (GRRMP identifies the period between February 1 and July 31). This buffer is established because the nest is often placed where the bird has a wide vista. In southwestern Wyoming, hatchlings are usually off the nest by the first of July.

Greater Sage-Grouse (*Centrocercus urophasianus*) are a common shrub steppe inhabitant and a popular game species. See the Section 3.9.4 for a detailed discussion of this species.

Burrowing Owls (*Athene cunicularia*) Nesting pairs of this species are most often associated with prairie dog colonies where they live in abandoned burrows. They are also found nesting in ground squirrel or badger holes and along roadways. Burrowing owls have been sighted within the project area and in suitable habitats outside the area. This species is known to nest in a prairie dog colony south of John Hay Reservoir, a prairie dog colony west of Brannon Reservoir, and in a ground squirrel hole near Chalk Buttes.

Sage Thrashers (*Oreoscoptes montanus*) are common migratory sagebrush obligate passerines. About the size of a robin, this mottled brown bird prefers sagebrush and greasewood communities for nesting and breeding. They commonly feed on seeds and berries, especially buffaloberry, currant, and chokecherry. The species does occur within the project area.

Loggerhead Shrike (*Lanius ludovicianus*) are found on the project area from early spring until they migrate south to Mexico and Central America in the fall. This black and white bird is slightly smaller than a robin and is often classified with raptors. Their prey includes songbirds, grasshoppers, crickets, beetles and even small mice. This species often impales their prey on cactus thorns, barbed wire, or greasewood thorns. They are known to nest near Luman Butte.

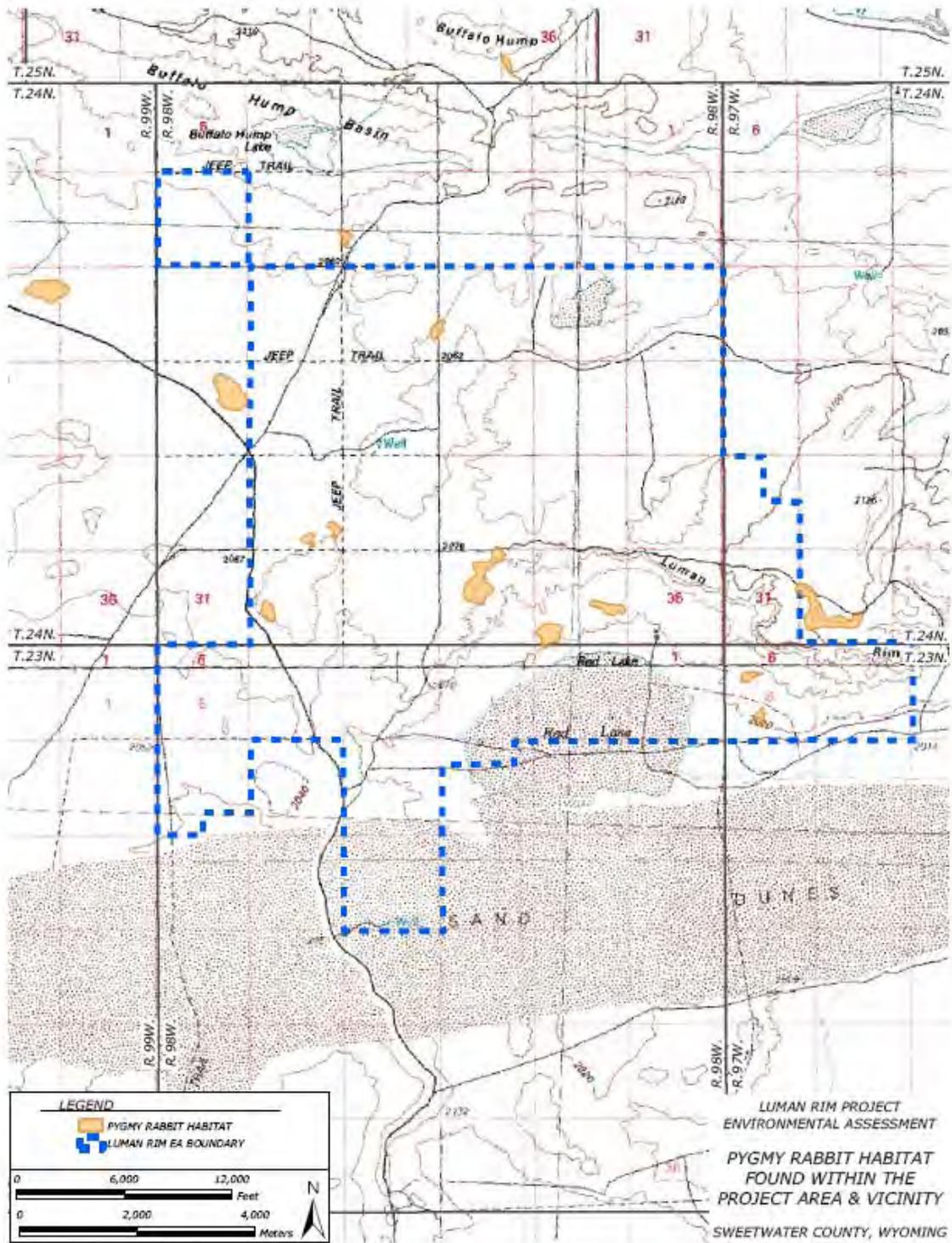
Brewer's Sparrow (*Spizella breweri*) and the **Sage Sparrow** (*Amphispiza belli*) are both sagebrush obligate species and likely occur in the project area. Both nest on or near the ground and feed on seeds and small insects. The Brewer's sparrow is commonly seen in the project area, while the Sage sparrow is found more often near the John Hay Reservoir.

Great Basin Spadefoot Toad (*Spea intermontana*) is a small toad-like frog that has a spade-like growth on its hind feet to dig a burrow in sand or mud. This family of amphibians is distinguished from true toads by their cat-like eyes and teeth in the upper mouth. Like other amphibians, they must live near a water body, even if the water is seasonal, for successful reproduction. They are commonly found in wetlands associated with flowing wells, along Brannon Reservoir and at the east end of Red Lake. With no perennial water and little ephemeral water sources, it is unlikely that the Great Basin spadefoot toad would be found in the Luman Rim Project.

3.9.6 Migratory Birds

Numerous sagebrush obligate species of passerine birds migrate through, nest and raise their young within the project area. Among the several hundred species of birds known to occur in the Great Divide Basin some are species of high federal concern. Sage thrasher, Brewer's sparrow, sage sparrow, mountain plover and loggerhead shrike are seen here during the spring. Other common birds include western bluebird, vesper sparrow, white-crowned sparrow, green-tailed towhee and horned larks.

Figure 3.12 – Suitable Pygmy Rabbit Habitat in Luman Rim Project Area



3.10 WILD HORSES

The Great Divide Basin herd management area (HMA) encompasses 778,915 acres, of which 562,702 acres are BLM-administered public lands. The management area is located 40 miles east of Rock Springs, to the Rawlins/Rock Springs field office boundary, west to the Continental Divide, and north of I-80 to just south of South Pass City. The northern portion of the herd management area consists primarily of consolidated public lands with state school sections and small parcels of private land making up the remaining lands. The southern portion is in the checkerboard land ownership area created by the Union Pacific Railroad grant (BLM 2006b).

The appropriate management level (AML) for this herd management area (HMA) is 500 horses, ranging from 415 to 600 head. Most horses are bay, sorrel, black, brown, paint, buckskin, or gray, but many colors and combinations are present. The Wyoming horses have a diverse background of many domestic horse breeds. They are most closely related to North American gaited breeds such as Rocky Mountain Horse, American Saddlebred, Standardbred, and Morgan (BLM 2006b) (Figure 3.13).

Figure 3.13 – Wild Horses near the Luman Rim Project Area



The BLM strives to manage these animals at levels consistent with the AML for the Divide Basin HMA, which would achieve a thriving natural ecological balance. The Green River RMP objectives for management of wild horses are to: 1) protect, maintain, and control viable, healthy herds of wild horses while retaining their free-roaming nature; 2) provide adequate habitat for free-roaming wild horses through management consistent with principles of multiple use and environmental protection; and 3) provide opportunity for the public to view wild horses (BLM 2006b).

Wild horse HMAs were established or confirmed through the Green River RMP planning process and are in conformance with the August 2003 Wyoming Consent Decree pertaining to the management of wild horses on the public lands of Wyoming (BLM 2006b).

3.11 RECREATION

The information presented here is based on a site visit, interviews with agency personnel and information from agency documents, including the GRRMP (BLM 1997).

In 2008, the number of licenses used for three big-game species in the full extent of hunt areas containing the LRPA was 1,273 hunters and 4,785 hunter days (3.7-day average per hunter) in the Steamboat mule deer area; 350 hunters (887 hunter days, a 2.5-day average) in the Red Desert antelope area, and 313 hunters (1,317 hunter-days, 4.2-day average) in the Steamboat elk area. The pooled ratio of resident to non-resident hunting licenses was 8.6 to one in 2008 for the three species hunted in these areas, compared to a pooled statewide ratio of 1.5 to one, indicating the areas provides hunting opportunities to predominantly Wyoming residents. The LRPA contains 21,471.1 acres, which is less than one percent of the 2,563,142-acre Steamboat mule deer area, the 2,181,330-acre Red Desert antelope area and the 2,530,039-acre Steamboat elk area.

Recreation usage inside the LRPA is not available from either the State's hunt data or from the BLM recreation data base, the Recreation Management Information System (RMIS). The BLM previously reported that recreation use in the vicinity of the LRPA, other than hunting, includes rock collecting, camping, hiking, wildlife observation, outdoor photography and picnicking, with wild horses being a particular attraction of the general area (BLM 2003a). The area may also attract very limited numbers of visitors engaged in rock collecting, camping, hiking, wildlife observation, and/or outdoor photography. Data on recreational use are extremely limited, it is expected that overall use levels are generally low and likely associated with area residents.

South of the LRPA, two WSAs support light recreation use, according to the BLM. In 1990, the Red Lake WSA drew fewer than 200 visitor-days per year, allocated between hunting (accounting for about 13 percent) and all other activities, identified as rock collecting, dunes exploration, classes in outdoor education, and camping, with camping accounting for less than one-half of one percent of total use. The BLM reported that in 1990 the Alkali Basin-East Sand Dunes attracted fewer than 75 visitor-days for all types of recreation, hunting included (BLM 1990). The BLM has no information more current than these two reports for the WSAs nearest the LRPA (Figure 2.1).

No developed recreational sites, facilities, or special recreational management areas exist within or near the LRPA. This means that the LRPA is part of the larger area within the RSFO managed as the Extensive Recreation Management Area, the area defined, by default, as the remaining acreage not included in one of the six BLM Special Recreation Management Areas (SRMA) (BLM 1990).

The BLM designated SCR 21 (Bar X Road) – which passes through the LRPA – as “under consideration for Back Country Byway Designation” (BLM 1997). The Bar X Road is 75 miles long, running north from the I-80 Table Rock interchange, 50 miles east of Rock Springs, to Wyoming State Highway 28, 13.5 miles northeast of Farson. Pending a formal implementation plan, the BLM treats the Bar X Road as if it were a back country byway by default (BLM 2008b). Formal implementation of a byway designation typically would include preparation of informational brochures and interpretive signs, potentially increasing recreational use of a designated road.

3.12 VISUAL RESOURCES

The information presented here is based on a site visit, interviews with agency personnel and information from agency documents, including the GRRMP (BLM 1997).

The LRPA, which contains 21,471 acres, is a small part (less than one percent of the acreage) of the larger landscape the BLM calls the RDWMA. As defined by the GRRMP, the RDWMA is approximately 341,000 acres of BLM-administered land uninterrupted by private land.¹ In the RDWMA, the BLM emphasizes protection of visual, watershed, and wildlife and provision of “large areas of unobstructed views” within the overall management framework for all resource values.²

The RDWMA is a sub-area of the Great Divide Basin region. Overall, the Great Divide Basin, including its Red Desert sub-part, is a collection of vast, inwardly drained dry plains. The dominant landscape is rolling, broken by steeper hills and rock outcrops. Larger views encompassing several view sheds are available from high points, taking in vistas of cliffs and mountain ranges in the far distance to the north and northwest. The horizon is an important aspect of all distant views. Reddish brown and buff colors of the badland formations add contrast, and they dominate in areas of steep topography. Vegetation is scattered and low; concentrations of growth follow ground and surface water sources.

Much of the LRPA compares to less rugged sections of the Great Divide Basin. However, the LRPA is broken by Luman Rim, a 200-foot cliff snaking northeasterly on the southern margin of the project area (Figure 3.14).

Figure 3.14 – Luman Rim



The Luman Rim outcrop faces generally southeast. Above the rim, within the LRPA, is a plateau undulating north for about 7 miles to Buffalo Hump Basin and the Buffalo Hump hill. At the foot of the

¹ Uninterrupted BLM administration occurs in the RDWMA because it lies north of the so-called “checkerboard,” where, by contrast, every other square mile of land alternates between BLM and private ownership.

² The management objective for the RDWMA “is to manage for all resource values in the Red Desert area with emphasis on protection of visual resources, watershed values, and wildlife resources and to provide large areas of unobstructed views for enjoyment of scenic qualities. This will be accomplished through facility design and placement and using topography to shield activities, using neutral colors so facilities blend with the landscape, identification of backcountry byways, and providing viewing points for the public” (GRRMP 1997).

Luman Rim wall within the LRPA, lies the Red Lake dry bed, a part of which was excluded from the Red Lake WSA (described below).

The LRPA is not pristine. Evidence of cultural modification in the project area includes improved and unimproved roads, fencing and other structures for grazing, current drilling activity, and oil and gas production facilities.

South of the LRPA, the Red Lake and Alkali-East Sand Dunes (East Sand Dunes) WSAs contain a total of 22,315 acres. The WSAs are part of the Killpecker Dunes, a remnant of the larger Red Desert landscape that is the largest region of active sand dunes in North America (BLM 1990).³

Bar X Road and one square mile of land owned by the State of Wyoming separate the Red Lake and East Sand Dunes WSAs. Otherwise, the two WSAs adjoin each other and share topography of low dunes with differences in elevation of only about 100 feet. Active dunes without vegetation characterize much of the WSA landscape; stabilized dunes support vegetation of big sagebrush, saltbush, and various grasses and leafy plants.

The Red Lake and East Sand Dunes WSAs (Figure 3.15) meet wilderness criteria, meaning they are in a natural condition with only a few human intrusions, among which are abandoned drilling sites and a shut-in gas well in the East Sand Dunes WSA. In the Final Rock Springs Wilderness EIS (BLM 1990), the BLM proposed no wilderness designation for any of the Red Lake and East Sand Dunes WSAs. Pending Congressional action, the WSAs continue to be managed in accordance with the “Interim Management Policy and Guidelines for Lands Under Wilderness Review.”

Figure 3.15 – Red Lake WSA from Bar-X Road



Generally speaking, casual viewing of the LRPA occurs from area roads that are used seasonally by wild horse enthusiasts, hunters and visitors from out of area who are attracted by “wide open, empty” space (BLM 2008b). Parts of the LRPA can be viewed from Bar X Road, which is the main access to the LRPA. The Bar X Road runs through several sections at the south end of LRPA. Then, after veering northwest, the Bar X Road runs partway up the western boundary of the LRPA before turning northwest again and away from the project area.

³ The name “Killpecker Dunes” also may be used to colloquially refer to the BLM Sand Dunes Off-Road Vehicle Area (ORV area). The ORV area is the eastern one-third of the Greater Sand Dunes ACEC, itself at the western end of the Killpecker Dunes formation and more than 25 miles northwest of the LRPA.

As noted in the Recreation section (3.11), the GRRMP (1997) named the 75-mile-long Bar X Road as “under consideration for Back Country Byway Designation,” referencing it in the GRRMP as the intent to create a “Red Desert backcountry byway.” Pending a formal implementation plan, the RSFO manages the Bar X Road by default as if it were a backcountry byway (BLM 2008b). Formal implementation of a byway designation typically would include preparation of informational brochures and interpretive signs, potentially increasing recreational use of a designated road. Any point along a backcountry byway may potentially be a “key observation point” (KOP) for viewing the surroundings.

The historical interior roads of the LRPA are graded surfaces or off-road tracks developed originally to support grazing and minerals development. There are roads both above the rim and at the foot of the rim. One established road below the rim defines the northern boundary of the Red Lake WSA. This road exits SCR 21 about 3.5 miles north of the intersection with SCR 20 (Luman Road). Renewed interest in oil and gas minerals led to more recent road improvements and extensions for accessing approved and potential development sites. The minerals industry is now the predominant year-round user of roads in the LRPA.

Visible dust clouds as a result of traffic on dirt roads in the LRPA, including the county roads, by oil and gas operations traffic, casual recreational users, hunters and livestock operations contribute to impacts to the visual integrity of the area.

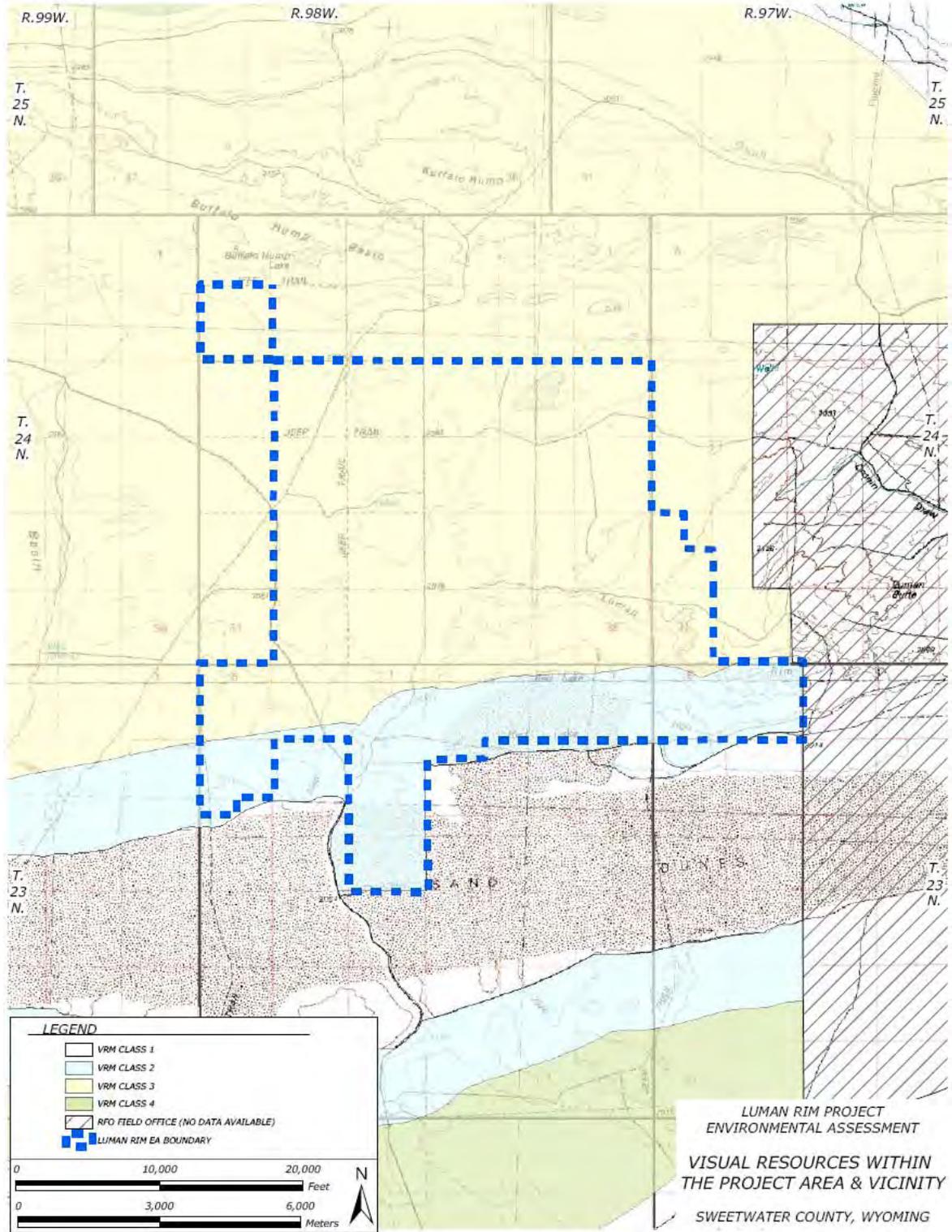
The BLM management objectives for the LRPA and surroundings follow from the BLM visual resource management classification (VRM Class) of the landscape (Figure 3.16). The management objectives and the criteria for design of management activities are stated in the BLM VRM Manual (BLM 1986).

Most of the LRPA, about 16,132 acres, is VRM Class III landscape, where the management objective is to design projects to partially retain [emphases added] the existing character of the natural landscape. Actions on Class III landscape may cause a moderate level of change to the characteristic landscape. The changes may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

A strip about one mile wide that crosses the southern part of the LRPA from east to west, and contains about 5,154 acres, is VRM Class II landscape. In Class II the design objective is to blend into and retain the existing character of the natural landscape. Actions on Class II landscape may cause a low level of change to the characteristic landscape. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Along the southern boundary line, which follows areas covered by project leases, very small pieces of VRM Class I landscape, approximately 75 acres, from the WSAs appear to overlap the LRPA. The objective for Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

Figure 3.16 – Visual Resource Management Designations in Luman Rim Project Area



3.13 CULTURAL RESOURCES

Cultural resources in the proposed project area consist of sites associated with prehistoric and historic time periods. The prehistoric period extends from approximately 12,000 years before present time (B.P.) through 350 B.P. when European cultural items began to arrive in the Red Desert. The area was inhabited by small, mobile groups of hunters and gatherers. Prehistoric cultural remains include scattered lithic debris, stone tools, grinding slabs, evidence of camp sites and occasional burials and house pits.

Historic use of the Red Desert Basin was mainly confined to pastoral activities and mineral extraction. The overall lack of water limited the development of homesteads or ranching. Evidence of sheep herding is scattered across the landscape in the study area.

Previously conducted Class III inventories have covered 1092 acres of the study area. The previous inventories included 66 well pads and access roads, 32 pipelines, two roads, a gravel pit, and a Class II sampling inventory. Twenty-three sites have been documented including five lithic scatters, 12 open camps, three areas of historic debris (one with a prehistoric component), one open camp with a stone ring, and one site that contained human remains. The final site (48SW3867) listed at Cultural Records is simply termed "Indian Trail". Additional inventories are anticipated and will change the number of resources identified.

Site 48SW3867 was entered into the database as part of an effort by Wyoming Recreation Commission to map historic sites. No field work was conducted on these sites and the plot for 48SW3867 was obtained from a Henderson map in the Cheyenne Office (Sutter e-mail communication). The location of the purported trail is unknown and early General Land Office maps do not show this trail in the study area.

Two areas of Native American concern are presently known. Although the Tribes did not respond to the BLM request for public input during scoping, the BLM would consult with affected Tribes to elicit concerns and resolve mitigation issues prior to ground disturbing activities.

The prehistoric sites consist of lithic scatters and camp sites with features. Diagnostic artifacts recovered in the study area date to the Late Prehistoric and Archaic time period. Although no Paleo Indian period artifacts have been recovered, the playa lakes in this area are known to contain evidence of early utilization dating to this time period. A number of the previously recorded sites in this area contain ground stone implements indicating that plant processing occurred along with other hunter-gatherer activities.

Although no sites in the study area have been subject to data recovery excavations, one of the premier archaeological sites discovered in the Red Desert Basin is located to the north of Luman Rim. The Buffalo Hump site (48SW5057) was excavated by Archaeological Services of Western Wyoming College in 1985 and 1986 (Harrell 1989). The multicomponent site revealed evidence of prehistoric occupation that spanned a 2000 year period during the Late Archaic and Late Prehistoric periods. Evidence of intensive seed gathering and processing at this site, along with the occurrence of ground stone in other previously recorded sites, indicate this area was the scene of these prehistoric activities.

3.14 SOCIOECONOMICS

The LRPA lies wholly within Sweetwater County. The geographic area of analysis for socioeconomic effects includes eastern Sweetwater County and western Carbon County, focusing on the LRPA and the Sweetwater County communities of Rock Springs and Wamsutter and the Carbon County community of Rawlins.

Population and Employment Demographics

Like Wyoming in general, Sweetwater and Carbon counties are in a period of economic decline, in response to an overall down turn in oil and gas development. This follows closely on the heels of an energy “boom” that ended in 2009. Oil and gas drilling in Sweetwater County increased by over 400% percent between 2000 and 2007, from 120 well starts in 2000 to 506 in 2007. Well starts in Carbon County increased by even more (463%) over the seven-year period, from 69 in 2000 to 320 in 2007 (WOGCC 2010) but declined 55% to 228 and 75% to 84, respectively, in 2009. As of July 8, 2010, 17 wells have been “spudded” in Carbon County while 212 have been started in Sweetwater County. These rates are comparable to 2003. Rock Springs has become a regional service center for the natural gas industry in southwestern Wyoming, Rawlins hosts a number of regional offices for gas companies and gas field service providers and Wamsutter hosts a large BP America field operations center and field offices and equipment yards for a number of gas field service companies. The reduction in numbers of wells spudded has a direct correlation to the employment rates of the respective Counties as well as the tax base associated with continued oil and gas production rates.

According to the U.S. Bureau of Economic Analysis, total Sweetwater County full and part-time employment increased from 24,249 in 2000 to 32,126 in 2008 (the latest date that this statistic is available), a 32 percent increase over the eight year period. Carbon County employment increased from 9,666 to 11,340 during the same period, a 17 percent increase (BEA 2010). These statistics do not reflect the 2009 economic downturn and the accompanying loss of employment opportunities. The Wyoming Department of Employment estimates total employment in Sweetwater County at 24,210 in March 2010 while Carbon County employment dropped to 8,320 (WDE 2010). Average annual unemployment for Sweetwater County was a record low of 2.4 percent during 2007. Carbon County average annual unemployment was 3.1 percent during 2007, slightly higher than the 2007 Wyoming statewide average of 3.0 percent, but substantially lower than the 2007 rate of 4.6 percent for the nation as a whole (WDE 2008). The Wyoming Department of Employment (WDE 2010) estimates the 2009 unemployment rates in Carbon and Sweetwater counties at 7.3% and 6.5% respectively, compared to the statewide rate of 7.7%.

The U.S. Census Bureau estimates that Sweetwater County population grew from 37,613 in 2000 to 39,305 in 2007, a 4.5 percent increase over the seven year period. In contrast, the Sweetwater Economic Development Association (SWEDA) estimates that county population grew to 42,296 at the end of December 2006, based on residential electric accounts. The Census Bureau estimates that Rock Springs grew from 18,589 in 2000 to 19,659 in 2007, a 5.8 percent increase. SWEDA estimates that Rock Springs grew by 19 percent to 22,209 by the end of December 2006. Similarly, the Census Bureau estimated that Wamsutter grew from 260 in 2000 to 266 in 2007, a 2.3 percent increase, while SWEDA estimated that Wamsutter grew to 609 in 2007, a 134 percent increase (U.S. Census Bureau 2008b, SWEDA 2008). SWEDA (2010) estimates the population of Sweetwater County was 45,021 by the first quarter of 2009; 64% of which resides in Rock Springs.

The Census Bureau estimates that Carbon County lost population between 2000 and 2007, decreasing from 15,639 to 15,486, about a one percent decrease. According to the Census Bureau, Rawlins population also decreased, from 8,969 in 2000 to 8,685 in 2007 for a loss of 3 percent, but Rawlins officials believe that the community actually grew substantially during this period (Rawlins Daily Times 2008).

The population growth in Rock Springs, Wamsutter and Rawlins absorbed most of the rental housing units and affordable housing units for sale. Rotating crews of natural gas drilling and field development workers resorted to temporary quarters such as motels, recreational vehicle (RV) parks and company provided temporary living quarters such as “man camps.” Housing starts increased dramatically, several apartment complexes and new motels were built in Rock Springs and Rawlins to house the continual

inflow of oil and gas and service company personnel. As a result of the 2009 economic downturn and the cooling of the natural gas industry the housing picture has changed completely in southwestern and south central Wyoming, there is currently an abundance of houses for sale, empty rental units and vacancies in many hotels. Housing foreclosures are increasing.

Public Services

The nearest law enforcement and emergency response services to the LRPA are located in Wamsutter, approximately 45 to 50 miles to the southeast. Memorial Hospital of Sweetwater County, located in Rock Springs 75 to 80 miles to the southwest, is an accredited Area Trauma Hospital.

Economic Diversity

Sweetwater and Carbon counties are heavily reliant on the minerals industries for their tax base, not only the oil and gas industry which account for over one third of the tax base of Sweetwater County (SWEDFA 2010) but also coal and trona mining. In addition to minerals, other economic activities that occur within and near the LRPA are livestock grazing (see Section 3.8) and outdoor recreation, principally hunting, wildlife watching and sightseeing (see Section 3.11). Wind energy project planning and development are increasing in southwestern Wyoming.

Although there is widespread support for natural gas development in communities near the study area, the health of public lands and the protection of wildlife and wildlife habitat are also very important to many residents (Blevins, et al. 2004; BLM 2003a; BLM 2006c).

Environmental Justice

Executive Order 12898, “Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations” (59FR7629) requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level).

The assessment of potential environmental justice impacts is guided by the Council on Environmental Quality’s *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). Determination of Environmental Justice impacts requires three steps: (1) a description of the geographic distribution of low-income and minority populations in the affected area; (2) an assessment of whether the action under consideration would produce impacts that are high and adverse; and (3) if impacts are high and adverse, a determination as to whether these impacts would disproportionately affect minority and low-income populations.

The LRPA and areas immediately adjacent are uninhabited. According to the 2000 census, minority populations in eastern Sweetwater County and western Carbon County were not meaningfully higher than the statewide minority population. Eastern Sweetwater County had a substantially lower percentage of poverty than the statewide average. Western Carbon County had a somewhat higher percentage (5.6 percent) of persons in poverty compared to the statewide average; however, this higher percentage is attributable to the presence of the state penitentiary.

3.15 TRANSPORTATION

Access to the LRPA is provided by US Interstate Highway 80 (I-80) and SCR 21. Annual average daily traffic (AADT) east bound at the intersection of I-80 and Bar X Road was 6,610 (3,570 or 54 percent trucks) during 2007 a two percent increase in total traffic and three percent increase in truck traffic over 2006 levels; westbound 2007 AADT was 6,090 (3,320 or 55 percent trucks), a three percent increase in

total traffic and four percent increase in trucks over 2006 AADT (WYDOT 2007). It is expected that traffic totals declined in 2009-2010 due to the downturn in gas development activity.

SCR 21 is a 20-foot wide road that is graveled for 7 miles and dirt/native material for about 66 miles of its 73-mile length (Sweetwater County 2006). The southern part of SCR 21 is heavily used by oil and gas traffic. Grazing operators, hunters, other recreationists also use the road, but this use is light and seasonal (Sweetwater County 2008).

Although SCR 20, intersects with SCR 21 south of the LRPA and provides access east to SCR 67 (Tipton North Road) which intersects with I-80 at Tipton. The greater distance from I-80 would discourage use of this road for access to the LRPA for all but contractors and vendors who may be traveling to the LRPA from work at other gas field locations to the east.

Gravel is scarce in eastern Sweetwater County and it is difficult to maintain gravel on the SCR 21 roadway, particularly after spring rains. The road becomes impassable in stretches after major storm events and, although the Sweetwater County Road and Bridge Department plows the road during winter, the Department's primary responsibility is to clear roads that provide access to residences and businesses, so snow removal on SCR 21 may be delayed during and after major snowstorms. In some areas oil and gas Operators contract for private snow removal on County roads providing access to leases, however, private snow removal contractors must obtain a permit from the County. Dust is a safety concern throughout the eastern portion of the county (Sweetwater County 2008).

A number of unnamed roads, two-tracks and Operator roads provide access within the LRPA. Of these, only roads providing access to wells and ancillary facilities are improved and maintained.

3.16 HEALTH AND SAFETY

Existing health and safety concerns in and adjacent to the project area include occupational hazards associated with natural gas exploration and operations; risk associated with vehicular travel on improved and unimproved roads; and low probability events such as landslides, flash floods, and range fires.

3.16.1 Occupational Health and Safety

Health and safety risks arising from current natural gas operations in the Luman Rim project area could affect the general public and persons working in the oil and gas industry. These risks include oil and gas occupational hazards, the operation of vehicles on improved and unimproved roads, natural gas pipeline operations, winter driving and working conditions, hunting related firearms accidents, collisions with livestock and big game, and natural hazards associated with wild fires, flash floods or winter blizzards.

Health and safety concerns within the existing Luman Rim field are primarily the occupational hazards associated with the oil and gas development and production activities. Operators and service companies working within the field are governed by the State of Wyoming Department of Employment Workers Occupational Health and Safety Administration (WOSHA) program. WOSHA has adopted the federal Occupational Health and Safety Administration (OSHA) general construction program rules and regulations and has special rules for oil and gas well drilling, well servicing and well special servicing operations.

The project workforce can be divided into two groups: those associated with drilling and completion activities and those involved in production operations. Drilling services employment categories had a non-fatal accident rate of 6.8 per 100 employees in 2004 compared to the operations support category non-fatal accident rate of 2.7 in the same year (U.S. Department of Labor 2007). Due to the high level of

accidents (greater than 3 LWDII [lost work day injuries and illness]) experienced in these occupations, Oil and Gas Well Drilling is one of the OSHA target industries in a cooperative effort between OSHA and industry partners to reduce accident and fatality rates. By comparison the LWDII rate associated with natural gas production and distribution was 1.0 in 2004 (OSHA2005) while all private industry work places reported a LWDII injury rate of 4.8 per 100 employees in 2004.

Natural gas gathering and transmission operations currently take place in and around the project area. Most natural gas transmission and gathering pipeline operations are regulated by the federal Office of Pipeline Safety (OPS). In 2006 there were 141 natural gas transmission line accidents reported nationwide, resulting in 3 fatalities and 4 injuries (OPS 2008). The OPS regulations require stringent system maintenance programs, emergency response planning, risk management planning, and individual personnel operations and maintenance training for each natural gas pipeline system.

3.16.2 Public Health and Safety

The LRPA is attractive to local residents as a recreation area for such pursuits as bird and big game hunting, rock hounding, and seeking solitude. The area is also home for scattered rural families and their ranching operations.

The roads within the project area see a wide variety of use. BLM and county roads have historically been built to the appropriate standards for the anticipated use, as have the private roads in the area. Roads to individual well sites are dirt, single lane access roads used primarily by site workers but may be accessed by bird and big game hunters. In an effort to protect their employees, as well as the public, the participating companies have safe driving policies in place. The project area is accessed via Interstate Highway I-80. This very high volume interstate highway provides access to the project area for contractors, drilling crews, production personnel and the general public. This topic is more fully discussed in the Transportation section (3.15).

The United States Department of Transportation (USDOT) regulates some aspects of gas-gathering and transmission pipelines operated in the field and beyond. USDOT regulations also address the safe transportation of hazardous materials (i.e., condensate, crude oil, methanol, drilling mud chemicals, etc) on the national roads and highways. The gas produced in the LRPA is generally “sweet,” meaning it does not contain hydrogen sulfide (H₂S), and therefore it does not pose a H₂S hazard to the general public or site workers.

Pipeline and site construction fire-prevention measures are in place during the summer construction season. These include using equipment with spark arrestors, welding in cleared areas only, and the ready availability of fire extinguishers or water trucks in the event fire occurs. The BLM requires, and companies implement, extra precautions in the event of drought or high fire danger.

Local and state emergency responders are annually provided information regarding the location and nature of hazardous materials that are held in quantities in excess of their regulatory threshold planning quantity or 10,000 pounds, whichever is greater. These notifications are required of all participating companies and their contractors under the Community Right-to-Know Laws (40 CFR 355 and 370, as amended). The participating companies each have emergency response plan as well as the trained personnel and equipment needed to respond to releases of hazardous materials or other hazardous conditions in the project area.

3.16.3 Other Risks and Hazards

Potential for firearm-related accidents would occur primarily during hunting season. No data were available to estimate or discuss likelihood of risk for gas field workers to be injured by hunters. Risk of fire in the project area could occur but is expected to have a low potential.

3.17 HAZARDOUS MATERIALS/WASTE MANAGEMENT

3.17.1 Waste Management

There are no known hazardous waste sites within the analysis area. There are a number of permitted solid or hazardous waste sites in southwestern Wyoming identified in the Wyoming Department of Environmental Quality (WDEQ) Solid and Hazardous Waste Division database (WDEQ 2006). These range from historic landfills located in small towns, such as Wamsutter, to active disposal facilities for specific gas field operational areas.

Reserve pits from oil and gas exploration and development activities are buried adjacent to each existing and plugged well as is the industry standard. These wastes are classified by the EPA as exempt non-hazardous and are not regulated in the Resource Conservation and Recovery Act (RCRA) (40 CFR 261.4). The disposal of these materials is regulated by the WOGCC and the BLM.

The management of non-exempt hazardous and non-hazardous (solid) wastes is regulated under the RCRA (40 CFR 260-268) while the management of releases of hazardous materials into the environment is regulated under Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA) (40 CFR 300-374). Generally, oil and gas exploration (i.e., reserve pits), production and gas gathering and processing wastes and releases of hazardous materials into the environment are considered to the RCRA exempt and are variously regulated by the WDEQ, the WOGCC and the BLM. Buried materials may also be present in association with historic homestead locations. Non-hazardous solid wastes generated from operations are generally hauled to municipal landfills in Rawlins and Rock Springs.

Areas that are particularly vulnerable to the release of hazardous materials include wetlands, water bodies, areas of shallow ground water and areas where wildlife and humans could be directly impacted. To enhance protection of these vulnerable areas companies must comply with the applicable provisions of Spill Prevention Countermeasure and Control (SPCC) regulations of EPA found at 40 CFR 112. These regulations require secondary containment for mobile and non-mobile equipment that contains oil in volumes greater than 1,320 gallons that could impact navigable waters of the United States in the event the material was released. This rule applies to drilling operations and production activities within the project area.

Sanitary wastes are disposed in portable toilets for long-term construction, drilling and completion operations; these wastes are hauled to municipal sewage treatment plants for disposal.

Produced water within the project area is currently managed through the use of commercially permitted evaporation ponds and injection/disposal wells. These facilities have been permitted by the WOGCC, the WDEQ and the BLM. The specific permitting mechanism depends on facility ownership, source of produced water and location.

3.17.2 Hazardous Materials Management

Hazardous materials are used in drilling, field development, construction, completion and production operations. BLM Instruction Memoranda WY-94-081 and WY-94-059 and Information Bulletin WY-97-011 require that NEPA documents list and describe any hazardous or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed project. This compilation for the Luman Rim project can be found in Appendix D, Hazardous Materials Summary. Operators are encouraged to substitute less toxic, yet equally effective, products when available (USDOJ-USDA 2007) in all phases of operations. Substitutions are not always available; therefore, it is acknowledged that hazardous materials may be used in the LRPA.

The Operators have a responsibility to comply with the state and federal regulations applicable to their operations. Documents regarding spill response planning, Community Right-to-Know reports, SPCC Plans, etc., are maintained by the companies.

3.17.3 Hazardous Materials Releases and Spill Response

The participating companies have trained personnel and/or contractors as well as the equipment needed to respond to releases of hazardous materials in the project area. Wells in the LRPA are completed in a number of different hydrocarbon reservoirs and produce a variety of fluids including condensate, natural gas and water. The opportunity exists for the release to the environment of these produced fluids as well as materials brought in for operations such as fuel, lube oils, mud products, and completion fluids. Releases of materials are reported to state and federal regulators as required. BLM NTL-3A is the appropriate mechanism for reporting spills, accidents, blowouts or other undesirable events that occur from federal minerals or on BLM-managed surface; otherwise, spills of hydrocarbon and hazardous materials are reported to WDEQ and WOGCC. Remediation of contaminated soils or off-site disposal of contaminated material is approved by the BLM prior to the management action. Participating companies must comply with the applicable provisions of SPCC regulations. These regulations require secondary containment for mobile and non-mobile equipment that contains oil in volumes greater than 1,320 gallons that could impact navigable waters of the United States in the event the material is released. This rule applies to drilling and production operations and other activities within the LRPA. The operators have prepared contingency plans.

3.18 NOISE

The project area is located in an unpopulated rural setting having modest sound disturbances. The principal sound source within the project area is the wind. Jet aircraft overflights at high altitudes, localized vehicular traffic on county, BLM and two-track roads in the project area and nearby drilling and natural gas production activities also cause sound disturbances within the analysis area.

The EPA has established a 55 A-weighted decibels (dBA) standard for acceptable environmental noise. Noise levels greater than 55 dBA may disturb local residents and recreators and could displace area wildlife. The degree of disturbance depends on the receptor's distance from the source, noise intensity and duration, as well as the sensitivity of the receptor. Median noise levels for the proposed project area likely range from 20 to 40 dBA in the morning and evening and from 50 to 60 dBA in the afternoon when wind speeds are typically greatest. These levels correspond to noise levels of a soft whisper (30 dBA), a library (40 dBA), a quiet office (50 dBA), a small town (40 - 50 dBA), and a normal conversation (60 dBA). Traffic along the interstate typically averages noise levels greater than 70 dBA (BLM 2005b).

Noise related to ongoing energy development activities may exceed 70 dBA within close proximity to the equipment or operation in question. The BLM measured various aspects of development operations in the

Jonah Field in western Wyoming and found flaring activities to be the loudest source of noise followed by drilling operations and compression. At 0.25 miles from the activity, noise was reduced to below the 55dBA level (BLM 2006a). Mitigation measures such as flowback separators on high intensity flaring operations aid in reducing noise to acceptable levels. No site specific noise data are available for the project area; but it is assumed that ambient noise levels within the area to be 30 to 40 dBA. The project area is subject to frequent strong winds which may add 5 to 10 dBA to normal ambient levels. Locally higher noise levels may be experienced proximal to operating drilling and completion operations.

Noise sensitive areas would include Greater Sage-grouse habitats used during breeding and nesting seasons and occupied raptor nests. No noise standards have been established by the State of Wyoming or the affected counties.

CHAPTER 4.0 - ENVIRONMENTAL EFFECTS

4.0 INTRODUCTION

This chapter provides an analysis of the potential environmental consequences that could result from implementation of the proposed Luman Rim Project for development of federal minerals associated with 54 additional federal conventional natural gas well locations, access roads and associated facilities. Two alternatives including the Proposed Action and the No Action (denial of Proposed Action) are analyzed. The Supplemental Authorities identified in Chapter 1 will be addressed as appropriate in the following discussion of the Environmental Effects.

Impact significance criteria are presented for each affected resource. The criteria are based on the Green River Resource Management Plan, current regulatory standards, scientific and environmental documentation, or professional judgment.

The analysis of the potential environmental consequences addresses the direct, indirect and residual effects as a result of implementing the Alternatives are discussed in Section 4.1. The Cumulative Effects Analysis for the Luman Rim Project is found in Section 4.2.

4.1 DIRECT AND INDIRECT EFFECTS, MITIGATION MEASURES AND RESIDUAL EFFECTS

Measures proposed by the applicant that would avoid or reduce impacts have been identified in Chapter 2, Section 2.1.8. The following impact assessment takes these measures into consideration. Any additional opportunities to mitigate impacts, beyond the practices committed to in Chapter 2, are presented in this chapter under the mitigation summary for each resource. Such measures are designed to further reduce or avoid unnecessary or undue impacts. Best Management Practices (BMPs) and mitigation measures are developed based on BLM requirements and on compensation for potential impacts to the natural and physical or the relationship between people and that environment. The BLM Standard Stipulations, Best Management Practices and Mitigation Requirements for Luman Rim are found in Appendix E.

Residual effects are those impacts, if any, which remain after the application of the listed mitigation measures.

4.1.1 Geology and Minerals

Standards for determining significance thresholds for geology or minerals have not been established.

Disturbance of the sand dune areas could be considered an impact if loss of vegetation or destruction of facilities or roads occur.

4.1.1.1 Proposed Action Direct and Indirect Effects

No direct or indirect impacts are anticipated on the geology and minerals from the proposed action in the LRPA. No landslide or seismic areas occur in the analysis area. Drilling of the wells in the LRPA may result in commercial oil and gas production which might lead to additional exploration and development of the oil and gas resource. Full field development will require new and additional analysis necessary for defining the field and determining the location of additional wells, as discussed in Chapter 2. Development could cause the depletion of the oil and gas resources. If the drilling fails to prove

commercial oil and gas production, then additional drilling would not occur. No other known mineral resources are known in the LRPA.

4.1.1.1.1 Mitigation Measures

Operator committed mitigation and practices, as well as standard BLM mitigation and lease stipulations, would avoid impacts to the surface geology (see Chapter 2). Erosion in the sand dune areas would be avoided or minimized by these mitigations and practices. Avoiding construction in the surface sodium sulfate areas, such as the Red Lake area, will offset excessive wind erosion. Rules and regulations by the BLM and the WOGCC govern the drilling of wells and installation of surface facilities which will reduce the potential erosional effects in the playa mineralized areas; a more detailed discussion of surface materials impacts can be found in the Section 4.1.4, Soils. Application of applicable and appropriate WOGCC and BLM subsurface construction standards will preclude impacts to the subsurface water and minerals resources.

4.1.1.1.2 Residual Effects

Depletion of the oil and gas resources could be considered a residual effect.

4.1.1.2 No Action Alternative

Oil and gas leaseholders, under the No Action Alternative, would be denied their rights for exploration or drilling on the federal mineral estate. The No Action Alternative would not preclude a future proposal for drilling in this or adjacent areas. Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur; effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.2 Paleontology

No standards have been identified for determining the significance threshold for paleontology. Damage, destruction, or improper collection of scientifically important paleontological resources could be considered significant if not properly mitigated or indirectly lost or destroyed due to private collection or vandalism.

4.1.2.1 Proposed Action Direct and Indirect Effects

The Proposed Action in the Luman Rim PA is not expected to cause any direct or cumulative impacts to the paleontology of the area.

The entire Luman Rim EA area is underlain by the bedrock of the Luman Member of the Green River Formation (Class 3) and the Wasatch Formation (Class 3 to 4). Soils and Quaternary deposits are generally less than 100 cm deep in the project area, and large portions of the proposed project area have exposed outcrops in the formations mentioned above. The project area is relatively unexplored for paleontological resources, but has a “moderate to high” probability of fossils to be found in the area. These same formations and members which are classified as “moderate to high” because of fossil vertebrates found in areas nearby the proposed project area have produced ostracods, mollusks, plants, reptiles, and mammals.

Construction excavation associated with the development of access roads, well pads, or reserve pits located on well pads could result in uncovering scientifically important fossils which would be an adverse

impact if mitigation were not applied. On-site paleontological surveys would be conducted, in compliance with IM 2009-0011, before any ground-disturbing activities occur (pipelines, roads, well sites, etc.). An on-site observation of the proposed areas undergoing surficial disturbance is necessary because judgments made from topographic maps alone are often unreliable. Areas of low relief on topographic maps have the potential to be erosional surfaces with the possibility of bearing fossil materials rather than surfaces covered by unconsolidated sediment or soils. After the paleontological surveys are completed, reports with recommendations for the project area would be submitted to the BLM for review.

Surface disturbing federal actions on public and split-estate lands may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils or the disturbance of the stratigraphic context in which they are located. Indirect adverse impacts may be created from increased accessibility to fossils leading to looting or vandalism activities. Land tenure adjustments may result in the loss of significant paleontological resources to the public if fossils pass from public ownership.

4.1.2.1.1 Mitigation Measures

Implementation of the committed practices found in Chapter 2 and other standard mitigation and lease requirements should avoid or reduce impacts to the paleontological resources of the area.

With the mitigation found in IM 2009-011, as provided below, all known or any unknown paleontological resources uncovered during construction, would be protected and any potential impacts minimized.

2. In PFYC Class III, IV, & V areas.

A pre-surface disturbance paleontological field study must be conducted by a BLM permitted paleontologist. A written report of the findings by the paleontologist must be submitted to the BLM Authorized Officer with recommendations for mitigation or avoidance. Authorization for an activity to proceed cannot be given by a consulting paleontologist. Performance of the survey, either by a consulting paleontologist or BLM staff, or submission of the report DOES NOT constitute approval for the activity to proceed. The BLM must review the report, including adequacy of the field methods and findings. The Authorized Officer must approve the findings and determine the need for monitoring prior to approval to proceed. See IM-2009-011 and attachments for more information.

3. The proponent would be responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer would provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator would be allowed to resume operations.

After the paleontological surveys are completed, reports with recommendations for the project area are submitted to the BLM for review. Finally, BLM recommendations based on those paleontological survey reports will be issued including, but not restricted to:

1. Re-location of the proposed construction area (i.e. well pads) or the re-routing of proposed pipeline or power line corridors and access roads.
2. An on-site paleontological monitor performed by a permitted paleontologist through the development of the project area to carry out mitigation of fossil resources disturbed during the construction process.
3. Elimination of individual, localized development areas from the proposed project plan.

In the event that any paleontological resources are uncovered during excavation activities, all such work will stop and the BLM will be notified for further guidance and direction.

4.1.2.1.2 Residual Effects

Residual effects to the paleontological resources could occur even if mitigation measures are applied; it is possible that unidentified, undiscovered resources could be impacted.

4.1.2.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur and would prevent any additional impacts to the paleontological resources in those areas. Effects to the paleontological resources on State mineral leases would be consistent with the Proposed Action as these leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.3 Air Quality

The 1977 Clean Air Act amendments established visibility as an AQRV that Federal land managers must consider. The 1990 Clean Air Act amendments contain a goal of improving visibility within PSD Class I areas. The Regional Haze Rule finalized in 1999 requires the states, in coordination with federal agencies and other interested parties, to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment.

Standards for healthy public rangelands require management actions or use authorizations to comply with all federal and state air quality laws, rules, regulations, and standards. Impacts which exceed this standard could be considered significant.

Air pollutant emissions would occur during well development and well production, and these emissions would impact air quality in the project area. Pollutants emitted would include PM10, PM2.5, NOx, CO, VOC, SO2, and HAPs including formaldehyde. Emissions would occur temporarily during well development, and over the LOP during well production operations.

The WDEQ-AQD, under its EPA-approved State Implementation Plan, is the primary air quality regulatory agency responsible for determining potential impacts once detailed industrial development plans have been made, and those development plans are subject to applicable air quality laws, regulations, standards, control measures, and management practices. Therefore, the WDEQ-AQD has the ultimate responsibility for reviewing and permitting the project prior to its operation. Unlike the conceptual 'reasonable, but conservative' engineering designs used in NEPA analyses, any WDEQ-AQD air quality preconstruction permitting demonstrations required would be based on very site-specific, detailed engineering values, which would be assessed in the permit application review. Any facility developed under the proposed action which meets the requirements set forth under WAQSR Chapter 6 will be subject to the WDEQ-AQD permitting and compliance processes.

The emission of these pollutants and their air quality impacts are limited by regulations, standards, and implementation plans established under WAQSR. Under FLPMA and the Clean Air Act, the BLM cannot conduct or authorize any activity that does not conform to all applicable local, state, tribal, or federal air quality laws, statutes, regulations, standards, or implementation plans. As such, significant impacts to air quality from project-related activities would result if it is demonstrated that:

- National Ambient Air Quality Standards (NAAQS) or Wyoming Ambient Air Quality Standards (WAAQS) would be exceeded; or
- Class I or Class II PSD Increments would be exceeded; or
- Air Quality Related Values (AQRVs) would be impacted beyond acceptable levels.

All NEPA analysis comparisons to PSD Class I or Class II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD increment consumption analysis. The determination of PSD increment consumption is an air quality regulatory agency responsibility. Such an analysis would be conducted to determine minor source increment consumption or, for major sources, as part of the New Source Review process. The New Source Review process would include an evaluation of potential impacts to AQRV such as visibility, aquatic ecosystems, flora, fauna, etc., performed under the direction of the WDEQ-AQD in consultation with federal land managers, or would be conducted to determine minor source increment consumption.

4.1.3.1 Proposed Action Direct and Indirect Effects

Emission sources would occur as part of well development and well production. Well development emission sources include vehicle traffic, well pad and road construction, and well drilling and completion activity. These well development sources would temporarily elevate pollutant levels but impacts would be localized and would occur only for the short-term duration of the activities. Fugitive dust emissions (PM10, PM2.5 and larger particles) and small quantities of vehicle exhaust emissions (NOx, CO, VOC, PM10, PM2.5) would result from work crews commuting to and from the work site and from the transportation and operation of equipment to construct the well pads, access road, and infrastructure. Fugitive dust emissions would also occur from construction of the well pads, access roads, and pipelines, and from total construction surface disturbance of 15.1 acres per well.

Diesel-fired drilling engines would emit primarily NOx, CO, SO2, VOCs, PM10 and PM2.5 as shown in Table 4.1, with emissions calculated based on manufacturer’s emissions data, total engine size of 850 hp, an operating load factor of 0.42, and drilling duration of 15 days per well. The project is planning 50% green completions. Any flaring required during well development would be temporary and performed in compliance with WDEQ-AQD requirements.

Total construction emissions per well are shown in Table 4.2.

Table 4.1 – Diesel-fired Drilling Engine Emissions

Pollutant	Manufacturer Emission Factor (g/hp-hr)	Drilling Engine Emission Rate (tons/well)
NO _x	4.5	0.64
CO	2.6	0.37
SO ₂	0.006	0.0009
VOCs	0.3	0.04
PM ₁₀	0.15	0.02
PM _{2.5} ¹	0.15	0.02

¹ PM_{2.5} assumed equivalent to PM₁₀ for drilling engines.

Table 4.2 – Total Construction Emissions per Well Developed

Activity	Tons/Well						
	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	VOCs	HAPs
Well Pad Construction				0.04	0.02		
Road and Pipeline Construction				0.03	0.01		
Wind Erosion				1.06	0.42		
Construction Traffic				0.06	0.008		
Construction Heavy Equipment Tailpipe	0.21	0.26	0.004	0.01	0.01	0.03	
Drilling Engines	0.64	0.37	0.001	0.02	0.02	0.04	
Drilling Haul Truck Tailpipe	0.03	0.04	0.0003			0.02	
Drilling Traffic				0.97	0.15		
Fracturing/Completion Engines	0.16	0.09	0.005	0.005	0.005	0.01	
Completion Traffic				0.13	0.02		
Completion Haul Truck Tailpipe	0.005	0.007	0.0001			0.003	
Completion Flaring	0.23	0.06	0.001	0.01	0.01	2.18	0.1
Total Construction Emissions per Well Developed	1.27	0.82	0.01	2.33	0.68	2.28	0.1

During field production, vehicle traffic and well maintenance activities would result in emissions of fugitive dust and vehicle exhaust emissions. Fugitive dust from project related construction and traffic would be controlled via the application of water and reduced traffic speeds. No diesel combustion equipment would be required at well sites during production because electricity is provided by solar panels. Each well site would be equipped with a TEG dehydrator, 3-phase separator, and tanks for storage of produced water, condensate, methanol, fluids, and glycol. The gas collection system is a closed system, and gas separated from produced water is returned to the gathering system. Gas releases during production would be limited to any pressure release required during a well work over, required every 10 years.

Well site production equipment is subject to current and future WDEQ-AQD oil and gas production facility BACT guidance. Existing Luman Rim sites have not required controls on production equipment under WDEQ-AQD BACT guidance; therefore, production facility emissions reflect emissions from a typical uncontrolled well. These estimates are based maximum uncontrolled emission thresholds from the proposed presumptive BACT requirements to be implemented by WDEQ-AQD in the summer of 2010. Should any well site equipment meet the criteria to require emissions control, 98% control would be required. Total production emissions per well per year are shown in Table 4.3.

Table 4.3 – Total Production Emissions per Year per Well

Activity	Tons/Year/Well					
	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	VOCs
Production Traffic (Unpaved Access and Resource Roads)				9.07	1.39	
Heavy Equipment Tailpipe	0.04	0.05	0.0006			0.02
Wind Erosion				0.89	0.36	
Production Facility						17.79
Total Production Emissions per Well Developed	0.04	0.05	0.0006	9.96	1.75	17.81
Total Production Emissions Over LOP (Tons/Year/58 Wells)	2.32	2.99	0.03	577	101	1,033

Pollutant impacts were assessed for the well construction phase. EPA’s SCREEN3 model was used to estimate maximum near-field particulate concentrations from construction of a typical well pad. Concentrations of PM10 and PM2.5 from well pad construction were predicted to be below WAAQS and NAAQS. SCREEN3 was also used to estimate NO2, CO, and SO2 concentrations from a typical drill rig operating in the project area. Emission rates and stack parameters for a drill rig were based on manufacturer’s data and best engineering estimates. The maximum predicted short-term and annual near-field NO2, CO, and SO2 concentrations were predicted to be less than the WAAQS and NAAQS. Results of the modeling analysis compared with applicable ambient air quality standards are summarized in Table 4.4.

Table 4.4 – Maximum Modeled Concentration Impacts from the Luman Rim Project

Pollutant/Averaging Time	Direct Modeled Concentration (µg/m ³)	Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	WAAQS/NAAQS (µg/m ³)
Nitrogen Dioxide (NO ₂)	1-Hour	68	157.7	188
	Annual	6	26.6	100
Carbon Monoxide (CO)	1-hour	1,863	1,932	40,000
	8-hour	1,746	1,794	10,000
Sulfur Dioxide (SO ₂)	3-hour	19.0	19.1	1300
	24-hour	16.0	16.1	260/365
	Annual	3.0	3.0	60/80
PM ₁₀	24-hour	62.0	87.3	150
	Annual	12.0	17.1	50
PM _{2.5}	24-hour	13.0	28.2	35
	Annual	6.0	9.0	15

Air pollutant concentration impacts from well development would be temporary and would occur in isolation, with no other sites in the area under concurrent development.

Air pollutant concentration impacts from well production sources would be small due to the limited site visit requirements, lack of need for power generation, no proposed compression, and limited number of other emissions sources at the Project Area.

GHGs would also be emitted from the project. GHG emissions from completion flaring are estimated to be 191.7 metric tons CO₂ equivalent (CO₂e). At this time, GHG emissions are not directly regulated by permit by the EPA or WDEQ-AQD. The EPA Mandatory Reporting of Greenhouse Gases; Final Rule (40 CFR Part 98) does require stationary sources emitting greater than 25,000 metric tons CO₂e to annually report those emissions. Luman Rim well development would be temporary in nature, and GHG emissions from combustion would be less than 1% of that annual reporting threshold.

4.1.3.1.1 Mitigation Measures

Implementation of the committed practices found in Chapter 2 and other standard mitigation and lease requirements should avoid or reduce impacts to air quality.

The WDEQ-AQD requested the addition of the mitigation found below to assure appropriate state permits are acquired for any temporary or permanent equipment used in association with this project. With application of this measure, state requirements for permitting for emissions would be met.

- The proponent would seek appropriate permits and follow state protocol for approval of all on-site temporary or permanent equipment used in association with this project from the Wyoming Department of Environmental Quality, Air Quality Division.

4.1.3.1.2 Residual Effects

Residual effects to air quality are considered relatively transient in nature, the effect not continuing beyond final reclamation of the emitting source. The concept of “global climate change” is premised on the concept that carbon based air emissions are residual in the environment and the effects realized for decades, if not longer.

4.1.3.2 No Action Alternative

Under the No Action Alternative the well sites and access roads would not be constructed, and no drilling would occur on federally managed lands and leases. As a result, no air emissions would be generated and no impacts to air quality would occur from the development of the federal mineral estate; additional wells would likely be drilled on State mineral leases. The area would continue to be in compliance with all ambient air quality standards and PSD increments, and AQRVs would not be affected.

4.1.4 Soils

The Wyoming Standards for Healthy Rangelands require soils to be stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff. Impacts which exceed this standard could be considered significant.

4.1.4.1 Proposed Action Direct and Indirect Effects

Potential impacts resulting from construction and installation of well pads and wells, access roads, pipelines, and ancillary facilities would include removal of vegetation and soil, exposure of soil, compaction, and undesirable mixing of soil horizons. These impacts could subsequently result in a loss of topsoil productivity, increased susceptibility of the soil to wind and water erosion, and the spread of

invasive, non-native species. Current objectives as stated in the GRRMP indicate that soil conservation must be addressed during all phases of surface disturbance actions, thereby maintaining soil productivity and stability (BLM 1997).

Soil impacts would be significant given the following:

- soil productivity is reduced to a level that prevents the disturbed area from recovering to pre-disturbance soil/vegetation productivity levels,
- soil erosion results in effects to water resources at any time throughout the life of the project,
- interim reclamation is not successful within two to five years of implementation.

The Proposed Action would result in the drilling of 54 additional federal and 4 state conventional gas wells in the LRPA. Drilling activities would result in an additional 879 acres of new disturbance, which equates to 4.1% of the LRPA. Approximately 74% (654 acres) of new disturbance would be short term (i.e., receiving interim reclamation following drilling or construction activities), whereas the remaining 225 acres (1.0% of the LRPA) would remain disturbed for the lifetime of the project. Potential impacts to soils in the LRPA from the Proposed Action include loss of soil productivity and increased susceptibility to erosion.

Loss of Productivity

Loss of soil productivity can result from the proposed action when construction and production activities disturb the soil resource. The mixing of soil horizons, where subsurface soil horizons are brought to the surface and mix with or replace surface soil horizons, can result in less biologically productive surface soils. Soil horizon mixing often results in elevated soil pH, increased soil salinity, higher sodium and calcium carbonate concentrations, decreased levels of soil nutrients and organic matter, and altered soil structure, texture, and rock content. The effects of soil mixing can be minimized or eliminated through proper soil salvaging (see Appendix B, Reclamation Plan).

In addition, soil compaction from construction and production activities on the disturbed areas can reduce soil productivity. Soil compaction impacts soil structure and reduces pore size. Excessive compaction can lead to reduced water infiltration into the soil and reduced permeability of water through the soil; reduced diffusion of oxygen, carbon dioxide and other gases into and out of the soil; reduced plant root penetration; and, reduced plant growth and production. The effects of compaction can be reduced at the time of reclamation through sound site preparation practices; including discing and ripping (see Appendix B, Reclamation Plan).

Spilled fuel, frac or drilling fluids can lead to loss of soil productivity at gas production facilities during construction and production activities. Depending on the size and type of spill, the effect on soils will vary considerably. Released fluids, in sufficient quantity, can lead to the creation of saline and/or sodic soil conditions. Saline soils can interfere with plant germination and growth, and sodic soils can become hard and crusted with effects similar to those of compacted soils. Soils impacted by spills would either be removed to an approved disposal site or remediated in place to reduce the effects of this potential impact. The effects of spilled fluids can be minimized through proper implementation of a SPCC Plan.

Increased Susceptibility to Erosion

Susceptibility to erosion is increased when construction and production activities from the proposed action disturb the soil resource. Increased erosion can potentially lead to increases in sediment yield to nearby ephemeral drainages and perennial streams. The potential for increased surface runoff and erosion would be greatest in the short term following surface disturbance activities and would decline over time

due to stabilization resulting from reclamation practices and natural processes. Unreclaimed surface disturbances, i.e., the road surface and well pad production area, will increase soil erosion, and the potential for weed establishment, for the life of the project, on approximately 225.87 acres (Table 2.1).

4.1.4.1.1 Mitigation Measures

As outlined in Chapter 3, the majority of soils (approximately 86 percent) within the LRPA are considered to have a slight water erosion potential. The potential for wind erosion in the LRPA is moderate, with approximately 93 percent of the project area ranked as having a moderate wind erosion potential. Poor reclamation potential lands comprise 14 percent of the LRPA; development in the majority of these lands is either under the jurisdiction of the State of Wyoming or they are constrained by various resource restrictions such as WSA status, or VRM classification. The susceptibility for increased erosion within the LRPA can be reduced through development of a SWPPP, proper implementation of erosion control methods and successful, timely reclamation of disturbed areas (see Appendix B, Reclamation Plan). Development in the majority of the “poor reclamation potential lands” are either State of Wyoming lands or they are constrained by various resource restrictions, such as WSA status or VRM classification.

Regular inspections of well locations, including topsoil stockpiles, cut-and-fill slopes, roads, and construction right-of-way areas should be conducted for signs of erosion and runoff problems or fluid spills. Problem locations should be stabilized and seeded as appropriate to prevent additional erosion and potential impacts to receiving waters.

See Chapter 2 for applicable Best Management Practices. The implementation of these measures and other standard mitigation and lease requirements should avoid or reduce impacts to the soils in the project area and watershed. With the application of the Reclamation Plan (Appendix B), including providing construction and reclamation contractors with the information found in Figure 3.2, no additional mitigation measures are necessary for soil resources.

4.1.4.1.2 Residual Effects

Residual effects would occur even if mitigation measures were implemented as soils would be dislodged during construction and operations activities and stabilized overtime with the implementation of aggressive reclamation.

4.1.4.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Soils related effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue. Erosion and soil compaction would continue at present levels from previously authorized production activities, livestock grazing and recreational use.

4.1.5 Water Resources

The Wyoming Standards for Healthy Rangelands require actions to comply with Wyoming State water quality standards and to avoid conditions that would hinder the progress of riparian areas towards

obtaining or maintaining a minimal state of Proper Functioning Condition⁴. Impacts which exceed this standard could be considered significant. There were no riparian areas identified in the LRPA.

4.1.5.1 Surface Water

4.1.5.1.1 Surface Water - Proposed Action Direct and Indirect Effects

Potential impacts to surface water resources from the Proposed Action include:

- Increased sedimentation and turbidity of affected surface water as a result of surface disturbance and increased erosion into surface waters via runoff; and
- Effects on water quality (e.g., potential contamination of surface water resources from spills or discharges of drilling fluids, petroleum, or other chemicals used for natural gas drilling and production activities).

The potential for adverse impacts to surface water resources would be greatest shortly after the start of construction activities and would likely decrease in time due to natural stabilization, reclamation, and revegetation efforts.

Increased Sedimentation and Turbidity

During construction, increased erosion and subsequent increased sedimentation to ephemeral drainages near the project area may occur. Since ground-disturbing activities within close proximity to drainages have the greatest potential for impacting water resources, rapid and successful reclamation/revegetation of temporarily disturbed areas and implementation of management actions to reduce erosion are particularly important in minimizing water quality impacts and to assure maintenance of long-term stream health.

The majority of the proposed facilities would be constructed on soils having a good to fair reclamation source material rating, aiding in the successful revegetation of the well pads and pipeline ROWs. Over time, short-duration precipitation events and snowmelt could cause soil loss from the proposed facilities in the project area to reach adjacent ephemeral drainages. This fine sediment could then eventually be transported down these ephemeral drainages to the Red Lake playa and other local playa lakes. In sufficient amounts, the additional sediment from construction activities and operational facilities could:

- Clog road culverts and cause road damage;
- Transport pollutants (e.g., trace metals, herbicides, petroleum constituents, etc); and
- Contribute to a degraded sediment regime, which could result in downcutting of the channel and bank destabilization.

Sediment loading values are not available for the project area. However, the highest sediment loading would be expected to occur during the months of March, April and May from snowmelt runoff.

⁴ **Proper Functioning Condition** - Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water, and vegetation.

The BLM has developed management actions specifically for the Red Desert Watershed Management Area to manage for all resources with the emphasis on protection of visual resources, watershed values, and wildlife resources (BLM 1997). With the application of these management actions for erosion and runoff control, the actual amount of sediment that would be transported to the ephemeral drainages within the proposed project area would be reduced. Sedimentation control devices would also be used along the proposed access roads and at drilling locations to minimize the amount of sediment that reaches any ephemeral drainage in the proposed project area. The erosion and runoff control devices used would be specified in the Storm Water Pollution Prevention Plan (SWPPP) and Application for Permit to Drill (APD) prepared for each proposed well pad, access road, and other project facilities. With implementation of the erosion control practices and the project specific Reclamation Plan (Appendix B), the amount of increased erosion associated with the Proposed Action could be minimal.

Increased Runoff

Soils compacted on existing roads, new access roads, and well pads generate more runoff than undisturbed sites. The increased runoff, resulting from 225.87 acres of LOP disturbance, could lead to slightly higher peak flows in ephemeral drainages flowing into the closed basins of Red Lake and other playa lakes, potentially increasing erosion of the channel banks. The increased erosion could also increase turbidity in these playa lakes during storm events. The magnitude of these impacts cannot be quantified, but is expected to be negligible based on the very small increase in surface water runoff that would be generated.

Surface Water Quality

Contamination of surface water and groundwater can occur in oil and gas fields. Sources of potential contamination include leaks from wellheads, conveyance pipelines, storage tanks, and tanker trucks, as well as leaching of contaminants from impacted soils that may be associated with these facilities. In addition, accidental spills of hydrocarbon products, including fuels and petroleum products, or produced water, would have the potential to contaminate surface waters if the spills were to occur when flow was present in the ephemeral drainages of the proposed project area. The implementation of an appropriate SPCC Plan would minimize, control, and cleanup the affected area. The measures provided in the SPCC Plan would minimize the opportunity for spilled material to enter a surface water feature and subsequently impacts surface water.

Produced fluids would be temporarily stored in steel tanks at each well site. The contents of the tanks would be separated, with water pumped out as needed, and transported by tanker truck to WOGCC permitted non-commercial disposal wells, reused for drilling at other well locations or hauled to WDEQ permitted commercial disposal facilities. Condensate would be sold and transported by truck. Therefore, no impacts to surface water resources in or near the proposed project area are expected in association with the routine disposal/management of produced water.

4.1.5.1.1.1 Mitigation Measures

See Chapter 2 for applicable management practices and requirements. Additional mitigation for surface water resources has been identified. The implementation of these measures and other standard mitigation and lease requirements should avoid or reduce impacts to the water resources of the project area.

- All production equipment would be installed and maintained in accordance with existing Notices to Lessees and/or Onshore Oil and Gas Orders pertaining to installation and maintenance of oil and/or gas production facilities on Federal leases.
- Integrity tests of pipeline would be conducted in full compliance with the BLM pipeline stipulations.

- Regular inspections of well locations, including topsoil stockpiles, cut- and fill-slopes, roads, and pipeline corridors should be conducted for signs of erosion and runoff problems. Problem locations would be stabilized and seeded as appropriate to prevent additional erosion and potential impacts to receiving waters.

Surface water resources would be protected through the implementation of applicable management practices BMPs and regulatory requirements (Chapter 2 and above); resulting in no adverse effect on surface water resource quality under the Proposed Action.

4.1.5.1.1.2 Residual Impacts

Residual impacts resulting from implementation of the Proposed Action would be realized from increased erosion and subsequent sediment yield to adjacent drainages over the life of the project, even with the implementation of BMPs. Overtime reclamation of the disturbed areas of the Project would reduce the potential of offsite transport of sediments.

4.1.5.1.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Surface water related effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.5.2 Groundwater

4.1.5.2.1 Groundwater - Proposed Action Direct and Indirect Effects

Potential impacts to groundwater resources from the Proposed Action include contamination of groundwater with produced water, drilling mud, or petroleum constituents.

Groundwater exists in the LRPA in shallow, perched, groundwater within the Quaternary hydrogeologic unit, in various formations within the Tertiary hydrogeologic unit, and in deeper bedrock formations beneath the proposed project area. Spills of fuels or produced fluids have the potential to contaminate groundwater resources, especially the shallow groundwater aquifers. Spills from facilities located adjacent to ephemeral drainages would have the greatest potential to contaminate groundwater. The implementation of an appropriate SPCC Plan would minimize, control, and cleanup the affected area. The measures provided in the SPCC Plan would minimize the opportunity for spilled material to enter a surface water feature and subsequently impacts shallow groundwater.

To prevent potential degradation of shallow groundwater, all boreholes and wells will be properly cemented and abandoned in accordance with WOGCC rules.

No produced water would be discharged into surface water drainages or allowed to flow onto the ground surface. There is a slight chance that produced water could be spilled during the loading operations. However, SPCC Plan related management actions would be employed to control runoff at each drilling/production location. Therefore, a spill of produced water would be unlikely to migrate off of the well pad and there is little chance that produced water would enter and contaminate shallow alluvial aquifers. Accordingly, the potential for contamination of groundwater resources by produced water is considered to be negligible.

Water Use

Approximately 25,000 barrels (3.2 acre-feet) of water would be needed for each well during construction, drilling and completion operations, including pipeline hydro test water. Therefore, drilling of the 54 federal wells would require an estimated total water use of about 1.35 million barrels, or 172.8 acre-feet, over a ten-year period. Water for drilling operations would be obtained from existing water wells located in the area. Yates Petroleum Corporation has acquired or will acquire Wyoming State Engineer permits to appropriate groundwater for the use of needed water. Therefore, the water used for the Proposed Action would not cause additional depletion of water from the project area beyond that already appropriated.

4.1.5.2.1.1 Mitigation Measures

The implementation of the applicable management practices and requirements found in Chapter 2 and those listed below should avoid or reduce impacts to the water resources of the project area.

- All production equipment would be installed and maintained in accordance with existing Notices to Lessees and/or Onshore Oil and Gas Orders pertaining to installation and maintenance of oil and/or gas production facilities on Federal leases.
- Integrity tests of pipeline would be conducted in full compliance with the BLM pipeline stipulations.
- With the use of proper well pad construction techniques, drilling practices, well completion and frac'ing operations, and with the implementation of BMPs and applicant committed practices, these standards would be met and no adverse effect on groundwater aquifers or surface water resource quality would be anticipated under the Proposed Action.

4.1.5.2.1.2 Residual Impacts

No residual effects to ground waters are anticipated with the application of applicable and appropriate BLM, WOGCC and industry construction and operational standards and BMPs.

4.1.5.2.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Groundwater related effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.6 Vegetation, Special Status Plant Species, Wetlands, Noxious Weeds

Standards for healthy public rangelands require upland vegetation to consist of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance. Impacts which exceed this standard could be considered significant.

4.1.6.1 Proposed Action Direct and Indirect Effects

Implementation of the project would result in the loss of natural vegetation in terms of cover and species composition in areas where well sites, facilities, and access roads would be constructed. An estimated 879 acres would be affected by initial surface-disturbing activities during drilling and testing. To avoid permanent loss of species diversity and vegetative cover, topsoil would be stockpiled, and reclaimed areas

would be seeded with site-specific mixes during appropriate planting periods, according to the committed practices detailed in Chapter 2 and the Reclamation Plan found in Appendix B. Life-of-project disturbance would be approximately 226 acres.

Indirect effects would include increased potential for weed invasion, exposure of soils to accelerated erosion, loss of habitats, and changes in visual aesthetics. Use of committed practices described in Chapter 2 during construction, operation, and reclamation activities would minimize effects on vegetation resources. Weed monitoring would occur during drilling, production, and reclamation activities. Weeds found would be controlled following county weed and pest department protocol and BLM-approved procedures. To further reduce potential impacts from invasive species, equipment should be washed prior to entering the project area. Properly reclaimed areas free of weed species would not cause loss of habitat or change visual aesthetics over the long term.

The Wyoming big sagebrush, greasewood, and saltbush cover types that would be disturbed under the project are commonly found across southwest Wyoming. The short-term or long-term loss in acreage described above would not impact the overall abundance and quality of these habitats.

In general, the duration of effects on vegetation in the LRPA would depend on the time required for natural succession to return disturbed areas to pre-disturbance conditions of diversity (species diversity and structural diversity). Reestablishment of pre-disturbance conditions would be influenced by climatic (growing season, temperature, and precipitation patterns) and edaphic (physical, chemical, and biological soil conditions) factors. This would include the amount and quality of topsoil salvaged, stockpiled, and spread over disturbed areas. If reseeding cannot be completed in the fall, seeding should take place in the early spring. Application of this measure would help assure proper revegetation.

The BLM has made a may affect, not likely to adversely affect determination for Ute Ladies' Tresses and a no affect determination for Blow-out Penstemon, two federally listed threatened or endangered plant species potentially found in the project area. Neither specimens of or suitable habitat for either of these species was identified in the project area. Application of the BLM stipulations to avoid riparian areas by 500 feet and ephemeral streams by 1,000 feet would preclude impacts to wetlands; therefore, no affect to Ute Ladies' -Tresses would be anticipated, if they were to exist in the area.

4.1.6.1.1 Mitigation Measures

See applicant committed practices in Chapter 2.

- All equipment would be washed prior to entering the project area in order to prevent or minimize the spread of invasive species.
- If seeding in the fall cannot be accomplished, seeding would be done in the early spring prior to April 15.
- The BLM Invasive Plant Management Plan will be implemented specific to the Luman Rim area.

4.1.6.1.2 Residual Effects

Residual effects, while not reaching the level of significance, would occur even if mitigation measures were implemented due to the time needed to fully reclaim disturbed areas. In addition, residual effects would result from the opportunity for the introduction of invasive species in areas where vegetation would be disturbed and the time required to mitigate these impacts.

4.1.6.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Effects on vegetation resources or wetlands consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.7 Range Resources and Other Land Uses

Standards for healthy public rangelands require upland vegetation to consist of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance. Impacts which exceed this standard could be considered significant.

4.1.7.1 Proposed Action Direct and Indirect Effects

Anticipated effects on range resources associated with the project are limited to a minimal loss of forage, an increased potential for vehicle/livestock collisions, and an increased potential for the spread of noxious and invasive weeds (discussed in Section 4.1.6). The project would not likely result in noticeable effects on range resources. There will be a reduction in grazing forage ability of about 68 short-term and 17.5 LOP AUMs under this proposal.

Livestock grazing activities would continue during the implementation of the project. Forage in the project area would be reduced slightly during drilling and field development and restored as soon as practical thereafter, except for areas used for road corridors and well facilities, which would remain disturbed throughout the productive life of the project component. The increased traffic associated with project activity could correspondingly increase the potential for vehicle/livestock accidents during that period; however, roadways are limited and the grazing area expansive, resulting in nominal likelihood of increased collisions.

No impacts to other land uses are anticipated as the overall area can easily accommodate ongoing land use activity. As long as the operators restrict operations to their rights-of-way, no impact to existing pipelines is expected although holders of existing rights-of-way should be notified when activity is planned within or adjacent to the existing facilities, as per One Call Of Wyoming requirements. The operators would continue to use certain roads having rights-of-way held by themselves and other operators; they would continue to be responsible for preventive and corrective maintenance of roads in the project area.

4.1.7.1.1 Mitigation Measures

- The proponent should notify holders of existing rights-of-way or other permits (i.e., grazing) of planned construction, operations, or maintenance activities.
- For the purpose of determining joint maintenance responsibilities, the proponent would make road use plans known to all other authorized users of the road. Any road rights-of-way would include a standard stipulation for joint road maintenance agreement.

4.1.7.1.2 Residual Effects

Residual effects, while not reaching the level of significance, would occur even if mitigation measures were implemented as forage would be reduced in construction and operations areas; re-establishment of native vegetation, including sagebrush, will occur over time.

4.1.7.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Effects on range resources, including grazing, consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.8 Wildlife/Special Status Species

Standards for healthy public rangelands require that such lands are capable of sustaining viable populations and a diversity of native animal species appropriate to that habitat. Those habitats that support threatened, endangered species, species of special concern, or sensitive species will be maintained.

4.1.8.1 Proposed Action Direct and Indirect Effects

The effects on wildlife resulting from the proposed project would include displacement of wildlife, loss or temporary disturbance of wildlife habitats, an increase in the potential for collisions between wildlife and motor vehicles, and an increase in the potential for illegal kill, harassment and disturbance of wildlife due to increased human presence and improved vehicle access. The magnitude of impacts to wildlife resources would depend on a number of factors including the type and duration of disturbance, the species of wildlife present, time of year, and successful implementation of avoidance and mitigation practices.

During construction, it is expected that some resident species will avoid active project areas. Disturbances from human activity and traffic would reduce wildlife use of habitats immediately adjacent to these areas by species sensitive to indirect human disturbance (noise and visual disturbance). Wildlife use of these areas would be lowest during the construction phase when human activities are more extensive and localized. Disturbance would decline during the production phase of operations and some animals may become acclimated to equipment, facilities, and infrequent human presence, and may reoccupy habitats near disturbed areas.

The direct disturbance of wildlife habitat in the project area likely would reduce habitat availability and effectiveness for a variety of big game and small mammals, birds, reptiles, amphibians, and their predators. An increase in mortality from increased vehicle use of roads in the project area would also be expected. An estimated 879 acres of short-term disturbance would be affected by new surface-disturbing project activities under the Proposed Action which would potentially affect wildlife. Interim reclamation would be implemented following each stage of project activities and is expected to return most habitats to pre-disturbance conditions in the long term. Interim reclamation is expected to reduce the number of acres lost to approximately 226 acres of direct habitat loss. Reclamation to “pre-disturbance” condition in the arid environment of Luman Rim is likely to take more than 20 years.

Due to the relatively high reproduction potential of some of these species and the relatively small amount of habitat disturbed, small mammal and songbird populations should quickly rebound to pre-disturbance levels following reclamation of utility corridors, unused portions of roads, well pads, and wells that prove to be unproductive. No long-term effects on populations of common small mammals and songbirds are

expected. Any potential impacts to amphibians are expected to be minimal due to project avoidance of riparian/wetland areas.

4.1.8.1.1 Big Game

Effects on big game species would include direct loss of habitat and forage, and increased disturbance from activities associated with the project. Disturbance of big game species during the parturition period and on winter range can increase stress and may influence species distribution and productivity (Hayden-Wing 1979, Morgantini and Hudson 1980) as well as individual survival. Elk crucial winter range is found in the southwest portion of the project area and the Bar-X Road crosses through the area; the LRPA overlaps the elk crucial winter range by 2,880 acres, or approximately 11.5%. No crucial big game winter range has been identified for pronghorn, deer or moose in the project area. No big game parturition areas are known in the Luman Rim project area.

There is potential for an increase in poaching and harassment of big game, particularly during winter. Big game would be expected to demonstrate some avoidance of the area for the life of the project due to an increase in human presence, although some individuals may habituate to the human activity.

Big game will be affected, however the level of effect is expected to be within the acceptable range, as the project area represents less than one percent of pronghorn antelope, mule deer, elk or moose winter or year-long range. Individuals could be impacted by the project activities due to avoidance of human activities. Snow removal could impede big game movement if berms were too high or if there were no breaks in the berms. Mitigation measures, as listed below, will be implemented to minimize impacts to big game species. Available habitat in the project area will be reduced until pre-disturbance reclamation conditions are achieved; big game species are expected to return to the area.

4.1.8.1.1.1 Mitigation Measures

See committed practices in Chapter 2 and Appendix F.

- Crucial winter range for elk is identified in the southern portion of the project area. A Timing Limit Stipulation (TLS) is in effect from November 15 through April 30 for the protection of wintering elk.
- Snow removal would be done in a manner that would not preclude movement by big game (i.e., no tall berms or regularly spaced breaks in the berms).
- Access to the project area during winter will be limited to permitted rights-of way with posted speed limits.
- Well locations may be fenced to protect reclamation from overgrazing and bedding by ungulates.
- Reserve pits and other facilities posing a potential for big game mortality or injury will be fenced.
- All field employees and contractors will undergo training regarding wildlife sensitivity and regulations similar to the Pinedale Working with Wildlife program.

4.1.8.1.1.2 Residual Effects

Residual effects, while not reaching the level of significance, would occur even if mitigation measures were implemented as displacement is expected and accidental mortalities may occur. If displacement occurs re-colonization is expected once project related disturbance is reduced.

4.1.8.1.2 Upland Game Birds

No effect on migrating Mourning Dove is anticipated from implementation of the proposed action. Greater Sage-grouse is discussed in section 4.1.8.1.4.

4.1.8.1.3 Raptors

Raptor nesting and foraging habitat is found throughout much of the Luman Rim Project. All raptor species and active nests are protected under the Migratory Bird Treaty Act (MBTA), golden eagles are further protected under the Bald and Golden Eagle Protection Act (BGEPA). In general, birds are more sensitive to indirect impacts, such as unexpected noises, than mammals. Literature suggests that noise levels greater than 49 dBA within breeding habitat from April 1 through June 30 are a negative impact to game and non-game birds, especially at night (WGFD 2004). The Proposed Action could have some potential for noise impacts above 49 dBA within raptor breeding habitat. Development too close to nests of some species of raptors has been identified to result in the nest abandonment or failure.

There are fifteen active and inactive raptor nests known in and near the LRPA. Active ferruginous hawk nests would have year round NSO buffer of 400 m (approximately ¼ mile) with a nesting season timing stipulation buffer of one mile from February 1 to July 31. Golden eagles has a year round NSO of 600 m (~1968 ft.) while other raptors in the area, with the exception of burrowing owls, are protected by a year round buffer of 250 m (or approximately 820 ft.) and a timing stipulation buffer of ½ mile from February 1 to July 31. These stipulations are intended to prevent nest abandonment. There are two active raptor nests within ½ mile of or within the Luman Rim project area.

There is a reasonable potential that burrowing owls may inhabit suitable prairie dog, ground squirrel or badger burrows within the project area, although no burrowing owls were identified during the 2008 and 2009 surveys. Burrowing owls and their habitat may be adversely impacted through access to prairie dog colonies and subsequent sport shooting. Some habitat loss would occur if roadways, pipelines or wells are situated to cross or be placed within prairie dog colonies. Project plans include avoidance of white tailed-prairie dog towns which would provide protection for these owls. Active burrowing owl nests would be protected by a nesting season timing stipulation buffer from April 1 to September 10 within ½ mile of an identified nest.

These surface disturbance and seasonal timing stipulations apply to all surface disturbing activities as well as drilling, and completion activities within the designated species specific protective buffer. Exceptions to these stipulations may be granted by the BLM AO if the nest is not active or fledglings are no longer using the nest.

Impacts to raptor species would be significant if the following occurred:

- Activities contributed to unlawful 'take' of any migratory bird, including raptors, as defined by the MBTA.
- Actions resulted in an irreplaceable loss, or abandonment of high value habitats.

- Surface disturbance from drilling, completion and transport activities of more than 5% of habitat within one-half mile buffer around raptor nests.

4.1.8.1.3.1 Mitigation Measures

The project would be conducted with adherence to committed practices as detailed in Chapter 2.

- To protect active raptor nests, activities or surface use will not be allowed within 0.5 miles of the nest from February 1 to July 31, annually; except for Ferruginous hawks for which the avoidance boundary will be 1.0 miles.
- A nest site is considered active if it has been used within the past five years. The Operators may request an Exception to the TLS on a case-by-case basis and they may be granted an Exception to the stipulation based on current nest activity. With these stipulations, the potential impacts to raptor nests would be reduced and/or eliminated.
- No above ground structures or roads are allowed to be constructed within 400 m (~1312 ft) of ferruginous hawk nests, 600 meters (~1968 ft) of golden eagle nests or within 825 feet of any other raptor nest.
- Net or otherwise protect produced water facilities to prevent incidental mortality to avian species.
- Implementing noise reduction techniques and facility design to reduce stress on wildlife from excessive noise.
- Remote monitoring of wells and pipelines to reduce field visits during operations and reduce stress on raptors and other wildlife.
- Modify tank batteries and other potential raptor perches located within one mile of sage-grouse leks or within prairie dog colonies to restrict or prevent raptor perching.

4.1.8.1.3.2 Residual Effects

Residual effects, while not reaching the level of significance, would occur even if mitigation measures were implemented as displacement is expected and accidental mortalities may occur. If displacement occurs re-colonization is expected once project related disturbance is reduced.

4.1.8.1.4 Threatened and Endangered Wildlife Species

The black-footed ferret is the only listed species that potentially occurs within the project area. The greater sage-grouse was found to be warranted for listing under ESA but precluded by higher priorities; the sage-grouse is discussed in this section. “Precluded by higher priorities” means that the greater sage-grouse is now considered a candidate species. In addition mountain plover are again being considered for listing as a threatened species.

Project area has been Block Cleared for Black-footed ferrets.

Black-footed Ferret and Associated White-tailed Prairie Dog Colonies

Ferrets depend almost exclusively on prairie dogs for food, and they depend upon prairie dog burrows for shelter, parturition, and raising young (Miller 1988). In order to be considered suitable for black-footed

ferrets, prairie dog towns or complexes must be in excess of 200 acres and have a burrow density greater than or equal to 8 burrows/acre (Biggins, et al. 1989). Several prairie dog colonies are known to occur in the general area and throughout the Red Desert; the prairie dog colonies within the Luman Rim project area are not sufficiently large to support black-footed ferret populations (Figure 3.9). Refer to Chapter 3 for a more detailed discussion of white-tailed prairie dogs and black-footed ferrets.

Prairie dogs could be subject to enhanced levels of predation by raptors if production facilities are used for perching. Anti-perching devices would mitigate this potential impact. Some of the wells proposed for development within the Luman Rim project are located within or near known prairie dog colonies with some existing wells and access roads passing through or situated on prairie dog colonies (State section). Since prairie dogs, ground squirrels and other burrowing mammals feel secure in their burrow; construction activities could result in individual mortalities.

To avoid impacts to prairie dog colonies, access roads should not be located within or cross prairie dog colonies. Proposed pipelines should follow roads where practical. Timely reclamation of disturbed areas would reduce impacts to prairie dogs and ground squirrels.

In 2004, the WGFD recommended that the Sweetwater Complex of white-tailed prairie dogs be considered “block cleared” and be relieved of any additional black-footed ferret surveys (WGFD 2004). Based on prairie dog colony acreage, colony distribution and prior studies, black-footed ferrets are unlikely to occur in the project area.

In the 2005 Statewide Programmatic Biological Assessment for black-footed ferrets, the BLM determined, “Implementation of geology and mineral management actions may affect, but is not likely to adversely affect individual black-footed ferrets, due to insignificant effects. Impacts to individual black-footed ferrets would be minimized through the conservation measures found in Section 4.1.8.1.4.1, so that negative impacts to individual ferrets would not occur.” Proposed field development activities plan to avoid disturbance within prairie dog colonies resulting in a “not likely to adversely affect” determination.

4.1.8.1.4.1 Black-footed Ferret and Associated White-tailed Prairie Dog Colonies Mitigation

- Within prairie dog colonies, construction of structures that could be used for raptor perches would be avoided or mitigated with anti-perching devices to prevent raptor perching.
- To avoid impacts to prairie dog colonies, access roads should not be located within or cross prairie dog colonies.
- Proposed pipelines should follow roads where practical.
- Timely reclamation of disturbed areas would benefit prairie dogs and ground squirrels.

In the unlikely event that Black-footed Ferrets are observed in the LRPA the following mitigations, taken from the Chapter 4 of the 2005 Statewide Programmatic Biological Assessment for Black-footed Ferrets would apply:

3 and 4. Observations of black-footed ferrets, their sign, or carcasses on a project area and the location of the suspected observation, however obtained, shall be reported within 24 hours to the appropriate BLM Wildlife Biologist and Field Supervisor of the USFWS office in Cheyenne, Wyoming, (307) 772-2374. Observations will include a description including what was seen, time, date, exact location, suspected cause of death, and observer’s name and telephone number. Carcasses or other “suspected” ferret remains shall be collected by the

BLM or USFWS employees and deposited with the USFWS Wyoming Field Office or USFWS law enforcement office. While BLM employees would not likely have a permit to “collect” a BFF carcass, it is imperative that a carcass be salvaged and immediately transported to the USFWS so that the carcass would not be scavenged and as much pertinent information concerning the cause of death be gathered, including photographs, so that an accurate depiction of the fatality would be documented.

5. If black-footed ferrets or their sign are found on public lands outside of the Shirley Basin nonessential experimental population boundary (even within a prairie dog town or complex previously determined to be unsuitable for, or free of ferrets), all previously authorized project-related activities (or actions on any future application that may directly, indirectly, or cumulatively affect the colony/complex) ongoing in such towns or complexes shall be suspended immediately and Section 7 consultation re-initiated with the USFWS. An emergency road closure for other than official travel (official travel would be defined as only those activities that are necessary to evaluate the black-footed ferret find) will be enacted by the BLM within 48 hours of the find to protect newly discovered black-footed ferrets. This emergency road closure would be for all non-paved roads within at least one mile of the find. A task force consisting of at least one member of the BLM, USFWS, WGFD and USGS-BRD will be formed within 48 hours of the find to assess the needs of protecting the newly discovered black-footed ferrets. The BLM shall coordinate with these three agencies in ensuring that ferret surveys or other appropriate actions are conducted at such locations.

6. Information shall be provided and posted in common areas and circulated in a memorandum among all employees and service providers. This information shall illustrate the black-footed ferret and its sign; describe morphology, tracks, scat, skull, habitat characteristics, behavior, and current status; and the relationship between project development and impacts to black-footed ferrets, especially regarding canine distemper.

Greater Sage-grouse

Effects to greater sage-grouse could include direct loss of habitat and forage, and increased disturbance from project related activities. Disturbance of sage-grouse during the nesting and brood rearing period and on winter concentration areas can increase stress and may influence species distribution. There may also be a potential for increased poaching and harassment or increased predation from raptors using facilities for perching. Greater sage-grouse would be expected to demonstrate avoidance of the area for the life of the project depending upon the level of human activity and where it occurs in relation to suitable habitat. Noise and human disturbance in the project may lead to lek abandonment, reduced nesting and nest failure.

There are seven leks within two miles of the Luman Rim project boundary (Figure 3.10). Of these, four leks were identified as occupied in 2009 and have either breeding or brood rearing habitats (or both) which will be impacted by development in the LRPA. Four of the leks are classified as occupied; the other three have been classified as unoccupied in the WGFD 2009 database.

The Luman Rim project area exhibits habitat characteristics which are not considered high quality sage-grouse habitats. The area is dominated by Luman Rim and its associated raptor habitat, is bordered on the south by the East Sand Dunes and Red Lake WSAs. The best grouse habitat lies to the northwest as illustrated by the clustering of leks and their associated nesting habitat in that direction. Areas of suitable sage-grouse nesting, brood rearing and late brood rearing habitat, as well as winter habitat, occur within the project area. Sage-grouse can be impacted by other activities associated with natural gas development, including increased human activity, increased traffic, and predation by birds of prey.

The Luman Rim project lies between the Northeast Rock Spring and South Pass Core Breeding Areas, as defined by the Sage-Grouse Core Breeding Areas Version 3 Map (WGFD 2010). The Governor's Sage-grouse Core Area concept provides habitat protection to leks within the identified Core Areas and increased mitigation flexibility relative to non-Core Area leks and associated seasonal habitats. The BLM Wyoming State Office issued an Instruction Memorandum WY-2010-012 for Sage-grouse conservation in December 2009 that mirrors and expands on the protections provided by the State Core Area concept.

No wintering areas for Greater Sage-grouse have been identified for the Luman Rim area, although in February 2010, sage-grouse were documented wintering less than 0.4 mile from the LRPA. As the vegetation and topography continue into the project area, it is expected that sage-grouse are within the project area during winter conditions (C. Nelson, BLM).

About forty percent of the proposed activity would occur in sage-grouse habitat within the project. The level of impact would not be significant for sage-grouse should the BLM distances and timing stipulations be implemented.

4.1.8.1.4.2 Greater Sage-grouse Mitigation

The project would be conducted with adherence to the practices found below.

Application of the mitigation measures found below would further reduce potential impacts.

- No disruptive activity within 2 miles of a lek from March 1 to July 15 to protect breeding, nesting and brood rearing greater sage-grouse. Sage-grouse TLS are as follows:
 - Sage-grouse Lek March 1 – May 15 between 8 pm and 8 am.
 - Sage-grouse brood rearing March 15 – July 15
 - Sage-grouse identified winter habitat Nov. 15 – March 15
 - The proponent may request an exception to the TLS, and depending on the current weather and habitat conditions as well as animal presence, the exception may or may not be granted.
- No surface occupancy within one-quarter mile of active sage-grouse leks, although the GRRMP also provides that some activities may be granted exceptions to this restriction, under certain circumstances.
- Construction of structures that could be used for raptor perches would be avoided or designed to prevent raptor perching. Exceptions may be granted if the activity would occur in unsuitable sage-grouse nesting habitat.
- Reserve pits shall be fenced to prevent sage-grouse entry and potential mortality.

Mountain Plover

The presence of prairie dog towns and other suitable habitats indicate that plovers may use some areas during the year (Figure 3.11). The WYNDD Mountain Plover Habitat Probability Model indicates several areas within the project boundary that have a high probability of plover use.

Mountain plover have been observed in the LRPA in the past and are known to occur just north and just east of the project. No mountain plover were observed in 2008 during wildlife surveys of the project.

4.1.8.1.4.3 Mountain Plover Mitigation

The potential exists for adverse impacts if protective measures are not implemented. Avoidance and mitigation measures consistent with USFWS guidelines (BLM 2008a) should minimize impacts to mountain plovers. These include, but are not limited to the following:

- Habitat which meets criteria suitable for mountain plover should be surveyed prior to any ground disturbing activities.
- The BLM TLS for Mountain plover nests from April 10 – July 10 within ¼ mile of nests or broods.
- Should a mountain plover nest, chick, or egg be observed during any surface disturbing activity, all work would be stopped within ½ mile and the BLM notified immediately.
- In mountain plover habitat, reclamation seed mixes would include plant species that would not exceed 6 inches in height.
- Roads and pipeline routes should be designed to minimize the amount of disturbance to suitable plover habitat.
- Stopping and getting out of vehicles along roadways would not be allowed in occupied mountain plover habitat during the breeding and nesting period (April 10 to July 10) except in emergency situations. This measure is to prevent unnecessary disruption to mountain plover which often results in nest failure.
- Structures located in or adjacent to occupied mountain plover habitat which could be used for raptor nesting or perching should be designed or retrofitted to prevent perching.

4.1.8.1.4.3 Residual Effects

Residual effects, while not reaching the level of significance, would occur even if mitigation measures were implemented as habitat will be disturbed, displacement is expected and accidental mortalities may occur. If sage-grouse or mountain plover are displaced from suitable habitat, re-colonization is expected once project related disturbance is reduced (Harju et al. 2010). The level of impact to mountain plover populations depends on both the density of mountain plovers and the level of oil and gas development within the project area.

4.1.8.1.5 BLM Special Status Wildlife Species

With increasing surface disturbance, the potential for direct and indirect impacts to wildlife increases; the more well pads, roads, and pipelines within the Luman Rim area, the higher the level of habitat fragmentation and associated decrease in habitat patch size. Indirect effects would include impacts from additional noise, dust, and human presence. These species are likely to alter their behavior and home range use within the area of potential effect and adjacent areas.

Migratory Birds

Bird species tend to be sensitive to noise impacts. All migratory bird species that use the area are most sensitive to disturbance during the spring breeding season. Migratory bird species nesting in the area may

suffer habitat loss through shrub removal or could collide with vehicle traffic. The proposed activity may benefit some species of birds which feed on weed seeds (i.e., Horned Larks). Stipulations enacted to protect raptor nests as well as prairie dog habitats, will also be beneficial to migratory bird species and may increase nesting success for those species.

4.1.8.1.5.1 Migratory Birds Mitigation

To further minimize impacts to migratory birds, the following measure would be adopted.

- All tanks will be closed topped or netted to preclude entry by migratory birds. Any netting would have a weave sufficiently small enough to prevent small migratory birds from tanks. Bird caps will be applied to equipment stacks.

4.1.8.1.5.2 Residual Effects

Residual effects to BLM sensitive or T&E species will be minimized through the implementation of appropriate timing limitation stipulations and other prudent BMPs. If displacement occurs re-colonization is expected once project related disturbance is reduced and habitat is restored.

4.1.8.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Effects on wildlife resources, T&E and BLM special Status Species would be similar to that of the Proposed Action, but on a smaller scale as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.9 Wild Horses

4.1.9.1 Proposed Action Direct and Indirect Effects

Direct impacts to wild horse populations could result from the temporary loss of 879 acres of habitat due to vegetation removal; displacement of wild horses due to disturbance by project-related activities; direct mortality due to construction-related activities; and an increased likelihood of horse/vehicle collisions due to increased traffic. Impacts to vegetation would be limited because this disturbance would be spread over a large area rather than a single block. The wild horse population in the Great Divide HMA is above the appropriate management level, but there is plenty of habitat for wild horses to utilize in and around the project area. Animals present within the area are already acclimated to human presence and disturbance by existing oil and gas developments. Response to development of the Proposed Action would primarily involve avoidance within the available habitat in the vicinity. Overall, impacts to wild horse population in the Great Divide HMA would be negligible.

4.1.9.1.1 Mitigation Measures

No additional mitigation is identified.

4.1.9.1.2 Residual Effects

Residual impacts as a result of the Proposed Action would result from the removal of an estimated short-term removal of 879 acres of forage for horses. This impact would be evident at some level until the project is fully reclaimed.

4.1.9.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Effects on wild horse population with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue. Impacts on wild horse populations would continue at present levels, with fluctuations due primarily to weather, disease, and other natural causes, and to herd reduction actions implemented by the BLM.

4.1.10 Recreation

Any impact that would eliminate opportunities for recreation in the RDWMA could be considered significant. The BLM management objective of providing large areas of unobstructed views for enjoyment of scenic qualities within the RDWMA as a whole and the related action, possible establishment of a “Red Desert backcountry byway” on the Bar X Road, is discussed in Section 4.1.11, Visual Resources.

4.1.10.1 Proposed Action Direct and Indirect Effects

Although there is no specific statement in Chapter 2 about the small areas of the East Sand Dunes and Red Lake WSAs no activity would be permitted in the WSAs, as provided in the Interim Management Policy for Lands Under Wilderness Review.

Short-term, potential effects to recreation opportunities would occur during construction and drilling in the LRPA. Impacts to recreation opportunities in the LRPA would involve displacement of some hunters if construction and drilling activities were to occur during hunting season. Some hunters perceive minerals development activities as displacing game species and creating an environment that detracts from the quality of the hunting experience. As a result, some hunters may choose to hunt in areas outside of the LRPA.

Effects similar to those described above would potentially persist during the 30-year operating life of the wells. However, the adverse effect that hunters may experience over the long term would be lower because production activity in the LRPA, from the 54 proposed federal wells, would be greatly reduced when compared to that which would occur during drilling and construction. In addition, the LRPA represents a very small fraction of the hunt areas of which it is a part.

Some hunters view improved access to an area as a beneficial effect of minerals development. Oil and gas roads are, generally, not closed to public use and have the potential to serve secondary uses, such as providing access for hunters and other recreational users (USDOI-USDA 2007).

Development activity has occurred in the LRPA over the last seven years, minimal additional effect to recreation resources would result from development on the Proposed Action. Potential short-term effects may occur because of minerals development traffic and activity during drilling and construction. The anticipated rate of development, five to ten wells per year, is consistent with what has occurred in the past. The long-term effect would be a small, potential rise in activity over the producing life of wells already approved. Potentially affected recreational users would be hunters in the LRPA, back country hikers and persons driving for pleasure on the Bar X Road.

As discussed in Section 4.1.11, development of 54 federal wells under the Proposed Action would potentially have an impact to enjoyment of the area’s scenic qualities for recreational users of the Bar X

Road, the pending “Red Desert backcountry byway.” Oil and gas development activities have occurred in the area within and surrounding the Project Area for many years. Encountering minerals development traffic on the road may also affect the quality of the recreational experience for users of the road who wish to find just the Red Desert’s undisturbed landscapes, isolation, and solitude. Industrial traffic during drilling and construction would continue to affect the Bar X Road for about 36.5 miles, from the Table Rock exit of I-80 to the LRPA. Industrial traffic due to wells in the LRPA would be long term, continuing for the producing life of the wells, but it would be much less than what may be experienced during drilling and construction.

4.1.10.1.1 Mitigation Measures

No additional mitigation is identified.

4.1.10.1.2 Residual Effects

Some recreationalists may continue to view the Luman Rim project as an impediment to their backcountry experience regardless of mitigation provided by avoidance of the WSAs and the VRM mitigation outlined in Section 4.11.

4.1.10.2 No Action Alternative

Twenty-six conventional gas wells have been drilled in the LRPA and there are seven more WOGCC approved well permits. Under the No Action Alternative, development of at least the five wells currently permitted in the State mineral estate (Sections 36 and 16) would likely occur. The State mineral estate Section 16 is located between the Red Lake WSA and the East Sand Dunes WSA and adjacent to the Bar-X Road. Section 36 is immediately northeast of Red Lake and would be visible from the Red Lake WSA; therefore some continued effect to recreational opportunities would occur from the development of these wells. The remaining wells, proposed to develop the federal mineral estate, would not be drilled. Development activity has occurred in the LRPA over the last seven years, minimal additional effect to recreation resources would result from development on the State mineral estate. Potential short-term effects may occur because of minerals development traffic and activity during the additional drilling and construction. The anticipated rate of development, five to ten wells per year, is consistent with what has occurred in the past. The long-term effect would be a small, potential rise in activity over the producing life of wells already approved. Potentially affected recreational users would be hunters in the LRPA and persons driving for pleasure on the Bar X Road.

4.1.11 Visual Resources

Impacts that would result in a change to the existing visual classification (Class III) or that would prevent a casual observer the opportunity of seeing areas with unobstructed views (from key observation points) could be considered significant. Long-term effects to the characteristic landscape which do not meet VRM management objectives for the LRPA could be considered significant. Whether activities meet VRM management objectives is determined by comparing the strength of the contrast introduced by the Companies’ activities to the levels of change provided for by the VRM inventory in the Green River Resource Management Plan (BLM 1997).

The BLM management objective of providing large areas of unobstructed views for enjoyment of scenic qualities within the RDWMA as a whole is also a criterion. The effect of activities within the LRPA to the availability of unobstructed views in the RDWMA would be measured against this objective, which was instrumental in the establishment of the VRM Classes in the GRRMP, as noted below.

The LRPA falls within the Red Desert Watershed Management area established by the GRRMP. The LRPA is less than one percent of the acreage in the RDWMA. The BLM has developed management actions specifically for the Red Desert Watershed Management Area (BLM 1997). The GRRMP stated that the Red Desert Watershed Management Area will be managed to ensure that development and activities conform to the concept of open space and consistent with VRM Class II and Class III.

The LRPA landscapes are classified as being in VRM Class III (16,132 acres), VRM Class II (5,154 acres), and VRM Class I (approximately 75 acres). Section 3.12 stated that landscapes in the LRPA are not pristine, meaning they all show some evidence of previous or current human intrusion. This applies even to some extent to the Alkali Basin-East Sand Dunes and Red Lake WSAs. These WSAs lie to the south of the LRPA and are almost entirely outside of the LRPA with the exception of the very small acreage noted above as the VRM Class I located within the LRPA.

4.1.11.1 Proposed Action Direct and Indirect Effects

Although there is no specific statement in Chapter 2 about the small amount of VRM Class I land within the LRPA, no activity would be permitted within the VRM I area due to its designation as a WSA.

Short-term, potential effects to the characteristic landscape in VRM Class II and Class III are associated with construction and drilling in the project area; these would include contrasts in line, form, color, and texture associated with drilling rigs, construction equipment, service trailers, and the general industrial character of drilling and testing activities.

Additional impacts could occur from fugitive dust produced by construction activities. Thus, any impacts to the Class II and III view sheds would be temporary and considered necessary and due. Use of low contrast, non-reflective paint and natural colors on structures would reduce the visual impacts to the extent possible and be in accordance with the GRRMP management actions for the Red Desert Watershed Management Area. BLM approved colors would be used on any temporary (i.e., tanks) or permanent structures (i.e., wellhead covers) in accordance with the GRRMP.

Fixed facilities such as access roads (improved and unimproved roads) would be required to service production facilities. Roads would create additional contrasts in line, color and texture to those described above. With appropriate mitigation, the level of contrast would not exceed standards for the VRM Class assigned. However, contrasts could diminish the experience of motorists and recreationists in the immediate area. Some temporary effects can be partially mitigated during construction and drilling by using BLM Oil and Gas Operations program BMPs (BLM 2006c). If the Companies incorporate necessary and effective BMPs into construction and drilling and undertake rapid interim reclamation, as soon as drilling is completed, the intensity and duration of short-term impacts to visual resources would be lessened. In addition, incorporating necessary and effective BMPs into construction and drilling can reduce the potential for long-term effects. BMPs applicable to construction and drilling include, but are not limited to, planning and design of roads, drill pad and central facilities; housekeeping standards; and minimizing topsoil removal through brush-beating or mowing, parking on the grass and excavating only as absolutely necessary for pits and pad leveling.

Long-term effects to visual resources would occur because of the operation of wells and production facilities in the LRPA. Potential effects would be caused by cleared pads and roads, edges created between clearings and vegetation, and the placement of structures, all of which would introduce moderate to strong contrast with the characteristic landscape as seen from a KOP.

Patterns of casual use in the area suggest that roads identified in Chapter 3 are the location of KOPs. KOPs of particular concern would be found on the Bar X Road, because of its pending status as a BLM

backcountry byway, and roads below Luman Rim either on or just north of the East Sand Dunes and Red Lake WSA boundaries, because of their location in VRM Class II and the proximity of the Luman Rim cliff. The BLM generated a digital analysis of key observation points along County Road 4-21 for the Lower Bush Creek CBNG environmental analysis (BLM 2003a, Figure 4.2). This analysis indicates areas that would be visible from Bar-X Road through the project area. The lack of site-specific information on well locations limits the ability to analyze whether the 54 federal wells of the Proposed Action would introduce contrast exceeding VRM objectives. Current plans indicate up to 16 new wells could be drilled within VRM II. Previous experience and observation development elsewhere in the RDWMA indicates that wells in the LRPA may meet VRM Class III objectives (“moderate” change) and may exceed VRM Class II objectives (“low” change). Additional wells drilled within the VRM II area would be consistent with or less obtrusive than existing operations in this VRM classification. Site specific analysis will be done at the time of the onsite.

The impacts to the BLM management objective of providing large areas of unobstructed views in the RDWMA is considered from a perspective of what is available to the casual viewer from KOPs on the 75-mile Bar X Road (the pending “Red Desert byway”). Development of the 54 federal wells of the Proposed Action would potentially obstruct or partially obstruct such views on one or both sides of the road for a distance of about four miles, or about five percent of the experience of driving the road from Table Rock to SH 28. This is a low impact to enjoyment of the area’s scenic qualities.

4.1.11.1.1 Mitigation Measures

The Companies commitment to use selected BMPs may mitigate the effect of the Proposed Action on Class II and Class III resources. BMPs, such as cluster or pad drilling (if geologically feasible), centralized facilities, using low-profile tanks, using natural topography to hide tank locations, painting tanks and facilities to blend with the surrounding landscape, and undertaking rapid interim reclamation as soon as drilling is completed could provide sufficient mitigation. However, site-specific observation and analysis would be needed to determine this. The GRRMP provides for site-specific review when, as noted in Chapters 2 and 3, it stated that for activities in the RDWMA, “Site specific visual resources reviews (inventories) will be conducted prior to allowing activities that may affect these values,” which values are, namely, as noted above, conformity with the “concept of open space” and consistency with established VRM Class II and Class III management objectives.

The RSFO would require that the Companies participate in planning and evaluation of effects to visual resources a site specific basis for all 54 federal wells of the proposed action and consider incorporating appropriate environmental BMPs into Applications for Permits to Drill. In addition, the RSFO would request that the Companies use visual simulation and participate with the BLM to evaluate the results for all proposed well sites potentially visible from KOPs on the Bar X Road and all well sites located in VRM Class II.

4.1.11.1.2 Residual Effects

No additional mitigation is identified beyond those measures identified in Chapter 2. Residual effects, while not reaching the level of significance would occur even if mitigation measures were implemented as the features associated with construction, drilling and production activities will be visible for the life of the project and beyond until final reclamation has been successful.

4.1.11.2 No Action Alternative

Twenty-six gas wells have been drilled in the LRPA and there are seven more WOGCC approved well permits. Under the No Action Alternative, development of at least the five wells currently permitted in the

State mineral estate (Sections 36 and 16) would likely occur. The State mineral estate Section 16 is located between the Red Lake WSA and the East Sand Dunes WSA and adjacent to the Bar-X Road. Section 36 is immediately northeast of Red Lake and would be visible from the Red Lake WSA; therefore some continued effect to the view shed would occur from the development of these wells. The remaining wells, proposed to develop the federal mineral estate, would not be drilled. Development activity has occurred in the LRPA over the last seven years, minimal additional effect to visual resources would result from development on the State mineral estate.

Long-term effects to visual resources would potentially occur because of the drilling and operation of the additional wells proposed in the state mineral leases and the wells already drilled and producing in the Luman Rim project area. Potential effects would be caused by cleared pads and roads, edges created between clearings and vegetation, and the placement of structures, all of which would introduce contrast with the characteristic landscape as seen from a KOP.

4.1.12 Cultural Resources

Once the final locations of the wells, access roads, pipelines, and related production facilities of the proposed project are determined, and prior to ground disturbing activities, the requirements of section 106 of the National Historic Preservation Act (NHPA) would be completed. This process would include identifying and evaluating cultural resources, indentifying any historic properties (as defined in the NHPA), assessing adverse effects from the proposed activity, and resolving any adverse effects. This process will be accomplished in consultation with the Wyoming State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation following the procedures set forth in the Programmatic Agreement Among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in which the BLM will meet its Responsibilities Under the National Historic Preservation Act (Protocol). Consultation with appropriate Native American Tribes and other affected parties will also be undertaken prior to authorizing activities which may affect historic properties or properties of significance to Tribes.

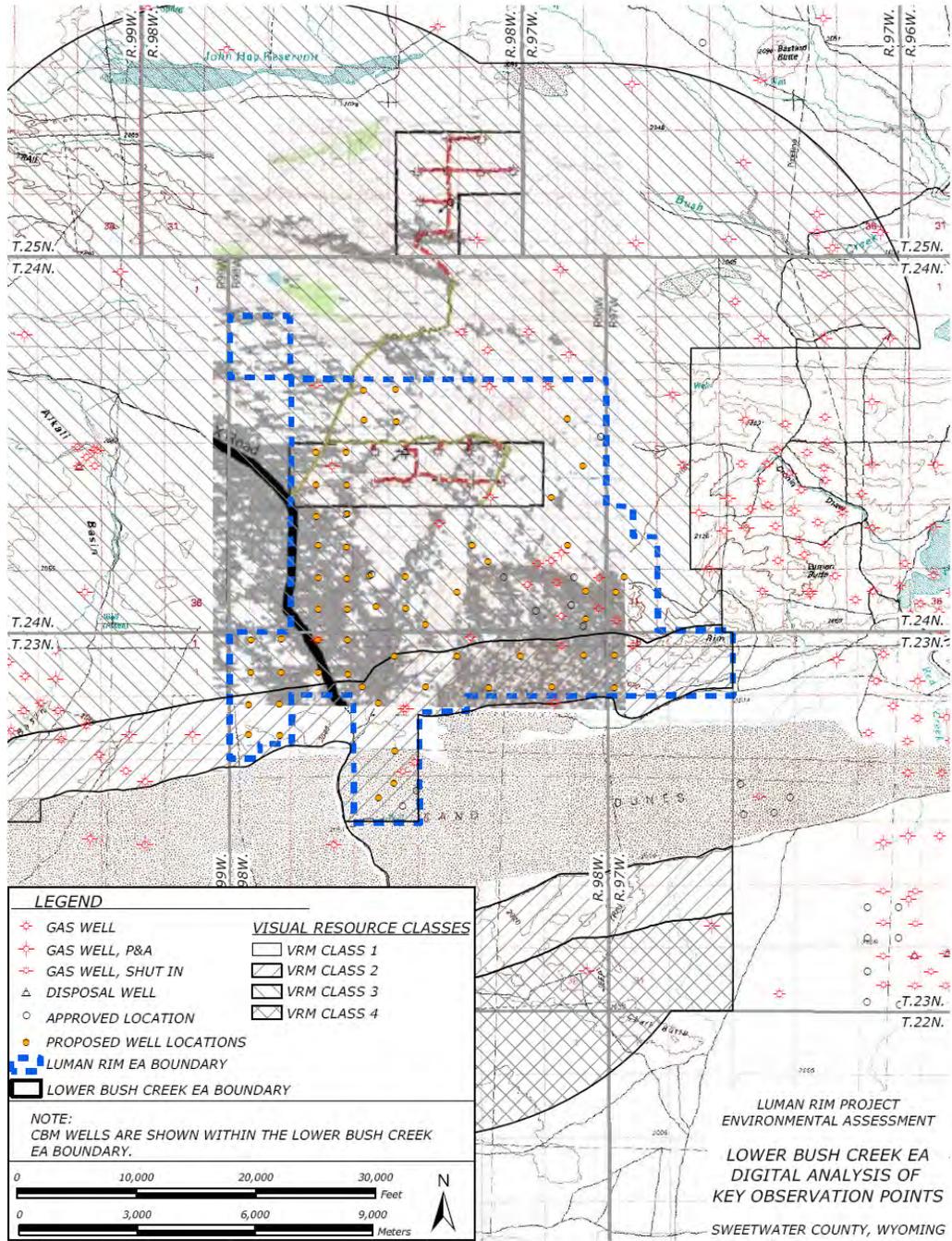
By completing the requirements noted above prior to authorizing ground disturbing activities, impacts to historic properties will be avoided, minimized, or mitigated. If actions were to adversely affect a National Register eligible property or property of significance to Tribes that could not be mitigated, the impact could be considered significant.

4.1.12.1 Proposed Action Direct and Indirect Effects

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may occur by:

- Physically altering, damaging, or destroying all or part of a resource.
- Altering characteristics of the surrounding environment that contribute to the resource's significance.
- Introducing visual or audible elements that are out of character with the property or alter its setting.
- Neglecting the resource to the extent that it deteriorates or is destroyed.

Figure 4.1 - Viewshed Analysis of Project Area and Access*



*modified from Lower Bush Creek EA 2003, Figure 4.2

As noted above, direct impacts can be assessed by identifying the types and locations of proposed activities and determining the exact location of cultural resources that could be affected. Indirect impacts could result from the effects of project-induced changes to land use patterns. For example, the creation of new roads increases public access to the area which could result in possible illegal collection of cultural resources.

Adverse effects to historic properties would be mitigated first by avoidance, then by other measures determined in consultation with the Wyoming State Historic Preservation Office and affected Tribes as appropriate. Monitoring by a professional archaeologist of surface disturbing activity is useful to reduce the potential damage to cultural resources. Direct impacts would primarily result from construction related activities. Activities considered to have the greatest potential effect on cultural resources include blading of well pads and associated facilities and the construction of roads and pipelines. Sites located outside the project area would not be directly affected by the construction activities.

4.1.12.1.1 Mitigation Measures

Application of the mitigation measures identified below would minimize potential impacts to cultural resources.

- Individual cultural clearances would be approved prior to approving well APDs.
- Selected surface or vegetative disturbing activities associated with individual actions should be monitored by a professional archaeologist.
- If at any time during construction, maintenance, or use of the project area, previously unanticipated or unknown cultural resources are discovered, all activities would be suspended in the area of discovery. Continued operation would be conducted in such a fashion as to permit no further damage to the discovered cultural resource. Protective measures could be implemented in consultation with the BLM and the Wyoming State Historic Preservation Office. Work would not resume in the area of discovery until a written Notice to Proceed is issued by the BLM authorized officer.
- Mitigation of effects to cultural resources would be determined through consultation between the BLM and the Wyoming State Historic Preservation Officer and affected Tribes, as appropriate.
- Protective measures may be required to preserve significant cultural resources outside the direct impact zones as well.

4.1.12.1.2 Residual Effects

Residual effects to the cultural resources could occur even if mitigation measures are applied and unidentified resources were impacted. These effects would not rise to the level of significance.

4.1.12.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Effects to cultural resources consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.13 Socioeconomics

Impacts that result in a major increase to the population base of Sweetwater or Carbon counties or major increases in needed social services could be considered significant.

4.1.13.1 Proposed Action Direct and Indirect Effects

The project could enhance local and regional economic conditions and could result in the generation of local, state, and federal government tax and royalty revenues should production prove successful and ensue. Tax revenues to Sweetwater County would increase with the development of natural gas production and the increase in the local tax base. Benefits would accrue to the state and federal governments from the sale of natural gas.

The relatively small, short-term drilling and testing operations workforce would not generate noticeable population effects or demand for temporary housing or local government services. Should a work camp be required, it would be authorized as separate action since exact location is unknown at this time.

The proposal to further develop the Luman Rim field are would involve capital investment. Development and operation of the project would require goods and services from a variety of local and regional contractors and vendors, from the oil and gas service industry and from other industries. Expenditures by the proponent for these goods and services, coupled with employee and contractor spending, would generate economic effects for Sweetwater and Carbon counties, and for Wyoming in the form of taxes collected.

Given the continued economic downturn, the un- and under-employed workforce and the availability of housing in southern Wyoming, it is reasonable to assume that the direct and indirect economic benefits of the project would be positive.

4.1.13.1.1 Mitigation Measures

See Chapter 2 for applicant committed practices.

- Any work camps would be authorized separately.

4.1.13.1.2 Residual Effects

Residual effects to the socioeconomic condition of the area could include a more stable workforce and local economy.

4.1.13.2 No Action Alternative

Under the No Action Alternative the Proposed Action would be denied and no additional project related natural gas development would take place on federal leases and holders of federal oil and gas leases would be denied their rights for exploration or drilling on the federal mineral estate. If drilling and production does not occur, then a significant economic benefit would be denied to the leaseholders. The state mineral leases would likely be developed and produced but additional federal minerals would not be recovered and revenues from these un-recovered minerals would not be realized by the federal and state governments, nor would additional tax revenues be realized by local governments. Limited additional socioeconomic effects would be expected to occur beyond the current situation.

4.1.14 Transportation

Impacts that result in major changes to traffic patterns on highways or county roads or cause severe damage to permitted roads or adjacent resources could be considered significant.

4.1.14.1 Proposed Action Direct and Indirect Effects

The project would generate traffic volumes on highways and county and management roads providing access to and within the project area consistent with previous seen levels as drilling and completion activities would be at a pace similar to that which has already occurred in the area. Traffic would result from the movement of project-related workers, equipment and materials to and from the project area to perform drilling, field development, well service, field operations, and reclamation activities.

Table 2.2 shows the estimated average number of trips associated with various well field activities. According to information provided by the Companies, drill rigs, water trucks, and other items of heavy equipment would be transported to the project area and remain within the project area until drilling is completed annually, with an estimated 5 wells drilled per year. Drilling and completion crews and other personnel would commute to the area daily for shift changes and as needed to complete specific activities. Based on these plans and the estimates contained in the table, the project would generate between 5 and 10 round trips per day during drilling and completion operations. After the drilling and completion activities are completed and production ensues, Proposed Action-related traffic would average three trips per week, with slightly higher peak periods when maintenance activities are performed on wells.

Given the relatively small increment of traffic and the relatively short duration of the drilling and completion phase, it is unlikely that the project would result in a measurable increase in accident rates on highways or county roads.

To avoid resource damage and inability to access the field when necessary, project roads will be constructed to the appropriate BLM Gold Book standard (see Appendix C, MSUPO).

4.1.14.1.1 Mitigation Measures

Implementation of applicant committed mitigation found in Chapter 2 should be adequate to avoid resource impacts.

4.1.14.1.2 Residual Effects

No residual effects are anticipated from the Proposed Action.

4.1.14.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Transportation related effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.15 Health and Safety

Impacts due to intentional violation of standards or regulations pertaining to worker safety could be considered significant.

4.1.15.1 Proposed Action Direct and Indirect Effects

Health and safety impacts of the project would include a relatively low individual risk to project workers from industrial accidents, and natural disasters. There would be a slight increase in the risk of traffic accidents during drilling and field development operations as well as occupational risks inherent to the oil and gas drilling industry.

Occupational Hazards

Health and safety concerns associated with the Proposed Action are similar to those described in Chapter 3. Implementation of the Proposed Action would likely result in an increased risk to the work force due to the increased number of personnel in the field, the increase in heavy equipment and drilling operations and the resultant increase in vehicle traffic. Compliance with the State of Wyoming Department of Employment Workers Occupational Health and Safety program rules and regulations for construction and oil and gas well drilling, well servicing and well special servicing operations will aid in reducing project related occupational hazards. In addition, the BLM considers safety issues during the APD review process (Operating Order #1) and reminds the operator of their occupational health and safety responsibilities in 43 CFR 3162.5-3. Compliance with the OSHA standards works to reduce the opportunity for occupational injuries.

Other Risks and Hazards

The risks to public health and safety are not expected to increase under the Proposed Action; the risk of traffic accidents involving the public are anticipated to be consistent with the current accident rate on area roads including I-80 and Bar X. Highway safety impacts are discussed under Transportation section.

4.1.15.1.1 Mitigation Measures

See mitigation sections for Soils and Water Resources for suggested mitigation for special purpose roads. No additional mitigation is identified beyond those measures found in Chapter 2.

4.1.15.1.2 Residual Effects

Residual effects to health and safety to industry workers of the public are not anticipated as a result of the Proposed Action.

4.1.15.2 No Action Alternative

Under the No Action Alternative, the development of the federal mineral resource associated with the Proposed Action would not occur. Health and safety related effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.16 Hazardous Materials and Waste Management

Intentional violation of any Federal or State regulation pertaining to the use, storage, transportation or disposal of hazardous materials could be considered significant.

4.1.16.1 Proposed Action Direct and Indirect Effects

Hazardous Materials

Drilling, field development, and production activities require use of a variety of chemicals and other materials, some of which would be classified as hazardous. The Companies and their contractors would

handle materials used for drilling, completion and production operations as described in Chapter 2, Appendix C and Appendix D. Thus, any impacts would be expected to be minor, especially if proper handling and use of such materials on the well site occurs as required in the various applicable regulations. Placement of well locations away from drainages, proper cementing operations, properly designed reserve pits and on-site storage areas would keep any accidental spills or leaks localized. Prompt clean up would prevent further contamination of soils, surface or ground water. Project operations would comply with all relevant federal and state laws regarding hazardous wastes or materials and with directives identified in the SPCC plan.

A Hazardous Materials disclosure is provided as Appendix D. This list of materials was developed pursuant to Instruction Memoranda WO-93-344 and WY-94-059, which require that all NEPA documents list and describe any hazardous or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed project.

Potential impacts associated with hazardous materials include human contact, inhalation or ingestion, and the effects of exposure, spills, or accidental fires on soils, surface water, groundwater resources, and wildlife. The risk of human contact would be limited predominately to Luman Rim operator and contractor employees.

Waste Management

The drilling of gas wells generates exploration wastes in the form of mud and cuttings which would be deposited into lined reserve pits or into “pit-less” tank systems. The BLM and WOGCC regulate the construction, use and closure of these facilities. Drilling fluids can be recycled to some extent, with the remainder dried and buried on site, as approved by the BLM and WOGCC, or hauled to a commercial oilfield waste disposal facility permitted through the Wyoming Department of Environmental Quality. Recovered fluids generated from completion operations are disposed of in the reserve pit, at a commercial disposal site or in an approved disposal well. Non-hazardous solid wastes generated from operations are generally hauled to municipal landfills in Wamsutter, Rawlins and Rock Springs.

To enhance protection of environmentally vulnerable areas companies must comply with the applicable provisions of SPCC regulations of EPA found at 40 CFR 112. These regulations require secondary containment for mobile and non-mobile equipment that contains oil in volumes greater than 1,320 gallons that could impact navigable waters of the United States in the event the material was released. This rule applies to drilling operations and production activities within the project area.

Sanitary wastes are disposed in portable toilets for long-term construction, drilling and completion operations; these wastes are hauled to municipal sewage treatment plants for disposal.

Produced water within the project area would be managed through the use of commercially permitted evaporation ponds and injection/disposal wells. These facilities would be permitted by the WOGCC, WDEQ and the BLM. The specific permitting mechanism depends on facility ownership, source of produced water and location.

4.1.16.1.1 Mitigation Measures

- A Hazard Communication Program, SPCC Plans, and other mitigation measures described in Chapter 2 would reduce the risk of human contact, spills and accidental fires, and provide protocols and employee training to deal with these events should they occur.
- Wastes generated by the various aspects of the development and production operations would be disposed in facilities permitted by the appropriate regulatory agency.

4.1.16.1.2 Residual Effects

Residual effects, while not reaching the level of significance, could occur even if mitigation measures were implemented. There is always a risk of oil, fuel or chemical spills which could result in long-term but relatively low-level contamination of the soil.

4.1.16.2 No Action Alternative

Under the No Action Alternative, potential for spills or leaks would not change from the existing condition. Additional drilling activity would be denied on Federal leases, however, selection of this alternative would not prevent drilling on State mineral leases, future drilling proposals or the potential for spills or leaks from other activities (e.g., recreational vehicle use, on-going oil and gas activities). Therefore, under the No Action Alternative, hazardous materials and waste management related effects consistent with the Proposed Action would be expected as State mineral leases would likely be developed in Luman Rim and the existing production operations would continue.

4.1.17 Noise

Significance criteria for project related noise includes long-term activities that would exceed suggested federal (EPA) 55 dBA maximum standard for noise at either human- or animal- sensitive locations. No threshold for noise has been identified by the State of Wyoming.

4.1.17.1 Proposed Action Direct and Indirect Effects

Noise associated with construction and natural gas production operations can create a disturbance that affects human safety (at extreme levels) and/or comfort, as well as modify animal behavior.

Determining activities that exceed the maximum standards is not a simple issue since perception of sound varies with intensity and pitch of the source, air density, humidity, wind direction, screening/focusing by topography or vegetation, and distance to the receptor. Frequent strong winds will add to ambient noise levels. The EPA guideline of 55 dBA is extremely conservative and represents a level at which an activity will have no effect on receptors in the environment; the sounds will not be noticeable to the human ear.

The direct impact of the Proposed Action is the drilling, completion and production of an additional 54 federal wells. The Companies each anticipate drilling 5 to 10 wells per year resulting in up to two rigs running at any one time for the next 5 to 10 years. In addition to drilling and completing the wells, the associated infrastructure will be constructed including access roads and gas pipelines, as well as the reclamation of disturbed areas.

Construction and drilling operations would take place at each well site resulting in an increase in noise, when compared to the natural background condition, of 30 to 50 dBA. Construction, drilling and completion activities related to the drilling of conventional wells may last from 30 to 60 days. Equipment and operational noise is generated during these activities from a variety of sources including engines, equipment impact and well flaring.

It has been determined that drilling and flaring operations produce the loudest project related noise. At Jonah (BLM 2006a) noise from drilling operations was measured as 77.5 dBA on-site and 50.1 dBA at 0.25 miles. Based on this information, drilling operations should not exceed the significance threshold for impacting sage-grouse leks, a sensitive receptor, as long as the 0.25 mile lek protection buffer is observed. Flaring operations at Jonah were measured at 97.9 dBA on-site and 66.3 dBA at 0.25 miles. The use of flowback separators decreased flaring noise to 63.7 dBA on-site. As a result of this

information, it appears that flaring operations may exceed the significance criteria on an occasional basis; due to the differences between the Jonah and Luman Rim gas resources, monitoring should be conducted to determine site specific impacts.

During the production phase of field operations, noise sources are generally less intense or of very short duration. These activities include occasional well workovers, routine site visitation by company personnel (“pumpers” and technicians) and road maintenance equipment. Holloran (2005) suggests that heavily traveled main haul roads located within 3 miles of greater sage-grouse leks may negatively impact male lek attendance. While Holloran (2005) does not provide information regarding the vehicle type, anecdotal information (Holloran pers. com. 2003) pointed to the steady stream of big diesel semi-rigs, such as water and fuel tankers, completion equipment haul trucks, and drilling equipment, as the traffic generating the noise and resultant disturbance impacts to sage-grouse. Production volumes anticipated for the Luman Rim project are relatively low, as are the corresponding number of trucks transporting produced fluids, condensate and water.

At various times and at specific locations within the project area, noise levels associated with drilling, field development and operations activities will temporarily exceed the EPA established threshold of 55 dBA, averaged over 24 hours. Noise generated from these activities can be of an intensity and frequency that causes harm to human receptors. Field development and production related noise impacts would affect site workers who are subject to state and federal OSHA standards. OSHA mitigation standards for noise exposure are an 8-hour time-weighted average of 85 decibels or a dose of 50% are referred to as OSHA action levels [29 CFR 1910.95(c) (2)]. Occupational exposure to noise levels in excess of 85 dBA requires monitoring and mitigation, preferably by engineering means, to protect workers. Non-site worker impacts would be limited due to the lack of residential occupation and concentrated recreational activity within the development area. Scattered activities, such as livestock operations and recreational activities, including hunting, may be exposed to noise as they move past development activities and operating equipment. Noise can also modify animal behavior and habitat use patterns, such as the use of critical winter habitats or sage-grouse leks.

Construction-related effects would be short term. Noise levels in excess of the 55 dBA standard (EPA standard) would occur during construction and drilling operations.

Given the low human population densities in the project area, construction and development operations under the alternatives would be sufficiently distant from residences that none would likely be affected by construction or development operations. Overall noise produced by construction and support services equipment during peak activity periods would be moderate because of its dispersed and short-term nature.

4.1.17.1.1 Mitigation Measures

Operational noise will be lessened with the implementation of remote telemetry which can significantly reduce the number of site visits needed by operations personnel. A survey conducted in the Moxa field area (BLM 2007b) found that the use of telemetry (remote monitoring of wells) could reduce field visits by 50%. The use of solar electricity or natural gas as a fuel for on-site power generation, as opposed to the use of diesel fuel, also reduces noise levels. Over time natural gas wells may require artificial lift systems to facilitate production resulting in the need to install gas lift, plunger lift, down hole pumps or other technology which could generate noise. Depending on the fluid volumes produced, the installation of produced water and condensate gathering systems to transport these fluids to centralized facilities for disposal or sale could substantially reduce production related noise compared to tanker truck transportation.

Noise from field development and production activities can also be dampened or reduced relative to receptors with the use of mechanical muffler systems, the use of vegetative, constructed or topographic screening, distance and consideration of the direction of the noise source from the receptor. These considerations serve to lessen the impact of noise on workers, residences and sensitive wildlife species. Noise is also affected by environmental factors, such as humidity, wind speed and direction, and air density. Consideration of the prevailing wind direction, when siting noise generating operations, also serves to lessen the impact of noise on sensitive receptors.

See committed management practices detailed in Chapter 2.

4.1.17.1.2 Residual Effects

Residual effects are not anticipated due to the transitory nature of noise. Indirect residual effects could include displacement of wildlife which move out of the area due to noise related disturbance and re-colonize once the disturbance has passed or they have acclimated to the disturbance.

4.1.17.2 No Action Alternative

Under the No Action Alternative, noise would be consistent with the existing condition. Additional drilling activity would be denied on Federal leases, however, selection of this alternative would not prevent drilling on State mineral leases, future drilling proposals or the potential for noise generated by other activities (e.g., recreational vehicle use, on-going oil and gas activities).

4.2 CUMULATIVE EFFECTS

40 CFR 1508.7 defines cumulative effects 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 effects can result from individually minor, but collectively significant, actions occurring over time.

The cumulative effects analysis area (CEAA), as defined for the Luman Rim project, is intended to disclose cumulative effects for resources that may be affected by the proposed action or no action alternative, and varies in size depending on the resource in question. Only those resources which are expected to be impacted by the Proposed Action are discussed in this section.

Reasonably foreseeable development is that development likely to occur within the cumulative impact assessment area within the next 5 years. Cumulative effects assessment areas vary among resources and are generally based on relevant landscape, resource, project, and/or jurisdictional boundaries. The CEAA for individual resources affected by this action is found in Table 4.5. The analysis assumes that the Luman Rim project and Continental Divide Creston (CD/C) natural gas development areas are approved and fully implemented. All development proposed on public lands is subject to compliance with NEPA including cumulative impact assessment. The proposed Luman Rim project lies immediately to the northwest and within the general cumulative impact assessment area for the various resources of concern being addressed in the CD/C NEPA analysis.

The Continental Divide/Creston Natural Gas Project EIS project is analyzing conventional and coal bed gas development in several geologic formations (principally the Almond, Lewis, and Mesaverde).

Industry operators have proposed consideration of various spacing and development scenarios in the CD/C area. The existing Wind Dancer and Hay Reservoir conventional gas projects as well as the Scotty Lake and Hay Reservoir CBNG fields are located in the northwest corner of the CD/C analysis area and are currently approved at 80-acre spacing. Many of these wells have already been drilled. There are roughly 60 existing and reasonably foreseeable conventional gas and CBNG wells in the northwest corner of CD/C. Figure 4.2 provides an overview of the generic Cumulative Effects Analysis Area of the Luman Rim project.

The Lower Bush Creek Coalbed Methane Exploratory Pilot Project is located in the Luman Rim project area. The EA for this project analyzed the disturbance and effects of the drilling and production from 20 coalbed natural gas wells over 3,500 acres. DR/FONSI for this project was signed on August 22, 2003. This project is in an indeterminate state due to water management issues, ten wells have been drilled and are shut-in; no operations are taking place relative to Lower Bush Creek CBNG. In addition to the CBNG wells in the Luman Rim project area, there are twenty-six existing conventional gas wells and seven more WOGCC approved well permits.

The expected short-term disturbance area for each conventional gas well in Luman Rim is approximately 15.16 acres, including well pad, access road, and pipeline for most wells (Table 2.1). It should be noted that the short-term disturbance figure represents the disturbance associated with a typical well prior to any reclamation activities. Most of the producing wells have been reclaimed to their production facilities and CBNG well sites are typically a quarter the size of conventional well sites.

Using this assumption, the Proposed Action, 54 federal and 4 state wells or approximately 876 acres, in combination with the 46 wells already drilling in Luman Rim, which includes the 20 Lower Bush Creek CBNG wells (697 acres), and 60 existing and reasonably foreseeable wells in the surrounding area (910 acres), would result in a total cumulative oil and gas development disturbance (short term) of 164 wells or 2,486 acres, within the generally described CEAA. This proposed project, in combination with other reasonably foreseeable activities and actions within the assessment area, is not expected to cumulatively affect resources of consideration if the mitigations provided in the APDs and Conditions of Approval (COAs) are implemented.

Past actions on or in the vicinity of the project area that continue today and have influences on the area include on-going natural gas exploration and development, livestock and wild horse grazing, recreation, and use by wildlife.

Figure 4.2 - Generic Cumulative Effects Analysis Area for the Luman Rim Project

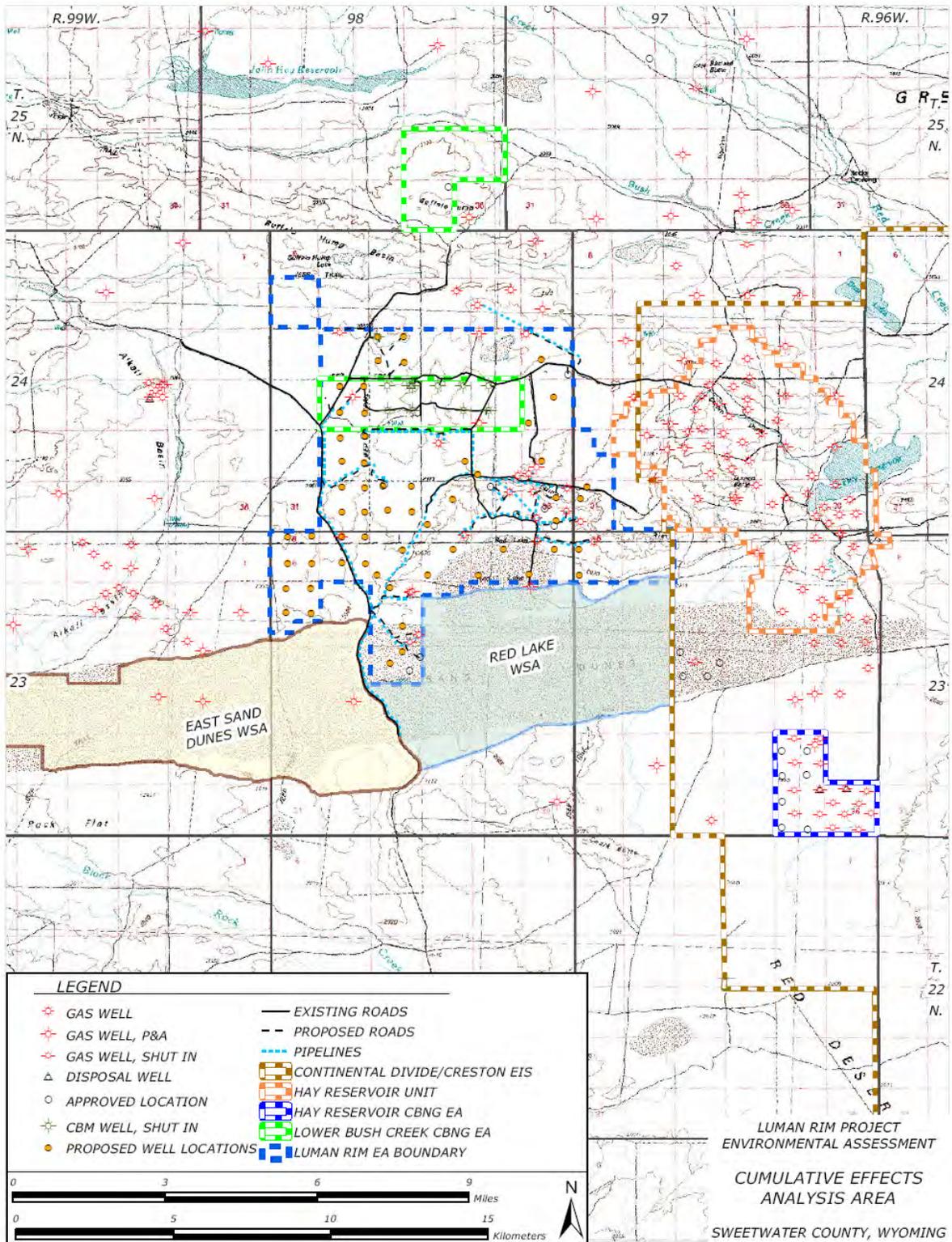


Table 4.5 - Cumulative Effects Analysis

Resource	Cumulative Effects Assessment Area	Number of Acres of Disturbance or Activity Level (existing disturbance and RFD)	Potential Cumulative Effects Relative to Luman Rim Project
Air Quality	Regional air shed including portions of Wyoming and northern Colorado.	Cumulative air quality impacts are defined as incremental impacts from any one alternative combined with impacts from other existing or proposed air emission sources in the region. Air pollutant emissions over the LOP would occur from routine vehicle traffic and production facility emissions. The contribution from these activities to cumulative ambient air concentrations and AQRVs, including regional haze and N deposition, at the PSD Class I Bridger Wilderness Area and PSD Class I Mount Zirkel Wilderness Area would be negligible.	Emissions within the federal and state thresholds.
Paleontological Resources	Paleontological Resources: project area + 2 miles; 69,714 acres.	Approximately 1607 acres of roads, well locations and pipelines.	Mitigation (pre-construction field surveys) to prevent destruction or damage to the resource.
Soils/Vegetation/ Invasive Species	Project Area + 2 mile buffer; 69,714 acres.	Approximately 1607 acres disturbed.	Proposed Action of 54 additional federal wells, initially disturbing 879 acres. No ESA listed plant species or their habitat exists in the project area. The Bastard draba milkvetch (<i>Astragalus drabelliformis</i>), a BLM special status species, has been observed in the project area but not in areas proposed for development. Mitigation, including stabilization and reclamation are required where soils are disturbed. Seeding with native species. Mitigation to prevent invasive species invasion/weed treatments required.

Resource	Cumulative Effects Assessment Area	Number of Acres of Disturbance or Activity Level (existing disturbance and RFD)	Potential Cumulative Effects Relative to Luman Rim Project
Surface Water Resources	The affected watershed includes the Red Lake playa and four additional small playas within the Luman Rim portion of the closed Great Divide Basin.	Estimated acres of existing disturbance in the North Red Desert Basin area of the Great Divide Basin watershed (1,607 acres) associated with the 106 existing, P&A'd, and SI wells.	Surface water will not be impacted by approximately 879 acres of additional disturbance from PA. Mitigation (avoidance/protection) required for all activities on public land.
Ground Water Resources	General Cumulative Impact Assessment Area for industrial and agricultural uses within the Great Divide Basin watershed that are removing water from the Mesaverde and various other formations.	Approximately 2.4 acre feet of ground water removed for each of the 53 RFD wells assuming the worst case of no recycling of drilling water and all required water being removed from the ground water source, 127.2 acre feet of water removed.	Proposed Action would use approximately 129 acre feet of water and would not cause depletion of water from the project area beyond that already appropriated. Mitigation is required to prevent ground water contamination.
Land Use/Range Resources	Red Desert Allotment – 257,514 total acres, 132,565 available acres; 10,377 total AUMs incl. 1,337 livestock AUMs.	106 wells = 1607 acres or 124 AUMs = 1.14% of the Allotment, assuming all these wells are within 2 miles of water.	Proposed Action would add 879 short-term acres of disturbance or reduce available AUMs by 68, assuming all the PA wells are within 2 miles of water.
Elk	Crucial winter/yearlong habitat affected by Luman Rim; 25,214 acres.	Two P&A's and three producing wells are within the elk crucial WR, accounting for approximately 76 acres of direct surface disturbance or 0.003% of the crucial habitat area.	Two permitted wells are proposed in the elk crucial winter range and would add approximately 31 acres of direct surface disturbance, or a total of 110 acres, 0.04%.
Sage- Grouse	Sage-grouse leks + 2 mile buffer associated with the LRPA – 38,054.5 acres.	35 existing and RFD wells are located within 2 miles of the nearest lek (approximately 528 acres of ST disturbance). None of these wells are within State of Wyoming identified core sage-grouse population areas.	23 proposed LR wells are (347 acres of direct disturbance) are located lek associated nesting habitat; none are located within State identified core population areas. Stipulations apply; RFD and Luman Rim proposals handled on a case-by-case basis. Mitigation would apply.

Resource	Cumulative Effects Assessment Area	Number of Acres of Disturbance or Activity Level (existing disturbance and RFD)	Potential Cumulative Effects Relative to Luman Rim Project
Raptors	Luman Rim project area + 1 mile buffer; 44,606.6 acres.	2 active, 3 P&A'd gas wells and -0- proposed RFD wells are located within 1 mile of active FH nests or 0.5 miles of other raptor nests located within the CEAA; approximately 75.5 acres of disturbance.	Proposed Action would add 1 well within 1 mile of raptor nests or 15.1 acres of disturbance. No wells are proposed within 0.5 miles of active FH nests. Timing stipulations would apply to all wells.
T&E	Black-footed ferret (within white-tailed prairie dog habitat).	LR and RFD well proposals are handled on a case-by-case basis	Proposed Action - No effect determination for black-footed ferret.
Socioeconomics	Sweetwater & Carbon counties		Continued employment opportunities within the Rawlins and Rock Springs areas; minor enhancement to local and state revenues; add to national energy supply.
Cultural	Project area; 21,366 acres.	Existing wells and roads resulting in approximately 879 acres of disturbance.	Proposed Action – no adverse effect determination.
Wild Horses	Great Divide Basin HMA 778,915 acres	~300 wells = 4,530 acres or approximately the forage allocation of three horses, assuming all these wells are within 2 miles of water.	Proposed Action would add 879 short-tem acres of disturbance or reduce available forage by less than one horse, assuming all the PA wells are within 2 miles of water.
Recreation	Project area + surrounding Area.	Mainly hunting related activities, some ORV use, scenic value and horse observing and backcountry experiences.	Some temporary displacement of hunters and recreationists during periods of drilling and construction. There may be reduced levels of satisfaction with the recreational experience but will provide more vehicle access.
Visual Resources	Project area + 10 mile section of access road leading to the project area; area within Class I, II, III and IV VRM.	Existing and RFD oil and gas activity, roads, pipelines, and other intrusions.	The area is not pristine. Existing, proposed, and RFD would add to the visual impact. However, all activity would be mitigated (i.e. placement, painted). Large areas of unobstructed views remain.

4.2.1. Air Quality

Regional air shed including portions of Wyoming and northern Colorado. Cumulative air quality impacts are defined as incremental impacts from any one alternative combined with impacts from other existing or proposed air emission sources in the region. Air pollutant emissions over the LOP would occur from routine vehicle traffic and production facility emissions. The contribution from these activities to cumulative ambient air concentrations and AQRVs, including regional haze and N deposition, at the PSD Class I Bridger Wilderness Area and PSD Class I Mount Zirkel Wilderness Area would be negligible. Emissions anticipated from the PA are within the federal and state thresholds.

4.2.2 Topography, Soils, Surface Water, and Vegetation

Past, proposed, and reasonably foreseeable actions would require restoration of disturbed areas to pre-disturbance conditions on public lands. Topographic alterations from natural gas exploration generally affect a very small portion of the total land surface.

The project area lies within a portion of the Great Divide Basin portion of the BLM Red Desert Watershed Management Area. Existing facilities found in the Great Divide Basin include the communities of Wamsutter and Rock Springs, the Union Pacific Rail Road, Interstate 80, state highways, county roads, and numerous upgraded roads and two track trails, well pads, pipelines, power lines, coal mining, etc. All of these developments affect surface water quality to a small degree - run off from gravel and two-track roads probably contribute most to any surface water impacts. However, storm water runoff control plans are required by federal, state, or county entities so cumulative impacts to surface water quality are expected to be within acceptable levels. Standard stipulations and site-specific construction and reclamation procedures are required on federal lands to maintain surface drainage patterns. Procedures require implementation of reclamation including re-grading and re-contouring disturbed areas to approximate original conditions, re-establishing appropriate vegetative cover, protecting soils from erosion, and stabilizing reclaimed landscapes. These precautions minimize cumulative impacts to topography, soils, surface water, and vegetation. Weed control would be implemented as necessary.

4.2.3 Geologic Hazards, Ground Water, Noise and Odors, Land Use, Range, Health/Safety, Transportation, and Hazardous Materials

Cumulative impacts from geologic hazards and to ground water, noise and odor, hazardous materials, transportation, health/safety, landownership, and land use are within the thresholds identified in the discussion of impacts for this project and the general cumulative impact assessment area which includes a portion of the Continental Divide/Creston EIS analysis area, Hay Reservoir conventional and CBNG projects, and the Lower Brush Creek CBNG project areas (see cumulative impact discussion for each resource).

4.2.4 Minerals/Energy Development and Socioeconomics

The proposed project could result in a greater volume of natural gas available for transmission and consumption; gas development in the Luman Rim project area would not interfere with the potential recovery of other minerals or wind energy. Natural gas production is considered a primary industry that is important to the economic stability and well-being of Carbon and Sweetwater counties, the State of Wyoming (increased revenues) and the United States (energy availability).

4.2.5 Cultural Resources

Disturbance and/or loss of unidentified sites or artifacts may add to the cumulative loss of information about our heritage in the project area and throughout the region, if these resources are not identified, inventoried, and/or appropriately protected or mitigated. However, such losses are not expected since mitigation measures as identified for the proposal would be implemented. Any potential future development projects with federal involvement would require the same level of analysis and protection. In the absence of cultural resource clearances and/or other federally mandated cultural resource protection measures on private lands, increased impacts to cultural resources may occur.

Cumulative impacts to cultural resources would be minimized by the avoidance of cultural resource sites with surface expression, and the identification and recovery of information from subsurface finds representing buried resources or sites during open trench monitoring.

4.2.6 Paleontology

With the application of appropriate mitigation, cumulative impacts similar to those of cultural resources are anticipated for paleontological resources. The likelihood of disturbing paleontological resources would remain low. In addition, natural erosion and illegal collection would continue at current levels.

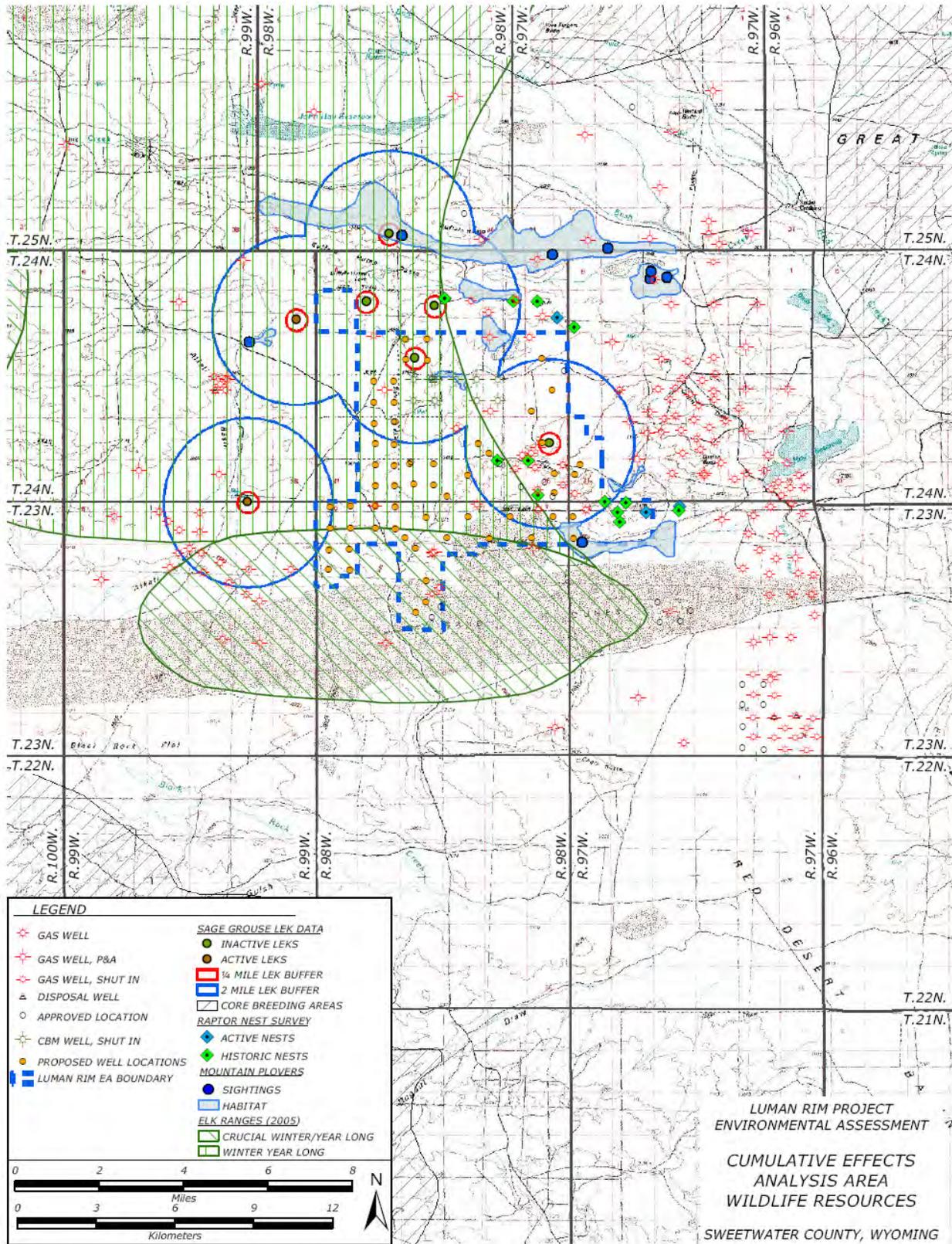
4.2.7 Wildlife

The cumulative effects analysis area for wildlife varies depending on the habitat needs of the species, Figure 4.3, illustrates these analysis areas. Impacts to big game species would be as described for the Proposed Action yet increased due to other on-going activities, including development and production activities occurring within the adjacent CD/CEIS analysis area, Hay Reservoir conventional and CBNG projects, and the Lower Brush Creek CBNG project areas. Most other mammal and bird populations would similarly be affected primarily by natural forces, especially the weather. Project developments (e.g., wells, roads, and gas injection pipelines) could impact management of greater sage-grouse and raptor habitat. However, protection of greater sage-grouse leks and nesting habitat and raptor nests on public land is strictly enforced and would be applied on future projects to ensure existing populations are maintained. The proposed project may contribute some additional impacts (e.g., habitat loss and increased human presence) to the cumulative effects on prairie dog habitat (including that which could support black-footed ferrets and other species such as the burrowing owl and mountain plover) from livestock grazing, oil and gas, recreational use, and vehicle traffic through habitat loss and increased access. Coordination and consultation with the FWS is conducted on a case-by-case basis. Application of mitigation measures, such as avoidance, in accordance with FWS' guidelines should minimize impacts to these species.

4.2.8 Visual Resources and Recreation

As mentioned above, the viewshed in the project area and along the Red Desert Byway is not pristine. However, large areas of unobstructed views occur in the area. Additional impacts to visual resources from future proposals could further alter the viewshed (i.e., well locations, roads, gas and water lines, gas pipelines, wind energy development and transmission lines, and the presence of dust), if not properly mitigated. Recreation is likely to continue at the same rate, although some recreationists may not like the development and avoid the immediate area. Large areas of unobstructed views and open space remain.

Figure 4.3 – Cumulative Effects Analysis Areas for Select Wildlife Species



4.2.9 Range Resources

As of July 2010, there were 160 existing, permitted and proposed CBNG and conventional gas wells within the Red Desert Allotment, 58 of which (54 federal and 4 state wells) are allotted to the Proposed Action. Luman Rim area and another an estimated 10 producing gas wells, two water injection wells, and 13 wells in other forms of completion on federal lands. There are currently 22 Approved Permits to Drill or Applications for Permit to Drill, and 30 Notices of Staking in the Red Desert Allotment. There are 21 active wells on state lands, these projects have or may affect approximately 2,385 acres or 191 AUMs of forage availability.

4.2.10 Wild Horses

The CEAA for wild horses would comprise the Great Divide Basin herd management area. Approximately 300 existing oil or gas wells are located within the area of the Great Divide Basin herd management area. The Continental Divide/Creston EIS analysis area, Hay Reservoir conventional and CBNG projects, and the Lower Brush Creek CBNG project areas are within this HMA.

Existing and foreseeable development in the HMA is approximately 300 wells or 4530 acres of long-term disturbance. This is approximately equivalent to the forage allocation of three horses, assuming all these wells are within 2 miles of water. The Proposed Action would add 879 short-tem acres of disturbance or reduce available forage by less than one horse, assuming all the PA wells are within 2 miles of water.

5.0 TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

The Luman Rim Natural Gas Development Project environmental assessment was prepared by an independent consulting firm with guidance, participation, and independent review and evaluation by the BLM. A list of personnel responsible for document preparation and their area of responsibility is listed in Tables 6.1 and 6.2.

5.1 TRIBES CONSULTED

Eastern Shoshone
Northern Arapaho
Northern Ute
Shoshone-Bannock

5.2 PUBLIC PARTICIPATION

A scoping notice was sent to the following list of agencies and organizations, and individuals around May 15, 2008, describing the project and requesting that any comments regarding the project be submitted to BLM by June 19, 2008. A copy of the scoping notice, including the list of parties notified, is found as Appendix A.

6.0 LIST OF PREPARERS

Table 6.1 identifies the BLM RSFO personnel associated with the review of this EA. Table 6.2 identifies those third party companies and associated personnel responsible for its preparation.

Table 6.1- BLM RSFO Interdisciplinary Team

Name	Area of Expertise
Samantha Thurston	Natural Resource Specialist
Angelina Pryich	Writer-Editor
Kevin-Scott Stadler	Archeologist - Cultural/Historic Resources
Trisha Cartmel	Petroleum Engineer
Dennis Doncaster	Hydrology
Kim Foster	Planning and Environmental Coordinator
Jim Glennon	Botanist
John Henderson	Fisheries
Jo Foster	Recreational Planner and Visual Resource Management
Jeromy Caldwell	Supervisory Wildlife Biologist
Carrie Nelson	Wildlife Biologist
Jay D'Ewart	Wild Horse Specialist
Lance Porter Gavin Lovell Joanna Nara-Kloepper	Field Manager Assistant Field Manager, Resources Assistant Field Manager, Minerals and Land

Table 6.2 - Third Party Interdisciplinary Team

Name	Area of Expertise
Renee Taylor	Taylor Environmental Consulting LLC - EA preparation, project management, data compilation, wildlife, various disciplines
Mike Evers	WWC Engineering - Hydrology
Jim Dunder	Wildlife Consultant
Susan Connell	Carter Lake Consulting LLC - Air Quality
Lloyd Levy	Lloyd Levy Consulting LLC - Recreation/VRM
Dina Brown Kelly House	KC Harvey - Soil Science, Reclamation, Vegetation
Jana Pastor	Western Archaeological Services - Archaeology
George Blankenship	Blankenship Consulting - Socio/Transportation
Steve Moore	Burro Canyon Consulting – Document preparation
Stephen Sandau	Intermountain Paleo – Consulting - Paleontology
Gene R. George and Associates	
Gene R. George	Geology
Mark Knoll	Cartography and GIS
Marty Shane	EA Preparation

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LIST OF ABBREVIATIONS AND ACRONYMS

°F	Degrees Fahrenheit
AADT	Annual average daily traffic
AML	Appropriate management level
AMSL	Above mean sea level
APD	Application for Permit to Drill
AQD	Air Quality Division
AQRV	Air Quality Related Values
AUM	Animal Unit Month
B.P.	Before Present Time
BACT	Best Available Control Technology
BBL	Barrels(s)
BLM	Bureau of Land Management
BMP	Best Management Practices
CASTNET	Clean Air Status and Trends Network
CBNG	Coal Bed Natural Gas
CD/C	Continental Divide Creston
CEAA	Cumulative Effects Analysis Area
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CH ₄	Methane
cm/sec	Centimeters per second
CO	Carbon monoxide
CO ₂	Carbon Dioxide
CO ₂ e	CO ₂ Equivalent
COAs	Conditions of Approval
COE	U.S. Army Corps of Engineers
CR	Country Roads
CSU	Controlled Surface Use
CWA	Clean Water Act
DATs	Deposition Analysis Thresholds
dba	Decibels
DOT	United States Department of Transportation
dv	Deciview
EA	Environmental Assessment
EIS	Environmental Impact Study
EO	Executive Order
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
FLPMA	Federal Land Policy Management Act
FWS	United States Fish and Wildlife Service
GHGs	Green House Gases

GRRMP	Green River Resource Management Plan
H ₂ S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HMA	Herd Management Area
HNO ₃	Nitric acid
IM	Instruction Memorandum
IMPROVE	Interagency Monitoring of Protected Visual Environments
KOP	Key Observation Point
LOC	Levels of concern
LOP	Life of Project
LRPA	Luman Rim Project Area
LWDII	Lost Work Day Injuries and Illness
MBTA	Migratory Bird Treaty Act
mg/L	Milligrams per Liter
MLA	Mineral Leasing Act
MSDS	Materials Safety Data Sheet
MSUOP	Master Surface Use Operations Plan
N	Total Nitrogen
N ₂ O	Nitrous Oxide
Na ₂ SO ₄	Sodium Sulfate
NAAQS	National Ambient Air Quality Standard
NADP	National Acid Deposition Program
NEPA	National Environmental Policy Act
NH ₄	Ammonium
NO ₂	Nitrogen dioxide
NO ₃	Nitrate
NO _x	Nitrogen oxide
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
ns	No Standard
O ₃	Ozone
OPS	Office of Pipeline Safety
OSHA	Occupational Safety and Health Administration
PFC	Proper Functioning Condition
PFYC	Potential Fossil Yield Classification
PM ₁₀	Particulate Matter <10 microns in diameter
PM ₂₅	Particulate Matter <2.5 microns in diameter
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RDWMA	Red Desert Watershed Management Area
RELs	Reference Exposure Levels
RMIS	Recreation Management Information System
RMP	Resource Management Plan
RSFO	Rock Springs Field Office

RV	Recreational vehicle
S	Total sulfur
SCBC	Sweetwater County Board of Commissioners
SCR 20	Luman Road
SCR 21	Bar X Road
SCR 67	Tipton North Road
SO ₂	Sulfur dioxide
SO ₄	Sulfate
SPCC	Spill Prevention and Control Countermeasure
SPCC	Spill Prevention Countermeasure and Control
SRMA	Special Recreation Management Areas
SVR	Standard visual range
SWEDA	Sweetwater Economic Development Association
SWPPP	Storm Water Pollution Protection Plan
T&E	Threatened or Endangered
TDS	Total Dissolved Solids
TEPC	Threatened, Endangered, Proposed and Candidate
TL	Timing Limitations
U.S.	United States
VOC	Volatile Organic Compounds
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Systems
WAQSR	Wyoming Air Quality Standards and Regulations
WDEQ	Wyoming Department of Environmental Quality
WDEQ-AQD	Wyoming Department of Environmental Quality Air Quality Division
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission
WOSHA	Workers Occupational Health and Safety Administration
WSA	Wilderness Study Area
WSEO	Wyoming State Engineers Office
WYNDD	Wyoming Natural Diversity Database