FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
J.M. Huber Corporation
Long Creek Federal POD
ENVIRONMENTAL ASSESSMENT –WY-070-**07-105**

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize J.M. Huber Corporation's Long Creek Federal PODCoal Bed Natural Gas (CBNG) POD comprised of the following 25 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	Long Creek Manigault	7LW-21*	SWNE	21	57N	75W	WYW132261
2	Long Creek Manigault	8LW-21	SENE	21	57N	75W	WYW132261
3	Long Creek Manigault	9LW-21	NESE	21	57N	75W	WYW132261
4	Long Creek Manigault	15LW-21	SWSE	21	57N	75W	WYW132261
5	Long Creek Manigault	1LW-27	NENE	27	57N	75W	WYW69340
6	Long Creek Manigault	3LW-27	NENW	27	57N	75W	WYW69340
7	Long Creek Manigault	5LW-27	SWNW	27	57N	75W	WYW69340
8	Long Creek Manigault	7LW-27	SWNE	27	57N	75W	WYW69340
9	Long Creek Manigault	10LW-27	NWSE	27	57N	75W	WYW69340
10	Long Creek Manigault	16LW-27	SESE	27	57N	75W	WYW145589
11	Long Creek Manigault	11LW-27	NESW	27	57N	75W	WYW145589
12	Long Creek Manigault	1LW-28	NENE	28	57N	75W	WYW69340
13	Long Creek Manigault	3LW-28	NENW	28	57N	75W	WYW132261
14	Long Creek Manigault	5LW-28	SWNW	28	57N	75W	WYW132261
15	Long Creek Manigault	9LW-28	NESE	28	57N	75W	WYW69340
16	Long Creek Manigault	11LW-28	NESW	28	57N	75W	WYW132261
17	Long Creek Manigault	13LW-28	SWSW	28	57N	75W	WYW132261
18	Long Creek Manigault	1LW-33	NENE	33	57N	75W	WYW133307
19	Long Creek Manigault	5LW-33	SWNW	33	57N	75W	WYW132261
20	Long Creek Federal	3LW-33	NENW	33	57N	75W	WYW132261
21	Long Creek Manigault	7LW-33	SWNE	33	57N	75W	WYW132261
22	Long Creek Manigault	9LW-33	NESE	33	57N	75W	WYW132261
23	Long Creek Federal	11LW-33	NESW	33	57N	75W	WYW132261
24	Long Creek Manigault	13LW-33	NWSW	33	57N	75W	WYW132261
25	Long Creek Manigault	15LW-33	SWSE	33	57N	75W	WYW132261

The following existing, previously approved impoundment was inspected and approved for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	T	R	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Dead Horse Lake	SENE	30	57	74	272	NA	NA

This approval is subject to adherence with all of the operating plans and mitigation measures contained in the Master Surface Use Plan of Operations, Drilling Plan, Water Management Plan, and information in individual APDs. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

RATIONALE: The decision to authorize Alternative C, as described in the attached Environmental Assessment (EA), is based on the following:

1. The Operator, in their POD, has committed to:
    - Comply with all applicable Federal, State and Local laws and regulations.
    - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
    - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
    - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts, I have determined that NO significant impacts are expected from the implementation of Alternative C and, therefore, an environmental impact statement is not required.

ADMINISTRATIVE REVIEW AND APPEAL: Under BLM regulations, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
J.M. Huber Corporation
Long Creek Federal POD
PLAN OF DEVELOPMENT
WY-070-07-105

INTRODUCTION

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Powder River Basin Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), #WY-070-02-065 (approved April 30, 2003), pursuant to 40 CFR 1508.28 and 1502.21. This document is available for review at the Buffalo Field Office. This project EA addresses site-specific resources and impacts that were not covered within the PRB FEIS.

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on WYW132261, WYW69340, WYW145589 and WYW133307 valid federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

1.1. Conformance with Applicable Land Use Plan and Other Environmental Assessments:

The proposed action is in conformance with the terms and the conditions of the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), April 2001 and the PRB FEIS, as required by 43 CFR 1610.5

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1, pages 2-54 through 2-62. This alternative would consist of no new federal wells. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits" in the lease lands, "subject to the terms and conditions incorporated in the lease." Thus, under this alternative, the operator's proposal would be denied.

2.2. Alternative B Proposed Action

J.M. Huber Corporation's Long Creek Federal POD Plan of Development (POD) for 26 coal bed natural gas well APDs and associated infrastructure.

Proposed Well Information: There are 26 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from 4 coal seams. Proposed well house dimensions are 6 ft wide x 7 ft length x 6 ft height. Wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Sec	T	R	Lease #
1	Long Creek Manigault	7LW-21*	SWNE	21	57N	75W	WYW132261
2	Long Creek Manigault	8LW-21	SENE	21	57N	75W	WYW132261
3	Long Creek Manigault	9LW-21	NESE	21	57N	75W	WYW132261
4	Long Creek Manigault	15LW-21	SWSE	21	57N	75W	WYW132261
5	Long Creek Manigault	1LW-27	NENE	27	57N	75W	WYW69340
6	Long Creek Manigault	3LW-27	NENW	27	57N	75W	WYW69340
7	Long Creek Manigault	5LW-27	SWNW	27	57N	75W	WYW69340
8	Long Creek Manigault	7LW-27	SWNE	27	57N	75W	WYW69340
9	Long Creek Manigault	10LW-27	NWSE	27	57N	75W	WYW69340
10	Long Creek Manigault	16LW-27	SESE	27	57N	75W	WYW145589
11	Long Creek Manigault	11LW-27	NESW	27	57N	75W	WYW145589
12	Long Creek Manigault	1LW-28	NENE	28	57N	75W	WYW69340
13	Long Creek Manigault	3LW-28	NENW	28	57N	75W	WYW132261
14	Long Creek Manigault	5LW-28	SWNW	28	57N	75W	WYW132261
15	Long Creek Manigault	9LW-28	NESE	28	57N	75W	WYW69340
16	Long Creek Manigault	11LW-28	NESW	28	57N	75W	WYW132261
17	Long Creek Manigault	13LW-28	SWSW	28	57N	75W	WYW132261
18	Long Creek Manigault	1LW-33	NENE	33	57N	75W	WYW133307
19	Long Creek Manigault	5LW-33	SWNW	33	57N	75W	WYW132261
20	Long Creek Federal	3LW-33	NENW	33	57N	75W	WYW132261
21	Long Creek Manigault	7LW-33	SWNE	33	57N	75W	WYW132261
22	Long Creek Manigault	9LW-33	NESE	33	57N	75W	WYW132261
23	Long Creek Federal	11LW-33	NESW	33	57N	75W	WYW132261
24	Long Creek Manigault	13LW-33	NWSW	33	57N	75W	WYW132261
25	Long Creek Manigault	15LW-33	SWSE	33	57N	75W	WYW132261
26	Long Creek Manigault	5LW-34	SWNW	34	57N	75W	WYW142833

Water Management Proposal: The following existing impoundment was proposed for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Dead Horse Lake	SENE	30	57	74	272	NA	NA

County: Campbell

Applicant: J.M. Huber Corporation

Surface Owners: 1. Gabrielle Manigault 2. Bow and Arrow Ranch, Inc. 3. BLM

Project Description:
The proposed action involves the development of the project, which includes the following:

- Drilling of 26 total federal CBM wells in Canyon, Cook, Wall and Pawnee coal zones to depths of approximately 585 to 861 feet. A single well per location will be drilled which is capable of producing from multiple coal seams.

- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry and well visitation. Metering will entail 2 visits per month to each well.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 1 existing discharge points and 1 existing stock water reservoir; 1 injection well (Bow & Arrow 11-7); and the Bow & Arrow subsurface drip irrigation system (SDI) within the Middle Powder River watershed.

- An improved road network.

- An above ground power line network will be constructed by a contractor Powder River Energy Corporation (PRECORP). The proposed route has been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 6 power drops.

- A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 12 months. Fuel deliveries are anticipated to be one time per week. Noise level is expected to be 73 to 84 decibels (depending on orientation to the generator) at distance range from 10 to 15 feet away.

- A buried gas, water and power line network.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

Implementation of committed mitigation measures contained in the MSUP, Drilling Program and WMP, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their POD, has committed to:

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD

4. Provide water analysis from a designated reference well in each coal zone.

The Operator has certified that a Surface Use Agreement has been reached with the Landowners.

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the Long Creek Federal POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well ID	Aliquot	T57/R75 Section	Lease #	Notes
7LW-21	SWNE	21	WYW132261	Proposed well location moved 10 yards down slope to more level topography. No pad will be needed.
8LW-21	SENE	21	WYW132261	Proposed well location straddles steep ridge and would result in more disturbance than is necessary. Pad moved to southeast so that disturbance will involve only one slope.
9LW-21	NESE	21	WYW132261	Pad will be slotted.
15LW-21	SWSE	21	WYW132261	Due to a raptor nest the well was moved to the east over a hill. Pad will be slotted.
5LW-27	SWNW	27	WYW69340	Proposed site straddles two small drainages below a knob. Well location will be moved north to avoid being in these drainages. This will be an exception location.
7LW-27	SWNE	27	WYW69340	Location OK. Will move pits to the south and pull north end of pad in to avoid a drainage. Pad will be extended to stockpile topsoil.
10LW-27	NWSE	27	WYW69340	Location OK. Pad will be slotted. The operator is concerned that there could be drainage problems without a full pad. The landowner wants a diversion structure constructed upslope from the slotted pad.
11LW-27	NESW	27	WYW145589	Original location is on a terrace above a small stream with two side drainages adjacent to pad. Steep slopes are associated with these drainages. Well location will be moved to the northeast to a level area. This will eliminate the need for a constructed pad. The relocation of a fence is

Well ID	Aliquot	T57/R75 Section	Lease #	Notes
				necessary here.
1LW-28	NENE	28	WYW69340	Site is in a narrow drainage and will be moved either approximately 75 feet north or possibly to the southwest corner of window. A small pad will need to be constructed if the first alternate location is used.
5LW-28	SWNW	28	WYW132261	Pad will be moved down slope to preserve upslope trees.
9LW-28	NESE	28	WYW69340	Moved about 40 yards to the northeast to a more level spot. Will be a double slot. Proposed access road crosses creek valley. Valley walls are very steep and require a lot of cut and fill. Looked at rerouting access from the north or south. Terrain is highly dissected and would result in more disturbance than the proposed route. There is also a large archeological site to the north. Ute's ladies tresses survey will be needed in 2007 along stream corridor.
11LW-28	NESW	28	WYW132261	Location moved 100 feet to the east to better topography. Constructed pad. Long access road needed since a straight shot off of county road has sight distance problems in both directions.
13LW-28	SWSW	28	WYW132261	Moving well location to avoid removal of large trees and for better topography. Moving access road to avoid removal of large trees.
5LW-33	SWNW	33	WYW132261	Location OK. Pad will be slotted.
9LW-33	NESE	33	WYW132261	Location OK. Spoil will not go towards drain. Pit will be lined.
11LW-33	NESW	33	WYW132261	Location OK. Pad will be slotted.
13LW-33	NWSW	33	WYW132261	Moved to the southeast to better topography. Pad required
5LW-34	SWNW	34	WYW142833	This well will be moved to fee/fee and will not be part of the POD. The operator requested that this APD be withdrawn.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

Programmatic mitigation measures are those, determined through analysis, which may be appropriate to apply at the time of APD approval if site specific conditions warrant. These mitigation measures can be applied by BLM, as determined necessary at the site-specific NEPA APD stage, as COAs and will be in addition to stipulations applied at the time of lease issuance and any standard COA.

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed and revised a guidance document, "Compliance Monitoring and siting Requirements for Unlined Impoundments Containing Coalbed Methane Produced Water" (September, 2006) which can be accessed on their website. For all WYPDES permits the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

1. Channel Crossings:
   a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
   b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
   c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

3. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.

2.3.2.3. Soils

1. The Companies, on a case by case basis, depending upon water and soil characteristics, will test sediments deposited in impoundments before reclaiming the impoundments. Tests will include the standard suite of cations, ions, and nutrients that will be monitored in surface water testing and any trace metals found in the CBNG discharges at concentrations exceeding detectable limits.

2.3.2.4. Vegetation

1. Temporarily fence reseeded areas, if not already fenced, for at least two complete growing seasons to insure reclamation success on problematic sites (e.g. close to livestock watering source, erosive soils etc.).

2.3.2.5. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.

2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.

3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.

4. The lower edge of soil or other material stockpiles will be located outside the active floodplain.

5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.

6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.6. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.

2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.

3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.

4. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.

5. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.

6. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.3.2.7. Threatened, Endangered, or Sensitive Species

2.3.2.7.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the Sundry Notices.

2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.

3. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimal disturbance buffer zone of one mile will be established for all bald eagle nest sites (February 1 – August 15).

4. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle winter roost sites. A seasonal minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.

5. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).

6. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM

biologist to have adverse effects to bald eagles or their habitat.

2.3.2.7.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2.3.2.7.3. Mountain Plover

1. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

2.3.2.7.4. Ute Ladies'-tresses Orchid

1. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid the establishment of noxious weeds.

2.3.2.8. Visual Resources

1. The Companies will mount lights at compressor stations and other facilities on a pole or building and direct them downward to illuminate key areas within the facility while minimizing the amount of light projected outside the facility.

2.3.2.9. Noise

1. Noise mufflers will be installed on the exhaust of compressor engines to reduce the exhaust noise.

2. Where noise impacts to existing sensitive receptors are an issue, noise levels will be required to be no greater than 49 decibels measured at a distance of one-quarter mile from the appropriate booster (field) compressor. When background noise exceeds 55dBA, noise levels will be no greater than 5dBA above background. This may require the installation of electrical compressor motors at these locations.

2.3.2.10. Air Quality

1. During construction, emissions of particulate matter from well pad and resource road construction will be minimized by application of water, or other dust suppressants, with at least 50 percent control efficiency. Roads and well locations constructed on soils susceptible to wind erosion could be appropriately surfaced or otherwise stabilized to reduce the amount of fugitive dust generated by traffic or other activities, and dust inhibitors (surfacing materials, non-saline dust suppressants, and water) could be used as necessary on unpaved collector, local and resource roads that present a fugitive dust problem. The use of chemical dust suppressants on BLM surface will require prior approval form the BLM authorized officer.

2.3.3. Site specific mitigation measures

General

All changes made at the onsite will be followed. They have all been incorporated into the operator's POD.

Surface Use

1. Due to close proximity to drainages, the Operator will line the drilling pits at the following well locations: 9LW-21, 1LW-27, 10LW-27, 16LW-27, 11LW-27, 1LW-28, 1LW-33, 9LW-33, 13LW-33 and 15LW-33.

2. At 16LW-27, 5LW-28 and 13LW-28 well locations and associated infrastructure, no trees over 6 inches DBH (diameter breast height) will be cut or damaged without the authorized officer's approval.

3. A road segment in NENE ¼, ¼ of section 33 is eroded. To prevent future erosion the operator will repair this road. Repair work may include restoring the crown and ditch to road, installing culverts and/or installing erosion control structures. This road segment runs northeast-southwest and is between the previously approved LX Bar pipeline at the northeast end and a cattle guard near the southwest end.

4. To prevent potential spread of noxious weeds by construction equipment the operator will pre-treat weed infestations before construction work begins. For example there is a Canada thistle infestation in the NESW of section 27 and a black henbane infestation at the SA Creek crossing in the NWNW of section of section 34.

5. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Supplemental Environmental Colors." The color selected for the Long Creek POD is Covert Green, 18-0617 TPX.

6. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.

7. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

Grade	Drainage Spacing
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-15%	150 ft

8. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
   Reclamation Standards
   C. 3. The reclaimed area shall be stable and exhibit none of the following characteristics:
      a. Large rills or gullies.
      b. Perceptible soil movement or head cutting in drainages.
      c. Slope instability on, or adjacent to, the reclaimed area in question.
   C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
   C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
      a. Successful onsite establishment of species included in the planting mixture or other desirable species.
      b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

9. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. In lieu of a different specific mix desired by the surface owner, use the following:

Ecological Sites	Wells and infrastructure
Loamy	7LW-21, 9LW-21, 3LW-27, 5LW-27, 7LW-27, 10LW-27, 16LW-27, 1LW-28, 3LW-28, 3LW-33, 11LW-27, 15LW-33
Ponderosa Pine/Little Bluestem	8LW-21, 11LW-27, 15LW-21, 5LW-28, 9LW-28, 11LW-28, 13LW-28, 1LW-33, 5LW-33, 13LW-33
Clayey (use loamy seed mix)	7LW-33, 9LW-33, 11LW-33

Ponderosa Pine/Little Bluestem Ecological Sites

Species	% in Mix	Lbs PLS*
Needleandthread (Hesperostipa comata ssp. Comata) or Indian ricegrass (Achnatherum hymenoides)	10	1.2
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	25	3.0
Sideoats grama (Bouteloua curtipendula)	20	2.4
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	30	3.6
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (*Dalea candidum, purpureum*)	5	0.6
American vetch (*Vicia Americana*)	5	0.6
Totals	**100%**	**12 lbs/acre**

Loamy Ecological Sites

Species	% in Mix	Lbs PLS*
Western Wheatgrass (*Pascopyrum smithii*) or Thickspike Wheatgrass (*Elymus lanceolatus ssp. lanceolatus*)	35	4.2
Bluebunch Wheatgrass (*Pseudoroegneria spicata ssp. Spicata*)	15	2.1
Green needlegrass (*Nassella viridula*)	25	3.0
Rocky Mountain beeplant (*Cleome serrulata*) or American vetch (*Vicia americana*)	10	1.4

Species	% in Mix	Lbs PLS*
White or purple prairie clover (Dalea candidum, purpureum)	5	0.3
Scarlet Globemallow (*Sphaeralcea coccinea*)	5	0.4
Prairie coneflower (*Ratibida columnifera*)	5	0.8
Totals	**100%**	**12.2 lbs/acre**

*PLS = pure live seed
*Northern Plains adapted species
*Double this rate if broadcast seeding

This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site descriptions, U.W. College of Ag. and seed market availability.

10. Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed.

11. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.

12. The operator is responsible for having a licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.

13. Please contact Dave Skinner, Natural Resource Specialist, at (307) 684-1179, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Wildlife

1. The following conditions will minimize the impacts to raptors:
   a. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following

Township/Range	*Section*	*Affected Wells and Infrastructure*
57/75	21	**Wells: Manigault Fed 9LW-21-57-75 and Manigault Fed 15LW-21-57-75** **ALL** project related activities within the **south** ½ of this section.
57/75	27	**Wells: Manigault 1LW-27-57-75, Manigault Fed 7LW-27-57-75, Manigault Fed 10LW-27-57-75, and Manigault Fed 16LW-27-57-75** **ALL** project related activities within the **east** ½ of this section.
57/75	28	**Wells: Manigault Fed 1LW-28-57-75 and Manigault Fed 3LW-28-57-75** **ALL** directly associated infrastructure to the above wells and **ALL** project related activities **north of the 7LW-28-57-75 well along the main corridor**.
57/75	33	**Wells: Manigault Fed 1LW-33-57-75, Manigault Fed 7LW-33-57-75, Manigault Fed 9LW-33-57-75, and**

Township/Range	*Section*	*Affected Wells and Infrastructure*
		Manigault Fed 15LW-33-57-75. **ALL** project related activities within the **east** ½ of this section.
57/75	34	**ALL** project related activities within the **west ½ and NW¼** of this section.

1) Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.

b. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to the following nest(s):

BLM ID#	Species	UTM (NAD 83)	Legal Location	Substrate
4396	Buteo	429884E 4972650N	SWSE Sec. 21 T57N R75W	Ponderosa pine, live
4397	Buteo	429881E 4972639N	SWSE Sec. 21 T57N R75W	Ponderosa pine, live
4398	Unknown	432500E 4971823N	SWNW Sec. 26 T57N R75W	Ponderosa pine, live
4399	Unknown	431985E 4970678N	SENE Sec. 27 T57N R75W	Ponderosa pine, live
4400	Unknown	432059E 4970580N	NENE Sec. 34 T57N R75W	Ponderosa pine, live
4401	Unknown	432040E 4970579N	NENE Sec. 34 T57N R75W	Ponderosa pine, live
4402	Red-tailed hawk	432083E 4970229N	SENE Sec. 34 T57N R75W	Ponderosa pine, live
1437	Red-tailed hawk	432079E 4970237N	SENE Sec. 34 T57N R75W	Ponderosa pine, live
1439	Red-tailed hawk	432129E 4970216N	SENE Sec. 34 T57N R75W	Ponderosa pine, live
4403	Red-tailed hawk	432121E 4970199N	SENE Sec. 34 T57N R75W	Ponderosa pine, live
1440	Golden eagle	432145E 4970194N	SENE Sec. 34 T57N R75W	Ponderosa pine, live
1422	Great-horned owl	430460E 4969763N	NESE Sec. 33 T57N R75W	Ponderosa pine, live
None	Unknown	430800E 4970166N	SWNW Sec. 34 T57N R75W	Ponderosa pine, live

c. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.

2. The following conditions will minimize the impacts to sage-grouse:

a. A survey is required for sage-grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist. The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1).
c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage-grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage-grouse.

3. The following conditions will minimize the impacts to mountain plovers:
   a. A mountain plover nesting survey is desired in suitable habitat prior to commencement of surface disturbing activities in the prairie dog towns. If the survey is not conducted prior to commencement of surface disturbing activities, it shall be conducted during the first breeding season following POD approval. No surface disturbing activities are permitted in suitable prairie dog colonies, from March 15-July 31, until a mountain plover nesting survey has been conducted for the current breeding season. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
57/75	**21**	**ALL** project related activities within the SW ¼ of the **SESW ¼ ¼** of this section.
57/75	**27**	**ALL** project related activities within this section **including and southwest of the access route to the Manigault Fed 13LW well**.
57/75	**28**	**Well: Manigault Fed 1LW-28-57-75** **ALL** project related activities within the **east ½** of this section, ***except*** for the Manigault Fed 9LW-28-57-75 well.
57/75	**33**	**Wells: Manigault Fed 7LW-33-57-75, Manigault Fed 9LW-33-57-75, and Manigault Fed 15LW-33-57-75** **ALL** project related activities within the **SWNE ¼ ¼ and the SE ¼** of this section.

   b. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
   c. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
   d. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

4. A burrowing owl survey is required in suitable burrowing owl habitat (i.e. active and inactive prairie dog colonies) between April 15 and June 15.
   a. If a burrowing owl is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between April 15 and August 31. If no burrowing owls are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season.

5. A swift fox survey will be required in suitable swift fox habitat (i.e. active and inactive prairie dog colonies) between April 15 and June 15. This condition will be implemented on an annual basis for the duration of surface disturbing activities.
   a. If a swift fox den is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 1 and August 31. If no swift fox dens are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 1).

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on March 6, 2007. Field inspections of the proposed Long Creek CBM project were conducted on August 2. 6 and 9, 2007 by: Rick Estes - Civil Engineer (permitting specialist), Ace Armann - Field Operations Superintendent, Larry Bridger – Civil Engineer, Brandon Brooks - Project Engineer, Ted Hamersma – Construction Supervisor, Paul Woody – Landman and Ricky Hendricks – Project Manager – J.M Huber/Baker Energy representatives; Kendall Cox – Manigault Ranch Representative; Mike McKinley, Kathy Brus, Jenny Morton, Wendy Sutton, Jenny Morton, Theresa Gulbrandson, Chris Perry and Dave Skinner - BLM .

This section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major issues. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table 3.1.

Table 3.1 - Critical elements requiring mandatory evaluation are presented below.

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species		X		Theresa Gulbrandson, Jennifer Morton
Floodplains		X		Mike McKinley
Wilderness Values			X	Dave Skinner
ACECs			X	Dave Skinner
Water Resources	X			Mike McKinley
Air Quality		X		Dave Skinner
Cultural or Historical Values		X		Wendy Sutton
Prime or Unique Farmlands			X	Dave Skinner
Wild & Scenic Rivers			X	Dave Skinner
Wetland/Riparian	X			Mike McKinley
Native American Religious Concerns		X		Wendy Sutton
Hazardous Wastes or Solids		X		Dave Skinner
Invasive, Nonnative Species	X			Dave Skinner
Environmental Justice		X		Dave Skinner

3.1. Topographic Characteristics of Project Area

The Long Creek POD is located north of Spotted Horse in northwest Campbell County, in Township

57N, Range 75W, Sections 21, 27, 28, and 33 Topography in the project area ranges from relatively flat plateaus, steep knobs and flat to gently sloping drainage bottoms to steep valley walls along SA Creek and tributaries. Elevations in the area range from 3,560 feet along SA Creek to 4,000 feet on the hill tops and mesas. SA Creek is the primary drainage within the project area. Historic uses of the area are primarily associated with livestock grazing. More recently, this has become an area of oil and gas development although livestock grazing still occurs.

3.2. Vegetation & Soils

3.2.1. Soils

General vegetation communities within the project area consist of sagebrush/grassland. Wyoming Big Sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the POD. Grass species consist of needleandthread, bluebunch wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and blue grama. Ponderosa Pine and Juniper trees were observed along incised draws. Differences in dominant species within the project area vary with soil type, aspect and topography.

Soils within the project area were identified from the *North Campbell County Survey Area, Wyoming (WY705).* The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

The map units identified for the soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Soil Map Unit Types

MUSYM	Map Unit Name	Acres	Percent
136	DEEKAY-ZIGGY LOAMS, 0 TO 6 PERCENT SLOPES	209.8	9%
168	JAYWEST-SPOTTEDHORSE LOAMS, 0 TO 6 PERCENT SLOPES	27.3	1%
176	LEITER-CROMACK CLAY LOAMS, 3 TO 15 PERCENT SLOPES	161.5	7%
224	UCROSS-IWAIT LOAMS, 0 TO 6 PERCENT SLOPES	26.5	1%
225	UCROSS-IWAIT-FAIRBURN LOAMS, 3 TO 30 PERCENT SLOPES	572.4	24%
239	IRONBUTTE-FAIRBURN-MITTENBUTTE COMPLEX, 6 TO 40 PERCENT SLOPES	13.4	1%
250	ZIGGY-UCROSS-OLDWOLF LOAMS, 3 TO 15 PERCENT SLOPES	54.9	2%
278	FAIRBURN-SAMSIL-BADLAND COMPLEX, 10 TO 45 PERCENT SLOPES	2.4	<1%
279	FAIRBURN-SAMSIL-BADLAND COMPLEX, WOODED, 6 TO 50 PERCENT SLOPES	211.3	9%
291	IRONBUTTE-FAIRBURN-MITTENBUTTE COMPLEX, WOODED, 3 TO 60 PERCENT SLOPES	997.3	41%
311	ROCKYPOINT-BORUFF COMPLEX, 0 TO 3 PERCENT SLOPES	113.9	5%
319	SPOTTEDHORSE-LIETER COMPLEX, 0 TO 6 PERCENT SLOPES	35.7	1%

For more detailed soil information, see the NRCS Soil Survey 705 – North Campbell County.
Additional site specific soil information is included in the Ecological Site interpretations which follow in

Section 3.2.2

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 2 to 4 inches on ridges to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area.

3.2.2. Vegetation

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information. The map unit symbols identified for the soils and the associated ecological sites found within the POD boundary are listed in the table below.

Map Units and Ecological Sites

MUSYM	Ecological Site
136	LOAMY (15-17NP)
168	LOAMY (15-17NP)
176	CLAYEY (15-17NP)
224	LOAMY (15-17NP)
225	LOAMY (15-17NP)
239	SHALLOW LOAMY (15-17NP)
250	LOAMY (15-17NP)
278	SHALLOW LOAMY (15-17NP)
279	Ponderosa Pine and Little Bluestem
291	Ponderosa Pine and Little Bluestem
311	LOWLAND (15-17NP)
319	LOAMY (15-17NP)

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are: Ponderosa Pine and Little Bluestem and Loamy.

Ponderosa Pine/Little Bluestem: This site occurs on moderately steep and steep slopes on upland ridges, escarpments and badlands, in the 15-17 inch precipitation zone. The soils of this site are shallow (less than 20”to bedrock) well-drained soils formed in moderately fine to moderately coarse loamy alluvium over residuum or residuum. Bedrock consists of interbedded shale, scoria and sandstone. These soils have moderate permeability and may occur on all slopes. The main soil limitations include the depth to bedrock and low organic matter content.

The present plant community is a Ponderosa pine/Little Bluestem. Dominant grasses identified include: wheat grasses, blue gramma, prairie sandreed, smooth brome, cheatgrass, sedges, needlegrass, fringed sagewort, prairie junegrass, little bluestem, sideoats gramma, Forbs identified include: scarlet globemallow, yarrow, winterfat. Other vegetative species identified at onsite: sagebrush, greasewood, juniper, ponderosa pine, and yucca.

Loamy Sites: This site occurs on land nearly level up to 50% slopes on landforms which include hill slopes and the associated alluvial fans and stream terraces, in the 15-17 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from unspecified sandstone. These soils have moderate permeability and

may occur on all slopes.

The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses identified include: blue grama, prairie junegrass, needleandthread, western wheatgrass, and cheat grass. Other vegetative species identified at onsite: sagebrush, rabbitbrush, prickly pear cactus, scarlet globemallow, fringed sagewort, ponderosa pine, and thistle.

A summary of the ecological sites within the project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Summary of Ecological Sites

Ecological Site	Acres	Percent
Ponderosa Pine and Little Bluestem	1209	50%
LOAMY (15-17NP)	927	38%
CLAYEY (15-17NP)	162	7%
LOWLAND (15-17NP)	114	5%
SHALLOW LOAMY (15-17NP)	16	1%

3.2.3. Wetlands/Riparian

Wetland/riparian areas were noted during the onsite adjacent to SA Creek from discharge of CBNG-produced water from upstream projects. The water management strategy utilized in the Long Creek POD which includes full containment in Dead Horse Lake, injection, and SDI should have minimal affect on producing, or enhancing, wetland/riparian habitat. There are 2 proposed culvert crossings and one proposed water line crossing in SA Creek, which should disturb less than 0.1 acre of wetlands per crossing negating the need for a Corps of Engineers permit.

3.2.4. Invasive Species

A search of the inventory maps and databases compiled by the University of Wyoming through cooperation between the BLM and Campbell County Weed and Pest revealed the possible presence of state-listed noxious weeds and invasive/exotic plant infestations. Populations of leafy spurge are found within the project area. Leafy spurge is a perennial weed that grows in nearly all soil types and habitats, spreads rapidly, and is difficult to control. Field bindweed, an invasive perennial vine, occurs one half mile west of the POD. Field bindweed, in addition to populations of Russian knapweed and salt cedar are found two miles northwest of the POD along the Powder River.

Cheat grass, Japanese brome, Canada thistle and black henbane were observed in the project area during the onsites.

The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105).

3.3. Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the wildlife database compiled and managed by the BLM Buffalo Field Office (BFO) wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Thunderbird-Jones & Stokes. Thunderbird-Jones & Stokes performed surveys for bald eagles, Ute's ladies tresses orchid, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006 and 2007 (Gregory 2006 and 2007).

A BLM biologist conducted a field visit on August 6, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS 3-114). Species that have been identified in the project area or that have been noted as being of special importance are described below.

3.3.1. Big Game

Big game species expected to be within the Long Creek POD project area include pronghorn antelope, mule deer, and elk. The WGFD has determined that the project area contains Spring-Summer-Fall, Winter and Yearlong range for pronghorn antelope; and Yearlong and Winter-Yearlong for mule deer. Although no part of the project area is designated range for elk, two elk data points were collected by the BLM north of the project area in Sections 14 and 15, T57N, R75W in May 2005.

Spring-Summer-Fall use is when a population or portion of a population of animals uses the documented habitats within this range annually from the end of previous winter to the onset of persistent winter conditions. **Winter** use is when a population or portion of a population of animals uses the documented suitable habitat sites within this range annually, in substantial numbers only during the winter period. **Winter-Yearlong** use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions.

Pronghorn antelope within the project area belong to the Gillette herd unit. The 2006 estimated herd population was 18,600 with a population objective of 11,000. Mule deer within the project area belong to the Powder River herd unit. The 2006 estimated herd population was 52,716 with a population objective of 52,000. Populations of pronghorn antelope and mule deer within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of SA Creek, Dead Horse Creek and Long Creek, which are tributaries of the Powder River. During field investigations, one spring was found within the POD boundary located in the NENE of Section 33, T57N, R75W (Estes 2007). Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.3.4. Raptors

Thirteen raptor nest sites were identified by Thunderbird-Jones & Stokes (Gregory 2006 and 2007) and BLM within 0.5 mile of the project area, of these thirteen nests only 1 was active in 2006 and 2007.

Table 3.2 Documented raptor nests within the Long Creek project area in 2006 and 2007.

BLM ID#	Species	UTM (NAD 83)	Legal Location	Substrate	Condition	Status in 2006	Status
4396	Buteo	429884E 4972650N	SWSE Sec. 21 T57N R75W	Ponderosa pine, live	Poor	Inactive	Inac
4397	Buteo	429881E 4972639N	SWSE Sec. 21 T57N R75W	Ponderosa pine, live	Poor	Inactive	Inac
4398	Unknown	432500E 4971823N	SWNW Sec. 26 T57N R75W	Ponderosa pine, live	Fair	Inactive	Inac
4399	Unknown	431985E 4970678N	SENE Sec. 27 T57N R75W	Ponderosa pine, live	Poor	Inactive	Inac
4400	Unknown	432059E 4970580N	NENE Sec. 34 T57N R75W	Ponderosa pine, live	Poor	Inactive	Inac
4401	Unknown	432040E 4970579N	NENE Sec. 34 T57N R75W	Ponderosa pine, live	Poor	Inactive	Inac
4402	Red-tailed hawk	432083E 4970229N	SENE Sec. 34 T57N R75W	Ponderosa pine, live	Poor	Inactive	Inac
1437	Red-tailed hawk	432079E 4970237N	SENE Sec. 34 T57N R75W	Ponderosa pine, live	Fair	Inactive	Inac
1439	Red-tailed hawk	432129E 4970216N	SENE Sec. 34 T57N R75W	Ponderosa pine, live	Gone	Inactive	Go
4403	Red-tailed hawk	432121E 4970199N	SENE Sec. 34 T57N R75W	Ponderosa pine, live	Fair	Inactive	Inac
1440	Golden eagle	432145E 4970194N	SENE Sec. 34 T57N R75W	Ponderosa pine, live	Good	Inactive	Inac
1422	Great-horned owl	430460E 4969763N	NESE Sec. 33 T57N R75W	Ponderosa pine, live	Good	Active	Active, c tailed hav
None	Unknown	430800E 4970166N	SWNW Sec. 34 T57N R75W	Ponderosa pine, live	Fair	Inactive	Inac

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act.

3.3.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988).

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1000 acres of black-tailed prairie dog colonies for survival (USFWS 1989).

The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn Mountains (Grenier 2003). The U.S. Fish and Wildlife Service has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

Five black-tailed prairie dog colonies were identified during site visits by Thunderbird-Jones & Stokes within the project area. Three additional colonies are located within 0.9 mile (1.5km) of these colonies. Combined, the colonies within and surrounding the project area, total 634 acres. The project area is located within the Recluse potential reintroduction area. Black-footed ferret habitat of sufficient size is not present within the Long Creek project area.

Table 3.3 Black-tailed prairie dog colonies identified during site visits by Thunderbird-Jones & Stokes and the BLM BFO database within the project area or within 0.9 mile (1.5km.) of those colonies.

Location	Size in acres	Status
Within the project area		
SENE Sec. 21, T57N, R75W	2	Active
NWNW Sec. 28, T57N, R75W	15	Active
E ½ Sec. 28, T57N, R75W	205.9	Active
SENE Sec. 27, T57N, R75W	21.3	Active
E ½ and NE Sec. 33, T57N, R75W	147.1	Active
Within 0.9 mile (1.5 km) of colonies (potential complex)		
W ½ Sec. 35, T57N, R75W	60.7	Active
SESE Sec 17; NENE Sec 20; SWSW Sec 16; NWNW Sec 21, T57N, R75W	58	Active
SW Sec 4 and E ½ Sec 5, T56N, R75W	124	Active
Total	**634**	

3.3.5.1.2. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea

level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

SA Creek, Dead Horse Creek, Long Creek and their tributaries are ephemeral. During field investigations, one spring was found within the POD boundary located in the NENE of Section 33, T57N, R75W (Estes 2007). Suitable habitat identified during surveys was found along portions of SA Creek in SE Section 34, T57N, R75W. Although the SA Creek floodplain is fairly flat and open, the creek is channelized with steeply cut banks in some areas and abrupt transitions from wetland to upland vegetation. A few wide moist areas are present at oxbows with wetland vegetation including sedges, rushes, and foxtail barley. Other areas along the creek are dominated by prairie cordgrass, Japanese brome, foxtail barley, cheatgrass, sedges, and occasional patches of cattails. Vegetation along the creek is quite dense (<25% bare ground) and tall (occasionally exceeding three feet) at most locations (Gregory 2006). Suitable orchid habitat is present along portions of SA Creek within the Long Creek project area. TJS surveyed theses areas for the presence of Ute ladies'-tresses orchid in 2006 and 2007. No orchids were observed.

3.3.5.2. Sensitive Species

The USDI Bureau of Land Management (BLM) Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

Prairie dog colonies create a biological niche or habitat for many species of wildlife (King 1955, Reading 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading1989) suggest that richness of associated species on black-tailed prairie dog colonies increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of numerous prey species (Clark 1982, Agnew 1986, Agnew 1988).

In South Dakota, forty percent of the wildlife taxa (134 vertebrate species) are associated with prairie dog colonies (Agnew 1983, Apa 1985, Mac Cracken 1985, Agnew 1986, Uresk 1986, Deisch 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list. The species of concern are swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*) and long-billed curlew (*Numenius americanus*).

3.3.5.2.1. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald eagle was removed from the Endangered Species list. The bald eagle remains under protection by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall continue to be complied with.

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

Bald eagle nesting and roosting habitat exists within the relatively dense ponderosa pine stands throughout the Long Creek project area, especially those mixed with large pine snags. Mature stands of ponderosa pines and snags are primarily found in the northern portion of the project area (sections 15, 16, 21 and 22). Scattered mature pines in the remainder of the project area could also provide potential roosting habitat, but represent only marginal bald eagle roosting and nesting habitat because of their low density and height (generally <20 feet). Roosting and nesting habitat is also present along the Powder River corridor, located approximately 2.5 miles northwest of the project area. Black-tailed prairie dog towns are present within the Long Creek project area and are a potential prey source for bald eagles. One juvenile bald eagle was observed during winter roost surveys in December 2006 in a dead ponderosa pine within the Long Creek project area in NWSE Section 28, T57N, R75W. The nearest known bald eagle winter roost is along the Powder River, approximately 10.4 miles southwest of the Long Creek project area. The nearest known bald eagle nest is located 11.1 miles southwest of the Long Creek POD along Clear Creek (Gregory 2006 and 2007).

3.3.5.2.2. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Their decline is related to multiple factors including, habitat destruction, poisoning, and Sylvatic plague.

Five black-tailed prairie dog colonies, totaling 391.3 acres, were identified during site visits by Thunderbird-Jones and Stokes within the project area.

Table 3.4 Black-tailed prairie dog colonies identified during site visits by Thunderbird-Jones and Stokes and the BLM BFO database within the project area.

Location	Size in acres	Status
Within the project area		
SENE Sec. 21, T57N, R75W	2	Active
NWNW Sec. 28, T57N, R75W	15	Active
E ½ Sec. 28, T57N, R75W	205.9	Active
SENE Sec. 27, T57N, R75W	21.3	Active
E ½ and NE Sec. 33, T57N, R75W	147.1	Active
Total	**391.3**	

3.3.5.2.3. Burrowing owl

The western burrowing owl has declined significantly throughout its range in North America. Current population estimates for the United States are not well known but trend data suggest significant declines

across their range. The last official estimated population placed them at less than 10,000 breeding pairs. The majority of the mid-western and western states within the owl's range have recognized that western burrowing owls are in trouble: it is state listed as endangered in Minnesota and Iowa, threatened in Colorado, and as a state Species of Special Concern in Kansas, Nebraska, Oklahoma, South Dakota, North Dakota, Montana, Idaho, Utah, Washington, Oregon, and California. It is listed as a sensitive species by the Bureau of Land Management throughout the west and by the U.S. Fish and Wildlife Service (Defenders of Wildlife).

The burrowing owl is a small, long-legged owl found throughout open landscapes of North and South America. Burrowing owls can be found in grasslands, rangelands, agricultural areas, deserts, or any dry open area with low vegetation where abandoned burrows dug by mammals such as ground squirrels (*Spermophilus spp*.), prairie dogs (*Cynomys spp.),* and badgers (*Taxidea taxus*) are available. Black-tailed prairie dog (*Cynomys ludoviscianus*) and Richardson's ground squirrel (*Spermophilus richardsonii*) colonies provide the primary and secondary habitat for burrowing owls (Klute 2003). Black-tailed prairie dog colonies provide burrows for burrowing owls to nest in, a reliable prey base (insects, small mammals, birds, reptiles and amphibians), provide predator alarm calls and a clear view for easier hunting (Butts 1973, Desmond 1991).

Burrowing owls are present in North America, and breed across the grassland regions of southeastern Alberta, Saskatchewan and Manitoba. They occur in all states west of the Mississippi Valley, breed south through the western and mid-western States. Burrowing owls are migratory. Most spend the winter in southern Mexico and Central America (Konig, Weick and Becking 1999). Due to the extensive amount of prairie dog colonies within the project area, good burrowing owl habitat exists throughout the project area.

3.3.5.2.4. Greater sage-grouse

Sage-grouse are listed as a sensitive species by BLM (Wyoming). In recent years, seven petitions have been submitted to the U.S. Fish and Wildlife Service (FWS) to list greater sage-grouse as threatened or endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse.

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003).

Suitable sage-grouse habitat is present in areas of the Long Creek POD. Larger, and denser stands of sagebrush observed in the north (Sections 21 and 22), within the SA Creek bed, and within other minor draws could provide nesting and wintering habitat. The moist draws and tributaries of SA Creek, especially where bordered by sagebrush habitat, could provide potential brood rearing and late summer habitat. However, the majority of the project area hosts rugged grassland habitats with only sparse sagebrush, which is less suitable as sage grouse habitat. According to BLM records, no sage grouse leks are located within 3 miles of the Long Creek POD. The nearest known lek (Three Bees) is located approximately 7.2 miles southeast of the project area (Gregory 2006 and 2007).

3.3.5.2.5. Mountain plover

Mountain plovers, which are a Buffalo Field Office sensitive species, are typically associated with high, dry, short grass prairies containing vegetation typically shorter than four inches tall, and slopes less than 5 degrees (BLM 2003). Mountain plovers are closely associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Suitable mountain plover habitat is present within the project area, mainly within the prairie dog colonies listed in Table 4 and patches of open grassland along SA Creek. Due to rough topography, a large potion of the Long Creek project area hosts unsuitable habitat for nesting plovers. Overall, the abundance and proximity of steep terrain within the Long Creek project area detracts from the "openness" of the landscape and limits the suitability for plovers (Gregory 2006 and 2007).

3.3.5.2.6. Swift Fox

The swift fox was removed from the Federal list of candidate species in January 2001. Swift fox populations have been reduced to about 40 percent of their former range. The swift fox is native to the grassland prairies of the Great Plains of North America. The original range of the species was influenced primarily by the extent of the shortgrass prairie and midgrass prairie ecosystem. Historic swift fox range is reported to have included 624,000 square miles of the grassland prairie in central North America (Scott-Brown 1987), extending north-south from central Alberta to central Texas and east-west between western Iowa and Minnesota to central Colorado (Hall 1981, Hall and Kelson 1959, Samuel and Nelson 1982, Scott-Brown 1987). The swift fox range primarily follows the distribution of the black-tailed prairie dog. Swift foxes were found to have their dens on or within 0.8 kilometers of prairie dog colonies (Hillman and Sharps 1978). The major portion of the swift fox diet is prairie dogs, 49% and insects, 27% (Uresk and Sharps 1986). Due to the extensive amount of prairie dog colonies within the project area, swift fox habitat exists throughout the project area.

3.4. West Nile Virus

West Nile virus (WNv) is a mosquito-borne disease that can cause encephalitis or brain infection. Mosquitoes spread this virus after they feed on infected birds and then bite people, other birds, and animals. WNv is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

Since its discovery in 1999 in New York, WNv has become firmly established and spread across the United States. Birds are the natural vector host and serve not only to amplify the virus, but to spread it. Though less than 1% of mosquitoes are infected with WNv, they still are very effective in transmitting the virus to humans, horses, and wildlife. *Culex tarsalis* appears to be the most common mosquito to vector, WNv.

The human health issues related to WNv are well documented and continue to escalate. Historic data collected by the CDC and published by the USGS at www.westnilemaps.usgs.gov are summarized below. Reported data from the Powder River Basin (PRB) includes Campbell, Sheridan and Johnson counties.

Table 3.5 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007*	155	22	Unk	1

*Wyoming Department of Health Records September 12, 2007.

Human cases of WNv in Wyoming occur primarily in the late summer or early fall. There is some evidence that the incidence of WNv tapers off over several years after a peak following initial outbreak

(Litzel and Mooney, personal conversations). If this is the case, occurrences in Wyoming are likely to increase over the next few years, followed by a gradual decline in the number of reported cases.

Although most of the attention has been focused on human health issues, WNv has had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNv had been detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations have incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNv. During 2003, 36 raptors were documented to have died from WNv in Wyoming including golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, Cooper's hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson's hawk (Cornish et al. 2003). Actual mortality is likely to be greater. Population impacts of WNv on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNv in the PRB in 2003. While birds infected with WNv have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNv mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNv, such as *Culex tarsalis*, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be provided educational material by their employers about WNv to reduce the risk of WNv transmission. The letter encouraged companies to contact either local Weed and Pest Districts or the Wyoming Department of Health for surface water treatment options.

3.5. Water Resources

The project area is within SA Creek and Long Creek watersheds within the Middle Powder River drainage system. These watersheds consist of moderately steep, dissected terrain with the upper portion of the watershed slopes exceeding 20%. SA Creek has an average gradient of 4 to 8% with an average channel from 3 to 6 feet deep and 8 to 15 feet wide.

3.5.1. Groundwater

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for

Wyoming Groundwater) define the following limits for TDS: 500 mg/l TDS for Drinking Water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

The ROD includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation.

Specifically relative to groundwater, the plan identified the following (PRB FEIS ROD page E-4):

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 1 registered stock and domestic water well within ½ mile of a federal CBNG producing well in the POD with a depth of 412 feet and static water levels of 160 feet below ground surface (bgs). For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the SA Creek and Long Creek drainages, which are tributaries to the Middle Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in μmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBNG produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Middle Powder River, the EC ranges from 1,421 at Maximum monthly flow to 2,154 at Low monthly flow and the SAR ranges from 3.92 at Maximum monthly flow to 4.62 at Low monthly flow. These values were determined at the USGS station located at Moorhead, Montana (PRB FEIS page 3-49).

For more information regarding surface water, please refer to the PRB FEIS Chapter 3 Affected Environment pages 3-36 through 3-56.

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the Long Creek Federal POD project, following the Secretary of the Interior's Guidelines and Standards. A Class III inventory specifically for the project was conducted by ACR April and June 2006 (BLM project no. 70070098). The inventory covered

approximately 2,410 acres; this inventory recorded 24 sites and 29 isolates. Sites and isolates are defined as specified by the *2006 State Protocol Between the Wyoming Bureau of Land Management State Director and the Wyoming State Historic Preservation Officer*. Additional Class III inventories within the project area were also consulted during the review of the proposed action (BLM project nos. 61800087, 70040071, 70060028, and 70080025). The following cultural resources are located in or near the APE (area of potential effect).

Table 3.6 Cultural Resources Inventory Results

Site/Isolate Number	Description	Eligibility	Impact/In APE	Effect
48CA853	Prehistoric Lithic Scatter	NE	Yes	No HP Affected
48CA854	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6263	Historic Homestead	NE	Yes	No HP Affected
48CA6264	Prehistoric Lithic Scatter & Historic Debris	NE	No	No Effect
48CA6265	Prehistoric Lithic Scatter	NE	Yes	No HP Affected
48CA6266	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6267	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6268	Prehistoric Lithic Scatter & Historic Debris	NE	No	No Effect
48CA6269	Prehistoric Lithic Scatter	E	No	No Effect
48CA6270	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6271	Historic Windmill	NE	No	No Effect
48CA6272	Prehistoric Lithic Reduction/Plant Processing	E	No	No Effect
48CA6273	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6274	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6275	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6276	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6277	Prehistoric Lithic Scatter	E	No	No Effect
48CA6278	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6279	Prehistoric Lithic Scatter	NE	Yes	No HP Affected
48CA6280	Prehistoric Lithic Reduction	NE	No	No Effect
48CA6281	Prehistoric Lithic Reduction	NE	No	No Effect
48CA6282	Prehistoric Quarry	NE	No	No Effect
48CA6283	Prehistoric Lithic Scatter	NE	No	No Effect
48CA6720	Prehisotiric Lithic Procurement	NE	Yes	No HP Affected

Site/Isolate Number	Description	Eligibility	Impact/In APE	Effect
48IR1	Historic Isolate	NE	No	No Effect
48IR2	Prehistoric Isolate	NE	No	No Effect
48IR3	Prehistoric Isolate	NE	No	No Effect
48IR4	Prehistoric Isolate	NE	No	No Effect
48IR5	Prehistoric Isolate	NE	No	No Effect
48IR6	Prehistoric Isolate	NE	No	No Effect
48IR7	Historic Isolate	NE	No	No Effect
48IR8	Prehistoric Isolate	NE	No	No Effect
48IR9	Prehistoric Isolate	NE	No	No Effect
48IR10	Prehistoric Isolate	NE	No	No Effect
48IR11	Prehistoric Isolate	NE	No	No Effect
48IR12	Prehistoric Isolate	NE	No	No Effect
48IR13	Prehistoric Isolate	NE	No	No Effect
48IR14	Prehistoric Isolate	NE	No	No Effect
48IR16	Prehistoric Isolate	NE	No	No Effect
48IR17	Prehistoric Isolate	NE	No	No Effect
48IR18	Prehistoric Isolate	NE	No	No Effect
48IR19	Prehistoric Isolate	NE	No	No Effect
48IR20	Prehistoric Isolate	NE	Yes	No HP Affected
48IR21	Prehistoric Isolate	NE	No	No Effect
48IR22	Prehistoric Isolate	NE	No	No Effect
48IR23	Prehistoric Isolate	NE	No	No Effect
48IR24	Historic Isolate	NE	No	No Effect
48IR25	Prehistoric Isolate	NE	No	No Effect
48IR26	Prehistoric Isolate	NE	No	No Effect
48IR27	Prehistoric Isolate	NE	No	No Effect
48IR28	Prehistoric Isolate	NE	Yes	No HP Affected
48IR29	Prehistoric Isolate	NE	Yes	No HP Affected
48IR30	Prehistoric Isolate	NE	Yes	No HP Affected

No resources of interest to Native American cultural groups or Traditional Cultural Properties are known to occur in the project area.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts to the environment which will result from this action. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced by the operator's plans and BLM applied mitigation. Of the 25 proposed well locations, one is on an existing or reclaimed conventional well pad, 11 can be drilled without a well pad being constructed and 14 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the (11) wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 20 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 11 wells would involve approximately 0.34 acre/well for 3.74 total acres. The other 14 wells requiring cut & fill pad construction would disturb approximately 0.36 to 0.74 acres/well pad for a total of 7.18 acres. The total estimated disturbance for all 25 wells would be 10.92 acres.

Approximately 5.45 miles of improved roads would be constructed to provide access to various well locations. No new or existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.27 miles of pipeline or power would be constructed outside of access corridors. JM Huber puts underground electric power in a separate trench ten feet away from gas and water lines. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings, including culverts and fords (low water crossings) are shown on the MSUP and the WMP maps (see the POD). These structures would be constructed in accordance with sound, engineering practices and BLM standards.

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. "Government soil experts state that SAR values of 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult." (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Total Pads	25		**10.92**	Long Term
Nonconstructed Pad	11	0.34 acres	3.74	
Slotted Pad	4	0.34 acres	1.36	
Double slot	1	0.56 acres	0.56	
Constructed Pad	9	0.36 to 0.74 acres	5.26	

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Impoundments	1 existing		N/A	Long Term
On-channel	0	Site Specific	0.0	
Off-channel	1	Site Specific	N/A	
Water Discharge Points	1	Site Specific or 0.01 ac/WDP	N/A	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	
Channel Modification		Site Specific	0.0	
Improved Roads	5.45		**48.51**	Long Term
No Corridor	0.34	50 feet	2.06	
With Corridor	5.11	75 feet	46.45	
2-Track Roads	0.0		N/A	Long Term
No Corridor				
With Corridor				
Pipelines	7.72		**32.02**	Short Term
No Corridor	0.47	30 feet	1.72	
With Corridor	6.25	40 feet	30.30	
Buried Power Cable				
No Corridor	0.08	30 feet	0.27	Short Term
Overhead Powerlines	1.39	30 feet	5.05	Long Term
Additional Disturbance	6 staging areas	200 X 400 feet	11.02	Short Term
Total			**64.48**	**Long Term**
Total			**107.79**	**Short Term**

The designation of the duration of disturbance is defined in the PRB FEIS (pg 4-1 and 4-151). "For this EIS, short-term effects are defined as occurring during the construction and drilling/completion phases. Long-term effects are caused by construction and operations that would remain longer".

4.1.1. Wetland/Riparian

Two culvert channel crossing and one pipeline crossing are proposed in the SA Creek drainage, which exhibits wetland/riparian areas resulting from prior upstream produced water discharge. The potential impact to wetlands from these crossings should be minimal and does not require a Corps of Engineers permit.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges.

Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas." (PRB FEIS Page 4-175).

4.1.2. Invasive Species

Based on the investigations performed during the POD planning process, the operator has committed to the control of noxious weeds and species of concern using the following measures in an Integrated Pest Management Plan (IPMP) included in the proposal:

1. Control methods will include herbicide application, mowing and hand pulling small infestations
2. Preventive practices will include inspecting disturbed areas upon completion of construction, reporting infestations scheduling the appropriate control methods and timing for the specific weeds present. Construction workers will be encouraged to clean equipment between locations; soil disturbance will be minimized and reseeded promptly with weed free seed and mulch.
3. Employees and contractors are trained in weed identification and prevention. Other key personnel will also receive outside sources (e.g. local weed and pest office). Weed identification guides will be provided to key field personnel.

Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time.

The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.3. Cumulative Effects

The PRB FEIS stated that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the Project Area. SAR in water in the sub-watersheds could be altered by saline soils because disturbed soils with a conductivity of 16 mmhos/cm could release as much as 0.8 tons/acre/year of sodium (BLM 1999c). Soils in floodplains and streambeds may also be affected by produced water high in SAR and TDS. (PRB FEIS page 4-151).

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage, which is approximately 40.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

- The WMP for the Long Creek Federal POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Spring-Summer-Fall, Winter, Winter-Yearlong, and Yearlong range for pronghorn antelope and mule deer would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD feels a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not accepted the disturbance (Madson 2005).

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and as the Pinedale Anticline study suggests mule deer do not readily habituate. A study in North Dakota stated "Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic" (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. In order to survive below the maintenance level, requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

4.2.1.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-211.

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged into one existing reservoir (Dead Horse Lake), into the existing Bow and Arrow 11-7 injection well, and into the existing Bow and Arrow Subsurface Drip Irrigation System. If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.2.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235.

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to over heating or chilling of eggs or chicks. The prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

Table 4.2 -Infrastructure within close proximity to documented raptor nests within the Long Creek project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
4396	429884E 4972650N	Buteo	Inactive	Well: 9LW-21 15LW-21 1LW-28 3LW-28 5LW-28 (construction of access road only)	 0.39 0.18 (out of line of sight) 0.41 0.3 0.27
4397	429881E 4972639N	Buteo	Inactive	Well: 9LW-21 15LW-21 1LW-28 3LW-28	 0.39 0.18 (out of line of sight) 0.41

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
				5LW-28 (construction of access road only)	0.3 0.27
4398	432500E 4971823N	Unknown	Inactive	Well: 1LW-27	 0.38
4399	431985E 4970678N	Unknown	Inactive	Well: 1LW-27 7LW-27 10LW-27 16LW-27	 0.26 0.27 0.32 0.44
4400	432059E 4970580N	Unknown	Inactive	Well: 16LW-27	 0.32
4401	432040E 4970579N	Unknown	Inactive	Well: 16LW-27	 0.32
None	430800E 4970166N	Unknown	Inactive	Well: 1LW-33 7LW-33 9LW-33	 0.37 0.46 0.33
1422	430460E 4969763N	RTHA/ GHOW	Active	Well: 7LW-33 9LW-33 15LW-33	 0.39 0.14 (out of line of sight) 0.41

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests.

The 15-21 well head was proposed within 0.25 miles in direct line of sight of two stick nests located in ponderosa pine trees. The wells were relocated approximately 600 feet to the north out of direct line of sight. The 5-34 well head was proposed approximately 300 feet and in direct line of sight of a stick nest. The well was moved approximately 600 feet to the northwest out of direct line of sight. This move put the well in a fee/fee location. Both of these well moves should alleviate some impacts to raptors.

4.2.4.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221.

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered and Sensitive Species

Table 4.3 - Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NS	NE	Habitat present but species not suspected to occur.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.
Effect Determinations

Effects Determinations
LAA Likely to adversely affect
NE No Effect.
NLAA May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-footed ferret

Because the black-tailed prairie dog colonies within and adjacent to the Long Creek project area are of insufficient size for supporting ferrets and are isolated from any prairie dog complexes, implementation of the proposed development should have "***no effect***" on the black-footed ferret.

4.2.5.1.2. Ute's Ladies Tresses Orchid

One spring has been identified within the Long Creek project area and suitable habitat is present along SA Creek. Roads and pipelines are proposed to cross SA Creek in several locations and will disturb Ute ladies'-tresses habitat.

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project will have "***no effect***" on the Ute ladies'- tresses orchid as no orchids are present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*Rana pipiens*)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will affect existing waterways.
Spotted frog (*Ranus pretiosa*)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	K	MIIH	Project includes overhead power.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog colonies present.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sagebrush cover will be affected.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	S	WIPV	Sagebrush cover will be affected.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Grasslands will be affected.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	NS	MIIH	Prairie dog colonies present.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (*Falco peregrinus*)	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat.
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Prairie dog towns will be affected.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (*Euderma maculatum*)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (*Vulpes velox*)	Grasslands	S	MIIH	Grasslands will be affected.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Plants				
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.

Project Effects
NI No Impact.
MIIH May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI Beneficial Impact

4.2.5.2.1. Bald eagle

Although habitat exists throughout the project area in the form of dense stands of Ponderosa pine, bald eagles are more likely to roost and nest along the Powder River, located less than two miles from the project area to the northwest. Bald eagles are likely to forage throughout the project area on a regular basis and have been observed doing so on several occasions.

There are 2.7 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. JM Huber is proposing an additional 1.06 miles of overhead three-phase distribution lines. There are currently 4.9 miles of improved roads within the project area, with 5.1 miles proposed.

The presence of overhead power lines may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. Typically two-tracks and improved project roads pose minimal collision risk In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%).

Produced water will be stored in 1 existing reservoir which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoir on eagles is unknown. The reservoir could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.2.2. Black-tailed prairie dog

Wells 13-LW27, 1LW-28, 7LW-28, 3LW-33, 7LW-33, 9LW-33, and 15LW-33 and associated access roads are located within prairie dog towns. The well locations and access roads were not removed from the prairie dog colonies at request of the landowner's representative.

When construction begins on roads, pipelines and pads, the earth moving equipment can remove anywhere from an inch to over several feet of dirt at one time destroying prairie dog burrows and foraging habitat. During construction of these facilities, there is the possibility that many of the prairie dogs within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and may

cause an increase in prairie dog mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover.

Individuals that survive the excavation process will likely be displaced. As the prairie dog town grows in size, prairie dogs move from an area of high population density to an area of low population density. Male prairie dogs resort to either long-distance dispersal to new colonies (mostly as yearlings, rarely as adults) or short distance within the home colony. Female prairie dogs disperse over long distances to other colonies (as either yearlings or adults). Short-distance dispersal of females within the home colony almost never occurs (Hoogland 1995). Dispersal of prairie dogs occurs as single individuals. Both male and female prairie dogs prefer to move into an existing colony or one that has been abandoned rather than start a completely new colony. Coterie (small family group within the colony) members resist attempted invasions by conspecifics including immigrants. Dispersing prairie dogs have increased stress levels, higher exposure to predators, and are unlikely to be accepted by other colonies if they even encounter one. Both males and females actively protect their coterie territories from invading males and females (Hoogland 1995).

Well houses and power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog road mortalities.

4.2.5.2.3. Burrowing owl

The eastern and southern portions of the Long Creek project area contain several large and continuous prairie dog colonies. Reasons for declining populations of burrowing owls are degradation of habitat and the decline of prairie dog colonies across the western United States. Other factors include urban sprawl, conversion of prairie to farmland, road collisions and accidental deaths through pesticide programs aimed at insect and mammal pests (Korfanta 2005).

When construction begins on reservoirs, roads, pipelines and pads the earth moving equipment can remove anywhere from an inch to over several feet of dirt at one time destroying prairie dog burrows (nesting habitat) and foraging habitat. During construction of these facilities, burrowing owls within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the burrowing owls and will likely cause an increase in burrowing owl mortalities. During the construction of these facilities, individuals are exposed more frequently to predators and have less protective cover.

The presence of overhead power lines and roads within the project area may impact burrowing owls. Overhead power lines create hunting perches for lager raptors, thus increasing the potential for predation on burrowing owls. They are also a collision hazard for burrowing owls flying through the area. Mineral related traffic on the adjacent roads may result in burrowing owl collisions with vehicles.

Restricting all project related activities (i.e. road/pipeline, reservoir and well pad construction, vehicle traffic, well drilling, human presence, overhead powerline construction, etc.) within one quarter mile of an active burrowing owl nest during the breeding season (April 15 through August 31) would likely reduce nest failure and would prevent road related mortalities.

The burrowing owl is protected under the Migratory Bird Treaty Act. Road related mortalities are considered take under the under the Migratory Bird Treaty Act:

> "*The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted regulation. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect."*

4.2.5.2.4. Greater sage-grouse

Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, power lines, reservoirs and other infrastructure (Theiele 2005, Oedekoven 2004). Sage grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. The Wyoming Game and Fish Department (WGFD) feels a well density of eight wells per section creates a high level of impact for sage grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004).

The presence of overhead power lines and roads within the project area may adversely affect sage grouse. Overhead power lines create hunting perches for raptors, thus increasing the potential for predation on sage grouse. Increased predation from overhead power near leks may cause a decrease in lek attendance and possibly lek abandonment. Overhead power lines are also a collision hazard for sage grouse flying through the area. Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al. 2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003).

Noise can affect sage grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). Sage grouse attendance on leks within one mile of compressors is lower than for sites farther from compressors locations (Braun et al. 2002).

Another concern with CBNG is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (Oedekoven 2004). West Nile virus represents a significant new stressor which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). Powder River Basin grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. Comm..).

The Buffalo Field Office (BFO) Resources Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA), which includes the WGFD, 1977 sage-grouse guidelines (Bennett 2004). Under pressure for standardization BLM Wyoming adopted the two-mile recommendation in 1990, and instructed the field offices to incorporate the measure into their land use plans (Bennett 2004, Murkin 1990).

The two-mile recommendation was based on research which indicated between 59 and 87 percent of sage-grouse nests were located within two-miles of a lek (Bennett 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

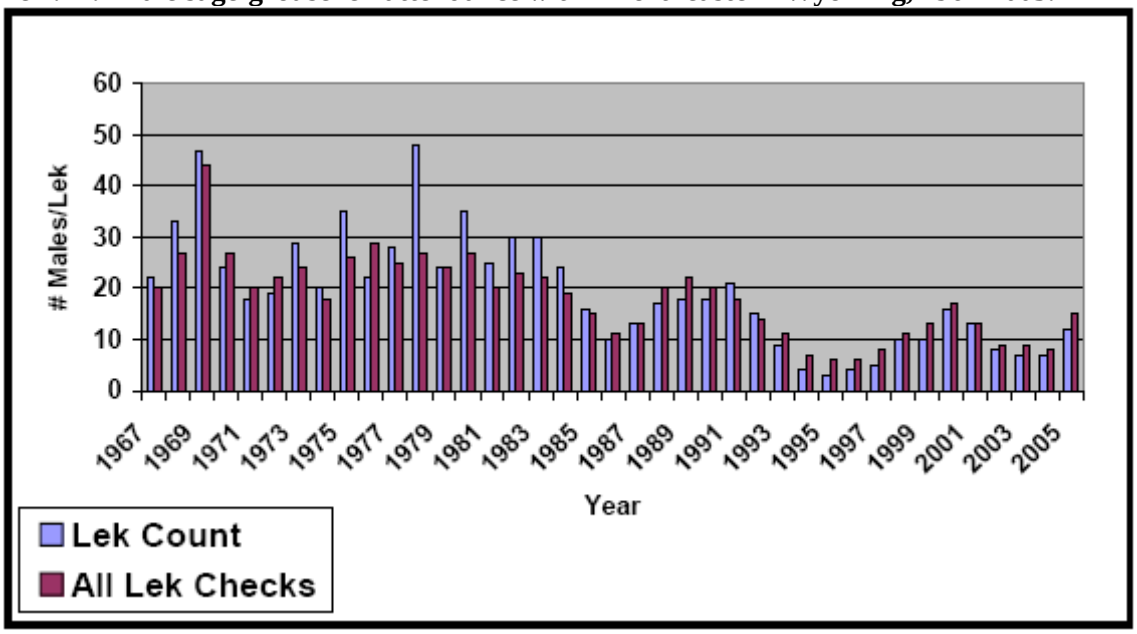
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed

natural gas development. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan's north-central Montana study area.

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Hollaran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres; meanwhile Powder River Basin sagebrush coverage was estimated to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding WAFWA revised their sage grouse management guidelines (Connelly et. al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where habitats are not distributed uniformly such as the Powder River Basin.

The sage grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 1) (Thiele 2005). The figure illustrates a ten year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak and each periodic low is lower than the previous population low. Long-term harvest trends are similar to that of lek attendance (Thiele 2005).

Figure 4.1 -. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



Sage-grouse populations within the PRB are declining independent of coalbed natural gas development. CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (Oedekoven 2004). The Powder

River Basin Oil and Gas Project Final Environmental Impact Statement estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003). Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

A two-mile timing limitation given the long-term population decline and that less than 50% of grouse are expected to nest within the limitation area is likely insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connely et al. 2000) recommend increasing the protective distance around sage grouse leks. Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. As stated earlier, a well density of eight wells per section creates sage-grouse avoidance zones which overlap creating contiguous avoidance areas (WGFD 2004).

An integrated approach including habitat restoration, grazing management, temporal and spatial mineral limitations etc. is necessary to reverse the population decline. The Wyoming Game and Fish Department (WGFD) has initiated such a program within the Buffalo Field Office area (Jellison 2005). The WGFD program is modeled after a successful program on the Deseret Ranch in southwestern Wyoming and northeastern Utah. The Deseret Ranch has demonstrated a six-fold increase in their sage-grouse population while surrounding areas exhibited decreasing populations (Danvir 2002).

4.2.5.2.5. Mountain plover

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines adjacent to the project area provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

Suitable mountain plover habitat is present within the project area. The project may impact mountain plovers.

4.2.5.2.6. Swift fox

The construction of well pads, roads, pipelines and reservoirs causes direct habitat loss (i.e. loss of prairie dogs and prairie dog burrows). During construction of these facilities, swift foxes may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows will cause considerable stress on the animals and is likely to cause an increase in swift fox mortalities. Individuals will be exposed more frequently to predators and have less protective cover. Mineral related traffic on the adjacent roads will likely result in swift fox road mortalities.

Restricting all development activities (i.e. road/pipeline, overhead powerline, reservoir construction, well drilling and all activities associated with bringing the wells into production, vehicle traffic and human presence) within a quarter mile of active swift fox dens between March 1 and August 31 would reduce direct impacts to swift foxes.

4.2.5.3. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-271.

4.3. West Nile Virus Direct and Indirect Effects

This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNv species and its effects in Wyoming.

There is no evidence that treatment, either through the use of larvicides or malithion, on a site specific or basin-wide scale will have any effect on the overall spread of the disease. The State agencies have not instituted state-wide treatment for mosquitoes due to WNv, nor are they requiring any mitigation specific to permitting for CBM operations.

Cumulatively, there are many sources of standing water, beyond CBM discharge, throughout the PRB that would add to the potential for mosquito habitat. Sources include; natural flows, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities.

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation.

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Middle Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies which include full-containment, injection, and subsurface drip irrigation

The WDEQ has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The WSEO has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state.

The maximum water production is predicted to be 8.0 gpm per well or 208.0 gpm (0.46 cfs or 335 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBNG Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Middle Powder River drainage, the projected volume produced within the watershed area was 9,689 acre-feet in 2008 (maximum production was estimated in 2005 at 12,328 acre-feet). As such, the volume of water resulting from the production of these wells is 3.5 % of the total volume projected for 2008. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 37% to groundwater aquifers and coal zones in the Middle Powder River drainage area (PRB FEIS pg 4-5). Although Dead Horse Lake has a capacity of 272 acre-feet the majority of the produced water (75%) will likely be injected (B&A 11-7) or used in the Bow & Arrow SDI system. For this action, it may be assumed that a maximum of 19.2 gpm will infiltrate at or near the discharge point and Dead Horse Lake (3.1 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic

purposes. According to the PRB FEIS, "the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water well produces from a depth of 412 feet compared to 250-800 feet to the Canyon/Cook/Wall/Pawnee coal zones. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to "…resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years." (PRB FEIS page 4-38).

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures will protect any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD. The reference well will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

Shallow ground water monitoring is ongoing at impoundment sites across the basin. Due to the limited data available from these sites, the still uncertain overall fate or extent of change that is occurring due to infiltration at those sites, and the extensive variable site characteristics both surface and subsurface, it is not reliable at this time to infer that findings from these monitoring wells should be directly applied to other impoundment locations across the basin.

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and is currently being revised as the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments". Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow groundwater. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded

impoundments.

4.4.1.1. Groundwater Cumulative Effects:

As stated in the PRB FEIS, "The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation." (PRB FEIS page 4-64).

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "…cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

Table 4.5 - Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Moorhead, MT Gauging station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 3.92 4.62	 1,421 2,154
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
Predicted Co-Mingled Produced Water Quality Canyon/Cook/Wall/Pawnee Coal Zones	2,000	36.2	2,150

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 2,000 mg/l TDS which is at the WDEQ criteria for agricultural use (2000 mg/l TDS).

For more information, please refer to the WMP included in this POD.

To manage the produced water, 1 existing impoundment (272 acre-feet) would potentially be used for storage within the project area. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). The previous assumption was that approximately 25% of the produced water would be discharge to Dead Horse Lake. Consequently, the volume of water produced from these wells may result in the addition of 0.011 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Middle Powder River of 86 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 26 wells is anticipated to be a total of 208.0 gpm, of which approximately 25% will go to Dead Horse Lake (0.12 cfs). Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full-containment, the produced water re-surfacing in SA Creek from this action (0.02 cfs) may add a maximum 0.016 cfs to the Middle Powder River flows, or 0.02% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Middle Powder River Watershed (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at each discharge point outfall. Aeration adds dissolved oxygen to the produced water which can oxidize susceptible ions, which may then precipitate. This is particularly true for dissolved iron. Because iron is one of the key parameters for monitoring water quality, the precipitation of iron oxide near the discharge point will improve water quality at downstream locations.

The operator has obtained Wyoming Pollutant Discharge Elimination System (WYPDES) permits from the WDEQ in previously approved PODs, for the discharge of water produced from this project.

In order to determine the actual water quality of the producing formations in this POD and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well to each coal zone within the POD boundary, if a another J.M. Huber reference well does not exist within 6 miles of the POD boundary. The reference well will be sampled at the wellhead for analysis within sixty days of initial production. A copy of the water analysis will be submitted to the BLM Authorized Officer.

As stated previously, the operator has committed to offer water well agreements to properly permitted domestic and stock water wells within the circle of influence of the proposed CBNG wells.

4.4.2.1. Surface Water Cumulative Effects

The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Middle Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

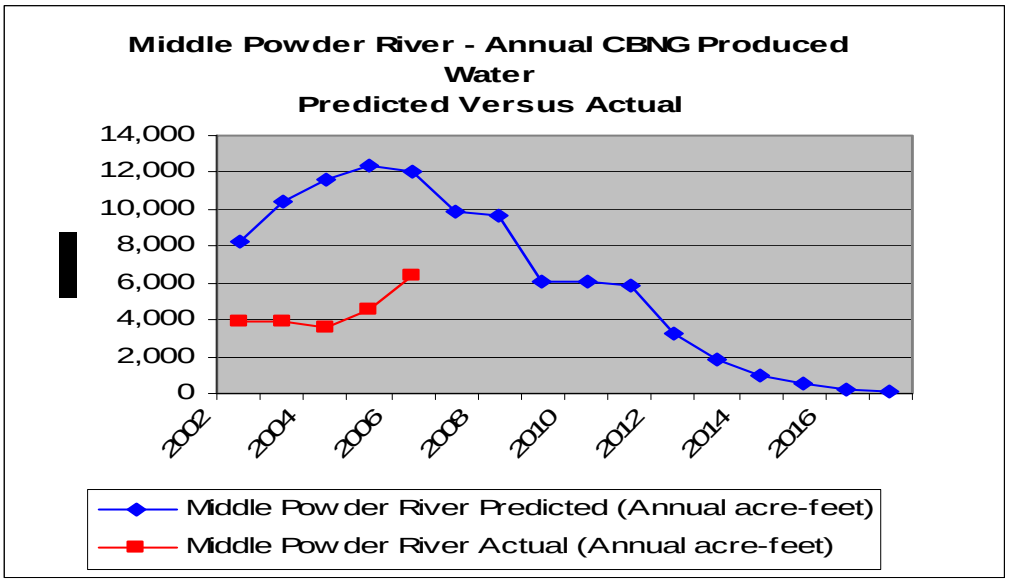
As of March 2007, all producing CBNG wells in the Middle Powder River watershed have discharged a cumulative volume of 22,292 acre-ft of water compared to the predicted 54,690 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6

following. This volume is 40.8% of the total predicted produced water analyzed in the PRB FEIS for the Middle Powder River watershed.

Table 4.6 - Actual vs. predicted water production in the Middle Powder River watershed 2006 *Data Update 3-16-07*

Year	Middle Powder River Predicted (Annual acre-feet)	Middle Powder River Predicted (Cumulative acre-feet from 2002)	Middle Powder River Actual (Annual acre-feet)		Middle Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	8,257	8,257	3,929	47.6	3,929	47.6
2003	10,421	18,678	3,860	37.0	7,789	41.7
2004	11,640	30,318	3,547	30.5	11,336	37.4
2005	12,328	42,646	4,588	37.2	15,924	37.3
2006	12,044	54,690	6,368	52.9	22,292	40.8
2007	9,897	64,587				
2008	9,689	74,276				
2009	6,030	80,306				
2010	6,030	86,336				
2011	5,899	92,235				
2012	3,276	95,511				
2013	1,797	97,308				
2014	964	98,272				
2015	495	98,767				
2016	231	98,998				
2017	82	99,080				
Total	**99,080**		**22,292**			

Figure 4.2 Actual vs. predicted water production in the Middle Powder River watershed



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Electrical Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage, which is approximately 40.8% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

Refer to the PRB FEIS, Volume 2, page 4-115 – 117 and table 4-13 for cumulative effects relative to the Middle Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

BLM review, conducted by Wendy Sutton, has determined that sites 48CA853, 48CA6263, 48CA6265, 48CA6279, 48CA6720, will be impacted by the proposed project. Four isolates (48IR20, 48IR28, 48IR29, and 48IR30) will also be impacted by the proposed project. Impacts to these non-eligible sites and isolates will result in no effect/no historic properties affected. Following the Wyoming State Protocol, Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 10/10/2007 that the proposed project would result in *no historic properties affected*.

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the ***Standard COA*** (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Rick Estes	Civil Engineer (permitting specialist)	Baker Energy	Yes
Ace Armann	Field Operations Superintendent	Baker Energy	Yes
Larry Bridger	Civil Engineer	J.M Huber	Yes
Brandon Brooks	Project Engineer	Baker Energy	Yes
Ted Hamersma	Construction Supervisor	Baker Energy	Yes
Paul Woody	Landman	J.M Huber	Yes
Ricky Hendricks	Project Manager		Yes
Kendall Cox	Ranch Manager	Manigault Ranch	Yes

6. OTHER PERMITS REQUIRED

A number of other permits are required from Wyoming State and other Federal agencies. These permits are identified in Table A-1 in the PRB FEIS Record of Decision.

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