

FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD

For
Coleman Oil & Gas, Inc.
SW RENO FLATS

Environmental Assessment - WY-070-EA07-196

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Coleman Oil & Gas, Inc.'s SW Reno Flats Coal Bed Natural Gas (CBNG) POD comprised of the following 26 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Sec.	TWP	RNG	Lease #
1	SW RENO FLATS BRIDLE BIT RANCH	13-31	NWSW	31	42N	72W	WYW143524
2	SW RENO FLATS BRIDLE BIT RANCH	23-31	NESW	31	42N	72W	WYW143524
3	SW RENO FLATS JAROSH	14-4	SWSW	4	41N	72W	WYW147274
4	SW RENO FLATS JAROSH	41-8	NENE	8	41N	72W	WYW147274
5	SW RENO FLATS JAROSH	43-8	NESE	8	41N	72W	WYW147274
6	SW RENO FLATS RENO	14-6	SWSW	6	41N	72W	WYW49854
7	SW RENO FLATS RENO	12-6	SWNW	6	41N	72W	WYW49854
8	SW RENO FLATS RENO	21-6	NENW	6	41N	72W	WYW49854
9	SW RENO FLATS RENO	23-6	NESW	6	41N	72W	WYW49854
10	SW RENO FLATS RENO	34-6	SWSE	6	41N	72W	WYW49854
11	SW RENO FLATS RENO	41-6	NENE	6	41N	72W	WYW49854
12	SW RENO FLATS RENO	43-6	NESE	6	41N	72W	WYW49854
13	SW RENO FLATS RENO	21-7	NENW	7	41N	72W	WYW143519
14	SW RENO FLATS RENO	32-7	SWNE	7	41N	72W	WYW143519
15	SW RENO FLATS RENO	34-7	SWSE	7	41N	72W	WYW143519
16	SW RENO FLATS RENO	43-7	NESE	7	41N	72W	WYW143519
17	SW RENO FLATS RENO	23-18	NESW	18	41N	72W	WYW140216
18	SW RENO FLATS RENO	14-18	SWSW	18	41N	72W	WYW140216
19	SW RENO FLATS SIOUX RANCH	12-5	SWNW	5	41N	72W	WYW49854
20	SW RENO FLATS SIOUX RANCH	14-5	SWSW	5	41N	72W	WYW49854
21	SW RENO FLATS SIOUX RANCH	21-5	NENW	5	41N	72W	WYW49854
22	SW RENO FLATS SIOUX RANCH	23-5	NESW	5	41N	72W	WYW49854
23	SW RENO FLATS SIOUX RANCH	32-5	SWNE	5	41N	72W	WYW49854
24	SW RENO FLATS SIOUX RANCH	34-5	SWSE	5	41N	72W	WYW49854
25	SW RENO FLATS SIOUX RANCH	41-5	NENE	5	41N	72W	WYW49854
26	SW RENO FLATS SIOUX RANCH	43-5	NESE	5	41N	72W	WYW49854

The following impoundments were also inspected and approved for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Daisy	SWNE	18	41	72	2.30	Existing	Fee
2	Crawford	SESW	7	41	72	17.52	8.21	WYW820646
3	Stinkbug	NENW	18	41	72	4.68	1.35	WYW820646

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.

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

**Coleman Oil & Gas, Inc.
SW RENO FLATS
Plan of Development
WY-070-EA07-196**

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/or impacts that are 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 5 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

Proposed Action Title/Type: Coleman Oil & Gas, Inc.’s SW Reno Flats Plan of Development (POD) for 30 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 30 wells proposed within this POD, one which has already been approved. The wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Well and metering house color will be Covert Green, 18-0617 TPX; selected to blend with the surrounding vegetation.

Wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Sec.	TWP	RNG	Lease #
1	SW RENO FLATS BRIDLE BIT RANCH	21-31	NENW	31	42N	72W	WYW143524
2	SW RENO FLATS BRIDLE BIT RANCH	12-31	SWNW	31	42N	72W	WYW143524
3	SW RENO FLATS BRIDLE BIT RANCH	23-31	NESW	31	42N	72W	WYW143524
4	SW RENO FLATS JAROSH	14-4	SWSW	4	41N	72W	WYW147274
5	SW RENO FLATS JAROSH	24-4	SESW	4	41N	72W	WYW147274
6	SW RENO FLATS JAROSH	41-8	NENE	8	41N	72W	WYW147274
7	SW RENO FLATS JAROSH	43-8	NESE	8	41N	72W	WYW147274
8	SW RENO FLATS RENO	14-6	SWSW	6	41N	72W	WYW49854
9	SW RENO FLATS RENO	12-6	SWNW	6	41N	72W	WYW49854
10	SW RENO FLATS RENO	21-6	NENW	6	41N	72W	WYW49854
11	SW RENO FLATS RENO	23-6	NESW	6	41N	72W	WYW49854
12	SW RENO FLATS RENO	34-6	SWSE	6	41N	72W	WYW49854
13	SW RENO FLATS RENO	41-6	NENE	6	41N	72W	WYW49854
14	SW RENO FLATS RENO	43-6	NESE	6	41N	72W	WYW49854
15	SW RENO FLATS RENO	21-7	NENW	7	41N	72W	WYW143519
16	SW RENO FLATS RENO	32-7	SWNE	7	41N	72W	WYW143519
17	SW RENO FLATS RENO	32-6*	SWNE	6	41N	72W	WYW49854
18	SW RENO FLATS RENO	34-7	SWSE	7	41N	72W	WYW143519
19	SW RENO FLATS RENO	43-7	NESE	7	41N	72W	WYW143519
20	SW RENO FLATS RENO	12-18	SWNW	18	41N	72W	WYW140216
21	SW RENO FLATS RENO	23-18	NESW	18	41N	72W	WYW140216
22	SW RENO FLATS RENO	14-18	SWSW	18	41N	72W	WYW140216
23	SW RENO FLATS SIOUX RANCH	12-5	SWNW	5	41N	72W	WYW49854
24	SW RENO FLATS SIOUX RANCH	14-5	SWSW	5	41N	72W	WYW49854
25	SW RENO FLATS SIOUX RANCH	21-5	NENW	5	41N	72W	WYW49854
26	SW RENO FLATS SIOUX RANCH	23-5	NESW	5	41N	72W	WYW49854
27	SW RENO FLATS SIOUX RANCH	32-5	SWNE	5	41N	72W	WYW49854
28	SW RENO FLATS SIOUX RANCH	34-5	SWSE	5	41N	72W	WYW49854
29	SW RENO FLATS SIOUX RANCH	41-5	NENE	5	41N	72W	WYW49854
30	SW RENO FLATS SIOUX RANCH	43-5	NESE	5	41N	72W	WYW49854

*already approved

Water Management Proposal: The following impoundments were proposed for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	F.C.R Detention	NENE	32	42	72	60.86	Existing	Fee
2	Daisey	SWNE	18	41	72	2.30	Existing	Fee
3	Crawford	SESW	7	41	72	17.52	8.21	WYW820646
4	Stinkbug	NENW	18	41	72	4.68	1.35	WYW820646

County: Campbell

Applicant: Coleman Oil & Gas, Inc.

Surface Owners: Jerry Dilts and the Bridle Bit Ranch; Jeanne and Janelle Louise Jarosh; Floyd C Reno and Sons; Sioux Ranch, Inc.

Project Description:

The proposed action involves the following:

- Drilling of 30 federal CBNG wells into the Wyodak coal zone to depths of approximately 895 feet.

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 and maintenance shall be accomplished by a combination of telemetry and well visitation. Metering will entail approximately 1 visit per 6 months to each well. Well maintenance will be as needed with the operator's personnel in the field daily.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 8 discharge points (1 existing) and 4 stock water reservoirs (2 existing) within the Antelope Creek watershed. Approximately 50% of CBNG water from this POD will be contained in impoundments while the remainder will be either discharged into two playas or directly discharged into tributaries of Spring Creek and Bates Creek.
- An unimproved and improved road network.
- An above ground power line network to be constructed by a contractor. The proposed route has not 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 proposed power drops.
- A buried gas, water and power line network, and 0 central gathering/metering facilities.

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 Water Management Plan (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 insure 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 SW Reno Flats POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well Name	#	Qtr/Qtr	Sec.	Twp.	Rng.	Comments
SW RENO FLATS BRIDLE BIT RANCH	12-31	SWNW	31	42N	72W	Moved 1000' out of view of raptor nest – well name changed to 13-31, qtr qtr changed to NWSW
SW RENO FLATS BRIDLE BIT RANCH	21-31	NENW	31	42N	72W	Well dropped due to unavoidable impacts to raptor nests.
SW RENO FLATS JAROSH	24-4	SESW	4	41N	72W	Well dropped due to unavoidable impacts to raptor nests.
SW RENO FLATS JAROSH	41-8	NENE	8	41N	72W	Due to active raptor nest in area, restrict maintenance between 2/1 - 7/31.
SW RENO FLATS RENO	21-7	NENW	7	41N	72W	Moved 300' out of line of sight for raptor nest.
SW RENO FLATS RENO	32-7	SWNE	7	41N	72W	Out of view of raptor within ¼ mile. Restrict maintenance 2/1 - 7/31
SW RENO FLATS RENO	34-7	SWSE	7	41N	72W	No vehicle traffic will be allowed along pipeline corridor from the 34-7 across drainage to discharge point. Due to raptor nests in area restrict maintenance 2/1 - 7/31
SW RENO FLATS RENO	12-18	SWNW	18	41N	72W	Well dropped due to unavoidable impacts to raptor nests.
SW RENO FLATS RENO	14-18	SWSW	18	41N	72W	Moved well closer to 2-track road beyond 1/4 mile buffer for raptor nests.
SW RENO FLATS SIOUX RANCH	23-5	NESW	5	41N	72W	Moved well 200' out of line of sight. Restrict maintenance 2/1 - 7/31
SW RENO FLATS SIOUX RANCH	32-5	SWNE	5	41N	72W	Discharge and tank moved to 12-5. Moved well 160' out of line of sight of nest. Restrict maintenance 2/1 - 7/31
SW RENO FLATS SIOUX RANCH	34-5	SWSE	5	41N	72W	Moved 300' out of line of sight for raptor nest. Restrict maintenance 2/1 - 7/31

Water Management Plan

- The FCR Detention impoundment was dropped from the WMP due to a change in water management strategy.
- Outfall 002 was moved to accommodate landowner wishes and Outfall 003 was dropped for the same reason.

The following wells are not being considered due to unavoidable impacts to active raptor nests:

1	SW RENO FLATS BRIDLE BIT RANCH	21-31	NENW	31	42N	72W	WYW143524
2	SW RENO FLATS RENO	12-18	SWNW	18	41N	72W	WYW140216

The following well was pulled from the SW Reno Flats POD by the Operator:

1	SW RENO FLATS JAROSH	24-4	SESW	4	41N	72W	WYW147274
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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 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. For WYPDES permits received by DEQ after the August 1st effective date, 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.

4. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.
5. The operator will supply to the BLM copies of the WYPDES permits for this POD as soon as they are available from WDEQ.

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. 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. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.
3. 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.

2.3.2.5. Threatened, Endangered, or Sensitive Species

2.3.2.5.1. Bald Eagle

1. 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 15 – August 15).
2. 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).
3. 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).
4. 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.

2.3.2.5.2. Mountain Plover

A mountain plover nesting survey following U.S. Fish and Wildlife Service protocol is encouraged prior to construction initiation, as project modifications can be made if necessary to protect nesting plovers and natural gas production. If requested in writing, then authorization may be granted for construction activities to occur between August 1 and March 15, outside the mountain plover breeding season. A mountain plover nesting survey following U.S. Fish and Wildlife Service protocol shall be conducted during the first available survey period (May 1 – June 15). Additional measures such as monitoring and activity restrictions may be applied if mountain plovers are documented.

1. A disturbance-free buffer zone of 0.25 mile will be established around all occupied mountain plover nesting habitat between March 15 and July 31.

2. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of occupied mountain plover nesting habitat.
3. Construction of ancillary facilities (for example, compressor stations, processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.
4. Where possible, roads will be located outside of plover nesting areas.
5. 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.
6. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.
7. When above ground markers are used on capped and abandoned wells they will be identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.
8. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

2.3.2.5.3. Ute Ladies'-tresses Orchid

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

2.3.2.6. 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.

2.3.2.7. 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 55 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.

2.3.2.8. 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 from the BLM authorized officer.

2.3.3. Site specific mitigation measures

1. All changes made at the onsite will be followed. They have all been incorporated into the operator’s Plan of Development (POD).
2. 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 “Standard Environmental Colors.” The color selected for the SW Reno Flats POD is Covert Green, 18-0617 TPX.
3. The approval of this project does not grant authority to use off lease federal lands. No access, surface disturbing activity, or use of off-lease federal lands, is allowed on affected leases until right-of-way grants become effective on the date in which the right-of-way grant is signed by the authorized officer of the BLM.
4. 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. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

A. Loamy Sites Seed Mix:

For the following locations: 41-8, 34-5, 43-5, 32-5, 41-5, 21-5, 12-5, 14-5, 23-31, 12-31, 43-6, 32-6, 21-6, 41-6, 12-6, 23-6, 32-7, 43-7, 34-7, 14-18

Species- Cultivar		LBS PLS/ACRE
Western Wheatgrass	<i>(Pascopyrum smithii)</i>	4.0
Blue Grama	<i>(Bouteloua gracilis)</i>	4.0
Green Needlegrass	<i>(Nassella viridula)</i>	4.0
American Vetch	<i>(Vicia Americana)</i>	1.0
Prairie Coneflower	<i>(Ratibida columnifera)</i>	1.0
Purple Prairie Clover	<i>(Dalea purpurea)</i>	1.0
Total		15.0

B. Sandy Sites Seed Mix:

For the following locations: 14-4, 23-5, 43-8, 21-7, 34-6, 14-6, 23-18

Species-Cultivar		LBS PLS/ACRE
Western Wheatgrass	<i>(Pascopyrum smithii)</i>	5.0
Indian Ricegrass	<i>(Achnatherum humenoides)</i>	4.0
Little Bluestem	<i>(Schizachyrium scoparium)</i>	4.0
American Vetch	<i>(Vicia americana)</i>	1.0
Prairie Coneflower	<i>(Ratibida columnifera)</i>	0.5
Purple Prairie Clover	<i>(Dalea purpurea)</i>	0.5
Total		15.0

Note: use the appropriate seed mix for roads and pipelines that cross onto different sites (i.e. Sandy, Loamy). 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.

5. Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. 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.
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 waterbars shall be placed according to the following spacing:

Grade Drainage Spacing

2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-16%	150 ft

8. Disturbance areas which have fragile soils and erosive conditions shall be stabilized in a manner which eliminates erosion until a self-perpetuating non-weed native plant community has stabilized the site. Stabilization efforts shall be finished within 30 days (or sooner) of the completion of construction activities.
9. 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 un-forested 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.
10. No pesticide spraying will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

11. All roads, pads, impoundments and locations where engineered construction will occur will be completely slope staked before the pre-construction meeting.
12. Primitive roads (2-tracks) with a utility corridor and the pipeline corridors without an access road will not exceed a disturbance width of 35 feet.
13. Utility corridors will be expediently reclaimed following construction and maintained in a professional and workmanship manner avoiding tire rutting, settling and erosion.
14. Mowing at the well site where a constructed pad is not approved as designed will be minimized to a 30 foot radius of the well stake.
15. Wells 23-31, 32-18 and any new overhead power in section 31, 6 and 18, shall not be constructed prior to completion of a mountain plover nesting survey.
16. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, “The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time”. The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, the operator will coordinate with the BLM to determine if additional surveys will be required.
17. The following conditions will minimize impacts to roosting and nesting bald eagles (Buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS);
 - a. Surveys for bald eagle winter roosts and nest sites are required annually until construction is completed throughout the project boundaries.
 - b. If a roost is identified a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal limited activity zone of 1mile will be established for all bald eagle roost sites (November 1 - April 1).
 - c. If a bald eagle nest is identified a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).
 - d. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.
18. The following conditions will minimize impacts to raptors;
 - a. No surface disturbance shall occur within ½ mile of all identified nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This affects the following wells and **associated infrastructure; pipelines, low water crossings, culverts, temporary access roads, discharge points, and overhead power and drops.**

BLM #	Species	UTM N (nad 83)	UTM E (nad 83)	Status	wells and or reservoirs
NEW	RETA	4823337	458022	ACTI	41-5
NEW	NOHA	4822119	458418	ACTI	24-4, 14-4

BLM #	Species	UTM N (nad 83)	UTM E (nad 83)	Status	wells and or reservoirs
NEW	FEHA	4822352	456882	INAC	23-5, 43-5, 34-5, 14-5, 32-5
NEW	RETA	4823324	456779	ACTI	21-5, 12-5, 23-5, 32-5
NEW	FEHA	4822572	456891	INAC	23-5, 43-5, 34-5, 14-5
NEW	FEHA	4820502	454496	INAC	34-7
NEW	FEHA	4820247	454777	INAC	34-7
NEW	FEHA	4821359	455174	ACTI	21-7, 32-7, 34-6, 14-6
914	FEHA	4821374	457032	INAC	34-5, 41-8
NEW	FEHA	4821243	456997	INAC	34-5, 41-8
NEW	FEHA	4821520	456791	ACTI	14-5, 34-5, 41-8
NEW	FEHA	4821537	456345	INAC	14-5, 34-5, 41-8
NEW	FEHA	4821718	456465	INAC	14-5, 34-5, 41-8
NEW	FEHA	4821716	456607	INAC	14-5, 34-5
NEW	FEHA	4821179	457148	INAC	43-8
3723	RETA	4819830	455360	ACTI	34-7, 12-18, 23-18
NEW	GOEA	4819064	455902	INAC	23-18, bates cr reservoir,
NEW	RETA	4818700	454427	ACTI	14-18, 23-18
NEW	SWHA	4819534	454708	ACTI	12-18, 23-18
NEW	FEHA	4822979	454058	INAC	12-6, playa in Sec. 6
NEW	FEHA	4822772	454142	INAC	12-6
NEW	FEHA	4818597	453962	ACTI	14-18
885	FEHA	4824535	454996	ACTI	12-31, 23-31

- b. 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. 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.
- c. Nest productivity checks shall be completed for all raptor nests within the POD listed in the table below. The 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/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.
- d. Between February 1 and the completion of raptor nest productivity checks, drilling, completion, and maintenance activities requiring more than checking the well must be approved by the BLM for the following wells: 13-31, 32-7, 21-7, 23-5, 14-5.
- e. No vehicle traffic other than pipeline maintenance will be allowed from the 34-7 well south down Little Bates Creek. This route will be signed as pipeline only, no CBNG traffic.
- f. Where the operator ties into existing power poles, the existing pole shall be constructed to meet or exceed 2007 APLIC standards.

BLM #	Species	UTM N (nad 83)	UTM E (nad 83)	QQ	Section	T	R	Substrate	Condition	Status
2490	FEHA	4822263	459472	NWSW	3	41	72	GHS	GONE	DNLO
2491	RETA	4821981	459366	SWSW	3	41	72	CTL	GOOD	INAC
2868	FEHA	4822214	459495	NWSW	3	41	72	GHS	GONE	DNLO
2869	FEHA	4822216	459905	NESW	3	41	72	GHS	GONE	DNLO
NEW	RETA	4823337	458022	NWNW	4	41	72	MMS	GOOD	ACTI
934	FEHA	4822598	457858	SWNW	4	41	72	GHS	GONE	DNLO
NEW	RETA	4823344	458563	NWNE	4	41	72	MMS	GONE	GONE
NEW	NOHA	4822119	458418	SESW	4	41	72	GHS	FAIR	ACTI
NEW	FEHA	4822352	456882	NESW	5	41	72	GHS	FAIR	INAC
NEW	RETA	4823324	456779	NENW	5	41	72	MMS	GOOD	ACTI
NEW	FEHA	4822572	456891	NWSE	5	41	72	CKB	GOOD	INAC
NEW	FEHA	4821359	455174	SESW	7	41	72	GHS	GOOD	ACTI
NEW	FEHA	4820502	454496	SWSW	7	41	72	CKB	EXCELLENT	INAC
NEW	FEHA	4820247	454777	SWSW	7	41	72	CKB	EXCELLENT	INAC
NEW	FEHA	4820827	454504	NWSW	7	41	72	CKB	EXCELLENT	INAC
914	FEHA	4821374	457032	SWNE	8	41	72	CKB	POOR	INAC
NEW	FEHA	4821243	456997	SWNE	8	41	72	CKB	FAIR	INAC
NEW	FEHA	4821520	456791	NENW	8	41	72	CKB	GOOD	ACTI
NEW	FEHA	4821537	456345	NWNW	8	41	72	CKB	FAIR	INAC
NEW	FEHA	4821718	456465	NWNW	8	41	72	CKB	POOR	INAC
NEW	FEHA	4821716	456607	NENW	8	41	72	CKB	FAIR	INAC
NEW	FEHA	4821179	457148	SWNE	8	41	72	ROC	GOOD	INAC
2882	RETA	4820901	459616	NWSW	10	41	72	RUL	GOOD	INAC
NEW	RETA	4820232	460221	SESW	10	41	72	CTL	GOOD	ACTI
2858	FEHA	4819180	458813	NWSE	16	41	72	CKB	GOOD	INAC
NEW	FEHA	4818737	458037	SWSW	16	41	72	CKB	GOOD	ACTI
3723	RETA	4819830	455360	NWNE	18	41	72	CTL	GOOD	ACTI
NEW	GOEA	4819064	455902	NESE	18	41	72	CTL	GOOD	INAC
NEW	GRHO	4819293	455548	NWSE	18	41	72	CTL	EXCELLENT	ACTI
NEW	RETA	4818700	454427	SWSW	18	41	72	CTL	GOOD	ACTI
NEW	SWHA	4819534	454708	SWNW	18	41	72	CTL	GOOD	ACTI
NEW	GRHO	4818371	456126	NWNW	20	41	72	CTL	GOOD	ACTI
NEW	RETA	4818286	456048	NWNW	20	41	72	CTL	EXCELLENT	ACTI
NEW	FEHA	4823231	453331	NENW	1	41	73	ROK	EXCELLENT	INAC
NEW	FEHA	4823169	453345	NENW	1	41	73	ROK	EXCELLENT	INAC
854	FEHA	4823257	453361	NENW	1	41	73	GHS	GOOD	INAC
861	GRHO	4821904	453668	SWSE	1	41	73	CTD	GOOD	ACTI
NEW	FEHA	4822979	454058	NENE	1	41	73	GHS	FAIR	INAC
NEW	FEHA	4822772	454142	SENE	1	41	73	CKB	POOR	INAC
NEW	FEHA	4823149	453416	NENW	1	41	73	GHS	EXCELLENT	ACTF
NEW	FEHA	4818597	453962	SESE	13	41	73	GHS	EXCELLENT	ACTI
885	FEHA	4824535	454996	SESW	31	42	72	GHS	EXCELLENT	ACTI
887	FEHA	4824544	455075	SESW	31	42	72	GHS	UNK	DNLO
2489	FEHA	4824272	456708	SESW	32	42	72	GRND	UNK	DNLO
2498	RETA	4824839	456357	NWNW	32	42	72	CTL	GOOD	ACTI
NEW	NOHA	4824809	456246	NWNW	32	42	72	GHS	GOOD	INAC

19. The following conditions will minimize 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.
 - D. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours.

20. The operator will locate the embankment for the Daisey reservoir upstream of the large cottonwood trees that grow at the site such that none of the trees will be inundated by reservoir water or removed during dam construction.

21. The operator will sample the two springs identified in the WMP and provide analysis results before federal water is produced from this POD (Both appeared to be persistent and could be sampled at the time of the onsite).

22. Please contact Amy Shepperson, Natural Resource Specialist, @ (307) 684-1119, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on November 24, 2006. Field inspections of the proposed SW Reno Flats CBNG project were conducted on July 11 and 12, 2007 by:

Amy Shepperson	Natural Resource Specialist	BLM
Bill Ostheimer	Wildlife Biologist	BLM
B.J. Earle	Archeologist	BLM
Chris Williams	Hydrologist	BLM
Anna Morgan	Land/Operations	Coleman Oil and Gas, Inc.
Larry Johnson		Coleman Oil and Gas, Inc.
Brian Heath	Wildlife Biologist	Arcadis Consulting
Crystal Lesmeister	Hydrologist	Western Water Consulting
Eddie Reno	Land Owner	
Jerry Dilts	Land Owner	
Pete Reno	Land Owner	

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			Bill Ostheimer
Floodplains		X		Chris Williams
Wilderness Values			X	Amy Shepperson
ACECs			X	Amy Shepperson
Water Resources	X			Chris Williams
Air Quality		X		Amy Shepperson
Cultural or Historical Values		X		BJ Earle
Prime or Unique Farmlands			X	Amy Shepperson
Wild & Scenic Rivers			X	Amy Shepperson
Wetland/Riparian		X		Chris Williams
Native American Religious Concerns		X		BJ Earle
Hazardous Wastes or Solids		X		Amy Shepperson
Invasive, Nonnative Species	X			Amy Shepperson
Environmental Justice			X	Amy Shepperson

3.1. Topographic Characteristics of Project Area

The SW Reno Flats POD is located in Campbell County, Township 41, 42 North, Range 72 West, Sections 4, 5, 6, 7, 8, 18, and 31. The project area involves private lands of multiple land owners overlaying federal minerals. U.S. Forest Service lands within the Thunder Basin National Grasslands border the project area. The topography is flat to gently rolling hills with dissecting drainages in some areas. Current land uses in the project area include livestock grazing, wildlife habitat, and oil and gas production.

3.2. Vegetation & Soils

3.2.1. Soils

Soils within the project area were identified from the *South Campbell County Survey Area, Wyoming*. The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards and published in 2004. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 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.

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.

Table 3.2 – Soil Map Unit Types

Map Unit Symbol	Map Unit Name	Map Unit Acres	Map Unit %
158	HILAND-BOWBAC FINE SANDY LOAMS, 6 TO 15 % SLOPES	850.17	20%
171	KEELINE-TULLOCK-NIOBRARA, DRY COMPLEX, 3 TO 30 % SLOPES	788.97	19%
111	BIDMAN-PARMLEED LOAMS, 0 TO 6 % SLOPES	411.24	10%
147	FORKWOOD-CUSHMAN LOAMS, 6 TO 15 % SLOPES	392.36	9%
157	HILAND-BOWBAC FINE SANDY LOAMS, 0 TO 6 % SLOPES	266.36	6%
145	FORKWOOD-CAMBRIA LOAMS, 0 TO 6 % SLOPES	165.58	4%
170	KEELINE-TULLOCK LOAMY SANDS, 6 TO 30 % SLOPES	161.16	4%
146	FORKWOOD-CUSHMAN LOAMS, 0 TO 6 % SLOPES	157.63	4%
118	CLARKELEN-DRAKNAB COMPLEX, 0 TO 3 % SLOPES	128.68	3%
190	PARMLEED-RENOHILL COMPLEX, 3 TO 15 % SLOPES	117.51	3%
156	HILAND FINE SANDY LOAM, 0 TO 6 % SLOPES	115.64	3%
216	THEEDLE-KISHONA-SHINGLE LOAMS, 3 TO 30 % SLOPES	114.43	3%
211	SHINGLE-WORF LOAMS, 3 TO 30 % SLOPES	88.64	2%
116	CAMBRIA-KISHONA-ZIGWEID LOAMS, 0 TO 6 % SLOPES	85.56	2%
200	RENOHILL-SAVAGETON CLAY LOAMS, 6 TO 15 % SLOPES	65.72	2%
144	FORKWOOD LOAM, 0 TO 6 % SLOPES	63.49	2%
213	TERRO-TALUCE SANDY LOAMS, 6 TO 30 % SLOPES	51.33	1%
217	THEEDLE-SHINGLE LOAMS, 3 TO 30 % SLOPES	49.95	1%
221	TURNERCREST-KEELINE-TALUCE FINE SANDY LOAMS, 6 TO 30 % SLOPES	39.15	1%
160	HILAND-VONALEE FINE SANDY LOAMS, 6 TO 15 % SLOPES	28.52	1%
229	ULM-RENOHILL CLAY LOAMS, 6 TO 15 % SLOPES	19.69	0%
235	VONALEE FINE SANDY LOAM, 0 TO 10 % SLOPES	13.76	0%
227	ULM CLAY LOAM, 0 TO 6 % SLOPES	12.95	0%
143	FELIX CLAY, PONDED, 0 TO 2 % SLOPES	11.26	0%
113	BIDMAN-ULM LOAMS, 0 TO 6 % SLOPES	10.06	0%
199	RENOHILL-SAVAGETON CLAY LOAMS, 0 TO 6 % SLOPES	6.65	0%

Additional site specific soil information is included in the Ecological Site interpretations which follow in

Section 2.2.2.

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.

The soils vary from clay to primarily sandy clay loams throughout the project area. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 1 to 2 to inches on ridges to 6 inches plus, in bottomland. Erosion potential varies from low to high depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area.

Loamy Sites:

This site occurs on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 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 sandstone and shale. These soils have moderate permeability.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, cheatgrass has invaded with western wheatgrass and thickspike wheatgrass maintains at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low.

Dominant grasses identified include: needle-and-thread, western wheatgrass, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs identified include: plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Other vegetative species identified at onsite: Fringed sagewort is commonly found, Plains pricklypear and winterfat can also occur.

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.

Sandy Site:

This site occurs on nearly level to 50 percent slopes on landforms which include alluvial fans, hillsides, plateaus, ridges and stream terraces in the 10-14" precipitation zone.

The soils of this site are moderately deep to very deep (greater than 20" to bedrock), well drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid or rapid permeability. The main soil limitations include low available water holding

capacity, and high wind erosion potential.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Needleandthread/Prairie sandreed Plant Community. Potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The state is a mix of warm and cool season midgrasses.

The present plant community is a *Needle-and-thread/threadleaf sedge/Fringed sagewort* plant community. Compared to the HCPC, prairie sandreed and Indian ricegrass have decreased. Threadleaf sedge, needle-and-thread and fringed sagewort have increased.

Dominant grasses identified include: Needle-and-thread, and threadleaf sedge. Forbs identified include: scarlet globemallow, plantain and various mustards. Other vegetative species identified at onsite: Yucca and plains prickly pear.

3.2.3. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory maps or databases on the CBM Clearinghouse website (<http://www.cbmclearinghouse.info/>):

- Skeleton Leaf Bursage

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).

The operator submitted an integrated pest management plan developed in coordination with the Campbell County Weed and Pest District. The goal of the plan is to minimize impacts on the current plant community and to avoid promoting the encroachment of these invasive species throughout the project area. In addition, Coleman Oil and Gas will submit a Pesticide Use Proposal (PUP) form WY-04-9222-1 to the BLM for the chemical treatment of noxious weeds. A COA has been applied to this approval that no surface disturbance will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

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 Arcadis G&M in 2006 and 2007. Arcadis performed one aerial and two ground surveys for greater sage-grouse and plains sharp-tailed grouse on April 12, 21, 29, 2006 and April 7, 19, and May 2, 2007; ground surveys for mountain plover nesting activity were completed on May 14, 21, 14 2006 and May 2, 20, June 4, 2007; the project area was ground searched for raptor nests and prairie dog colonies on April 19, May 14, June 14, August 21, November 13 2006 and May 2, 20, June 4, July 2, 2007. Ute ladies'-tresses surveys were completed in 2007.

A BLM biologist conducted field visits on July 11 and 12, 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 project area include mule deer and pronghorn. The WGFD has determined the entire project area to be yearlong range for both mule deer and pronghorn. Yearlong use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. The project area is part of the Thunder Basin herd units for both species. The 2006 estimated herd population was 31,891 with a population objective of 28,000 for pronghorn and 9,244 with a population objective 9,100 (WGFD 2006). 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 Spring Creek to the east and Bates Creek to the west. Both creeks are tributaries of the Cheyenne River. Spring Creek has perennial water in places, usually pooled in the summer, and with CBNG produced water providing a perennial source. Historically these drainages were ephemeral and no fishery was present. Any fishery present now would be the result of CBNG production. Fish that can be found in the Cheyenne River drainage are listed in PRB FEIS (Table 3-157).

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

Forty six raptor nest sites were identified by Arcadis (Arcadis 2007) and BLM within 0.5 mile of the project area, of these seventeen nests were active in 2007. Of those active in 2007 there were seven red-tailed hawks, six ferruginous hawks, three great-horned owls, one Swainson's hawk, and one northern harrier.

Table 3.3 Documented raptor nests within the SW Reno Flats project area in 2007.

BLM #	Species	UTM N (nad 83)	UTM E (nad 83)	QQ	Section	T	R	Substrate	Condition	Status
2490	FEHA	4822263	459472	NWSW	3	41	72	GHS	GONE	DNLO
2491	RETA	4821981	459366	SWSW	3	41	72	CTL	GOOD	INAC
2868	FEHA	4822214	459495	NWSW	3	41	72	GHS	GONE	DNLO
2869	FEHA	4822216	459905	NESW	3	41	72	GHS	GONE	DNLO
NEW	RETA	4823337	458022	NWNW	4	41	72	MMS	GOOD	ACTI
934	FEHA	4822598	457858	SWNW	4	41	72	GHS	GONE	DNLO
NEW	RETA	4823344	458563	NWNE	4	41	72	MMS	GONE	GONE
NEW	NOHA	4822119	458418	SESW	4	41	72	GHS	FAIR	ACTI
NEW	FEHA	4822352	456882	NESW	5	41	72	GHS	FAIR	INAC
NEW	RETA	4823324	456779	NENW	5	41	72	MMS	GOOD	ACTI
NEW	FEHA	4822572	456891	NWSE	5	41	72	CKB	GOOD	INAC
NEW	FEHA	4821359	455174	SESW	7	41	72	GHS	GOOD	ACTI
NEW	FEHA	4820502	454496	SWSW	7	41	72	CKB	EXCELLENT	INAC
NEW	FEHA	4820247	454777	SWSW	7	41	72	CKB	EXCELLENT	INAC

BLM #	Species	UTM N (nad 83)	UTM E (nad 83)	QQ	Section	T	R	Substrate	Condition	Status
NEW	FEHA	4820827	454504	NWSW	7	41	72	CKB	EXCELLENT	INAC
914	FEHA	4821374	457032	SWNE	8	41	72	CKB	POOR	INAC
NEW	FEHA	4821243	456997	SWNE	8	41	72	CKB	FAIR	INAC
NEW	FEHA	4821520	456791	NENW	8	41	72	CKB	GOOD	ACTI
NEW	FEHA	4821537	456345	NWNW	8	41	72	CKB	FAIR	INAC
NEW	FEHA	4821718	456465	NWNW	8	41	72	CKB	POOR	INAC
NEW	FEHA	4821716	456607	NENW	8	41	72	CKB	FAIR	INAC
NEW	FEHA	4821179	457148	SWNE	8	41	72	ROC	GOOD	INAC
2882	RETA	4820901	459616	NWSW	10	41	72	RUL	GOOD	INAC
NEW	RETA	4820232	460221	SESW	10	41	72	CTL	GOOD	ACTI
2858	FEHA	4819180	458813	NWSE	16	41	72	CKB	GOOD	INAC
NEW	FEHA	4818737	458037	SWSW	16	41	72	CKB	GOOD	ACTI
3723	RETA	4819830	455360	NWNE	18	41	72	CTL	GOOD	ACTI
NEW	GOEA	4819064	455902	NESE	18	41	72	CTL	GOOD	INAC
NEW	GRHO	4819293	455548	NWSE	18	41	72	CTL	EXCELLENT	ACTI
NEW	RETA	4818700	454427	SWSW	18	41	72	CTL	GOOD	ACTI
NEW	SWHA	4819534	454708	SWNW	18	41	72	CTL	GOOD	ACTI
NEW	GRHO	4818371	456126	NWNW	20	41	72	CTL	GOOD	ACTI
NEW	RETA	4818286	456048	NWNW	20	41	72	CTL	EXCELLENT	ACTI
NEW	FEHA	4823231	453331	NENW	1	41	73	ROK	EXCELLENT	INAC
NEW	FEHA	4823169	453345	NENW	1	41	73	ROK	EXCELLENT	INAC
854	FEHA	4823257	453361	NENW	1	41	73	GHS	GOOD	INAC
861	GRHO	4821904	453668	SWSE	1	41	73	CTD	GOOD	ACTI
NEW	FEHA	4822979	454058	NENE	1	41	73	GHS	FAIR	INAC
NEW	FEHA	4822772	454142	SENE	1	41	73	CKB	POOR	INAC
NEW	FEHA	4823149	453416	NENW	1	41	73	GHS	EXCELLENT	ACTF
NEW	FEHA	4818597	453962	SESE	13	41	73	GHS	EXCELLENT	ACTI
885	FEHA	4824535	454996	SENE	31	42	72	GHS	EXCELLENT	ACTI
887	FEHA	4824544	455075	SENE	31	42	72	GHS	UNK	DNLO
2489	FEHA	4824272	456708	SENE	32	42	72	GRND	UNK	DNLO
2498	RETA	4824839	456357	NWNW	32	42	72	CTL	GOOD	ACTI
NEW	NOHA	4824809	456246	NWNW	32	42	72	GHS	GOOD	INAC

² ACTI = Active, INAC = Inactive, GONE = Gone, INDI = Inactive Dilapidated, OCCU = Occupied, DNLO= Did not locate

³ FEHA = Ferruginous Hawk, GOEA = Golden Eagle, RETA = Red-tailed Hawk, NOHA = Northern Harrier, SWHA = Swainson's Hawk

⁴ CLF = Cliff, CKB = Creek Bank, CTL = Cottonwood (Live), CTD = Cottonwood (Dead), ELL = Elm (Live), GHS = Ground/Hillside, MMS = Manmade Structure (e.g. nest platform, windmill, etc.), POL = Ponderosa Pine (Live), POD = Ponderosa Pine (Dead), ROC = Rock Outcrop, WIL = Willow (Live), SNA = Snag, PIL = Pillar, JUL = Juniper (Live), RUL = Russian Olive (Live)

⁵ GOOD = Intact and in usable condition, FAIR = Material slumping or sliding, usable with minimal maintenance, POOR = Material slumping or sliding, usable with substantial maintenance, REMNANTS = Scant material remaining and not usable unless fully rebuilt

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 have also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

No prairie dog colonies were identified during site visits (Arcadis 2006, 2007). Black-footed ferret habitat is not present within the project area. The Thunder Basin National Grasslands black-footed ferret potential reintroduction area (Oakleaf 1988) is two townships to the north east of the project area.

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 and one in 2006 (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.

The project will discharge produced water into Spring Creek and North Bates Creek. These creeks empty into Antelope Creek downstream from the known Ute ladies'-tresses population. Arcadis surveyed both Spring Creek and North Bates Creek downstream from discharge points for the orchid in 2007, none were found. (Arcadis 2007b)

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 dogs 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 Reading 1989) 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.

The project area has suitable bald eagle roosting habitat along Spring and Little Bates Creeks. Protocol winter roost surveys were conducted for the POD in 2006/2007 and 11 bald eagles were seen in the project area. Table 3.3 from the Arcadis 2007 report summarizes the results of roosting surveys. A historic roost is located on Bates Creek 1.5 miles south and west from the 14-18 well.

Table 3.3.1 Bald eagle winter roost survey results for the SW Reno Flats POD.

UTM_E	UTM_N	Date	TRS	Comments
458296	4823245	15/5/2006	41/72 4	Flying Adult and Juvenile
458490	4823206	1/22/2007	41/72 4	Flying
453206	4816912	2/23/2006	41/73 25	Two adults in tree.
451447	4818037	2/23/2006	41/73 23	Single adult in tree.
450068	4818675	2/23/2006	41/73 15	Five adults in three trees.

3.3.5.2.2. Black-tailed prairie dog

No black-tailed prairie dog towns were identified in the project area.

3.3.5.2.3. 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 but patchy in the project area. One pile of grouse droppings was found at the onsite in section 5. One sage grouse lek is within 3 miles of the POD. These leks are identified below (Table 3.3).

Table 3.3.2 Sage-grouse lek(s) surrounding the project area.

Lek Name	T	R	Sec ¼,¼	UTMN	UTME	County	2007 status / high male #	Distance (mi) from POD
160 acre	42	73	15 NESE	4828885	451064	Campbell	Unknown	3 miles

3.3.5.2.4. 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. The BLM habitat model indicated suitable habitat throughout the project area. The Dilts and Reno Ranches were not surveyed for mountain plover habitat in 2007 due to lambing season coinciding with plover surveys. Suitable mountain plover habitat that was not surveyed occurs in sections 31 of T72WR42N, 6 of T72WR41N, and 13 T73WR41N. Almost the entire area was unsuitable in 2007 due to the height of grass. During drought periods the project area could provide nesting habitat.

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 3.4 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

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007	119	20	None reported	1

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 the Antelope Creek drainage system.

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.

The BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

The on-going shallow groundwater impoundment monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two of these other sites also are showing an increasing TDS level as water infiltrates while two other sites are not.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 10 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 1 to 720 feet. 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 Bates Creek and Spring Creek drainages which are tributary to the Antelope

Creek 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). Ephemeral channels often well vegetated grassy swales, without defined bed and bank, while larger tributaries have well defined floodplains and low flow channels. Spring Creek is an intermittent, and some reaches may be wet throughout most of the year due to the presence of several springs in the area.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) 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 CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Antelope Creek, the EC ranges from 2,271 at Maximum monthly flow to 4,127 at Low monthly flow and the SAR ranges from 5.63 at Maximum monthly flow to 8.66 at Low monthly flow. These values were determined at the USGS station located at Riverview, WY (PRB FEIS page 3-49).

The operator has identified two natural springs within $\frac{1}{2}$ mile of this POD boundary at T41N, R72W, Section 1 and Section 4. The estimated flow at both springs has been determined to be less than 1 gpm; seepage and the water quality of both springs will be provided when available.

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 and Paleontological Resources

Class III cultural resource inventories were conducted for the SW Reno Flats project prior to on-the-ground project work (BFO Inventory Nos.) #61860025 and 70070055. Block and linear inventory totaled 4245 acres. The earlier inventory was conducted by Archaeological Energy Consulting for Diamond Shamrock: Rattlesnake Fed. #32-6; this inventory covers a single APD for the current project and will use the original area of disturbance. The recent block inventory was conducted by Pronghorn for the current project. Seven sites and 8 Isolated Resources were located by this inventory; all sites were found to be of the historic period, and included one homestead, one depression which may have been a homestead or facility, 2 windmills, and three instances of rock cairns or rock piles, none of which appeared to be prehistoric. Of the 8 isolated resource finds, five were prehistoric. Since none of the sites will be impacted by the current project design, the project report was submitted to SHPO on 8/15/2007 under the “Notify and Proceed” procedure of the State Protocol.

The project area is mapped as Tertiary Wasatch, which has a Paleontological Sensitivity Rating of 5, nominally a high ranking. However, no paleontological localities are known in the area, and no occurrences of bone, invertebrate or shell, or plant remains were observed during the on-site. However, the lack of information on this subject is probably due to minimal research in the project area. No resources of interest to Native American cultural groups or Traditional Cultural Properties are known to occur in the project area.

Table 3.6 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48CA4834	Historic Site	Not Eligible
48CA4835	Historic Site	Not Eligible
48CA4836	Historic Site	Not Eligible
48CA6322	Historic Site	Not Eligible
48CA6323	Historic Site	Not Eligible
48CA6324	Historic Site	Not Eligible
48CA6705	Historic Site	Not Eligible
8 IFs	Isolated resources	Not eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action POD, which resulted in development of Alternative C as the preferred alternative, have reduced the potential impact 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 following the operator's plans and BLM applied mitigation. Of the 27 well locations, 1 is within the disturbed area of an existing conventional well pad, which was already approved. 26 of the proposed wells will be drilled without a well pad being constructed. Surface disturbance associated with the drilling of the 27 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 32 x 20 feet) and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these wells would involve approximately 0.1 acre/well for 2.7 total acres.

Approximately 6.38 miles of new and 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. 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 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
Non-constructed Pad	27	0.1/acre	2.7	Long Term
Gather/Metering Facilities	0	Site Specific	0	Long Term
Screw Compressors	0	Site Specific	0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments			9.70	Long Term
On-channel	3	Site Specific	9.56	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	7	Site Specific or 0.01 ac/WDP	0.14	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads			26.07	Long Term
No Corridor	0.41	35' Width	1.76	
With Corridor	5.73		24.31	
2-Track Roads			21.44	Long Term
No Corridor	0.28	35' Width	1.2	
With Corridor	4.77		20.24	
Pipelines				Short Term
No Corridor	2.5	20' Width or Site Specific	10.6	
With Corridor				
Buried Power Cable		12' Width or Site Specific		Short Term
No Corridor				
Overhead Powerlines	4.33	35' Width	18.35	Long 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

A portion of the water produced in this POD will be discharged at two outfalls into ephemeral tributaries of Spring Creek. Wetland and riparian species may become established in the ephemeral channels below these outfalls where none existed before. One existing outfall will discharge CBNG water directly to Spring Creek, which has intermittent flow character and already supports wetland and riparian species. There are few if any cottonwood trees that will be exposed to hydrologic changes due to CBNG discharge

from this POD.

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 two impoundments in ephemeral draws will potentially allow for wetland-riparian species establishment downstream of the embankments.

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. Co-operation and consultation with Campbell County Weed and Pest, the University of Wyoming, CBM Clearinghouse and a licensed commercial applicator licensed by the State of Wyoming to patrol and spray noxious weeds existing within the project area or new infestations establishing in newly disturbed areas.
2. Monitoring of the project area to identify and implement control efforts of new infestations of noxious and/or invasive species.
3. Education of field personnel in the identification and impacts that noxious and invasive plants on the environment.

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. Pricklypear cactus (*Opuntia polyacantha*), is a native species and found throughout native rangelands. A control program for this species is not recommended.

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 Antelope Creek drainage, which is approximately 27 % 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 commitment by the operator to monitor the volume of water flowing into Bates Creek and Spring Creek.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, 61 acres of yearlong range for pronghorn 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 to North Bates Creek, Spring Creek and one playa. Both creeks are historically ephemeral and any fishery would be a result of CBNG produced water. Produced water discharged into the playa in Section 6 (T41R72), Spring and Bates Creek may impact plants and animals through continual inundation. Certain animals such as fairy shrimp (*Branchinecta* sp.) and spadefoot toads (*Spea hammondi*) as well as plants have adapted to ephemeral water. Impacts from changes in water quantity and quality are generally described below for the Powder River system. Similar changes could be expected in the North Bates, Spring Creek drainages and playa.

Change in Water Quality

Fish and amphibian species have evolved and adapted to existing conditions. Changes in water quality

may have detrimental impacts on the native aquatic fauna. Major information gaps for these species include feeding habits, reproduction, specific habitat preference and seasonal habitat use.

Wyoming Game and Fish Department initiated a detailed fish and amphibian survey of the main-stem Powder River in 2004 to determine baseline species composition and distribution in the Basin. In accordance with the PRB FEIS, a monitoring plan was established by the Interagency work group. The plan calls for baseline data collection over a three year period which is intended to provide information relative to the effects upon the aquatic biota of CBNG water.

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their recently released report on the Powder River. This report indicated that CBNG discharges could affect native species in the drainage.

Change in Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a very dynamic hydrograph with high sediment loads. Changes in this flow regime (i.e., perennial flows) may seriously impact native fauna by altering their use of historical habitats for spawning, rearing, and reproduction. Alterations that impact channel morphology is an issue, and will have impacts to the aquatic biota due to changes in sediment loads, loss of habitat, and possible disruption of migration movements due to barriers created by culverts and/or head cuts. This is a monitoring and adaptive management issue for CBNG development.

4.2.2.1. Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. 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).

Density of breeding Brewer's sparrows declined by 36% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). Findings suggest that indirect habitat losses from energy development may be substantially larger than direct habitat losses (Ingelfinger 2004).

Density of breeding sage sparrows was reduced by 57% within a 100-m buffer of dirt roads regardless of traffic volume. The density of roads constructed in natural gas fields exacerbated the problem and the area of impact was substantial (Ingelfinger 2004).

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, Pages 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 Wells within ½ mile to documented raptor nests within the project area (Timing limitations will apply to these wells).

BLM #	Species	UTM N (nad 83)	UTM E (nad 83)	Status	wells and or reservoirs
NEW	RETA	4823337	458022	ACTI	41-5
NEW	NOHA	4822119	458418	ACTI	24-4, 14-4
NEW	FEHA	4822352	456882	INAC	23-5, 43-5, 34-5, 14-5, 32-5
NEW	RETA	4823324	456779	ACTI	21-5, 12-5, 23-5, 32-5
NEW	FEHA	4822572	456891	INAC	23-5, 43-5, 34-5, 14-5
NEW	FEHA	4820502	454496	INAC	34-7
NEW	FEHA	4820247	454777	INAC	34-7
914	FEHA	4821374	457032	INAC	34-5, 41-8
NEW	FEHA	4821243	456997	INAC	34-5, 41-8
NEW	FEHA	4821520	456791	ACTI	14-5, 34-5, 41-8
NEW	FEHA	4821537	456345	INAC	14-5, 34-5, 41-8
NEW	FEHA	4821718	456465	INAC	14-5, 34-5, 41-8
NEW	FEHA	4821716	456607	INAC	14-5, 34-5
NEW	FEHA	4821179	457148	INAC	43-8
3723	RETA	4819830	455360	ACTI	34-7, 12-18, 23-18
NEW	GOEA	4819064	455902	INAC	23-18, bates cr reservoir,
NEW	RETA	4818700	454427	ACTI	14-18, 23-18
NEW	SWHA	4819534	454708	ACTI	12-18, 23-18
NEW	FEHA	4822979	454058	INAC	12-6
NEW	FEHA	4822772	454142	INAC	12-6
NEW	FEHA	4818597	453962	ACTI	14-18

885	FEHA	4824535	454996	ACTI	12-31, 23-31, 21-31
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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 operator moved eight wells out from line of sight of nests, or to a sufficient distance, that the production phase of development should not impact nesting. The 21-31 and 12-18 wells could not be moved out of view or to a sufficient distance from nests. Human activity at these wells would most likely cause nest abandonment. Due to these anticipated impacts, the 21-31 and 12-18 wells will not be permitted. Despite placing the 13-31, 32-7, 21-7, 23-5, and 14-5 wells in the best possible location given drilling constraints, maintenance activities requiring machinery (e.g. pulling units, back-hoe) or personnel on the ground for more than 15-20 minutes may disrupt nesting activity. The proposed corridor along the Little Fork of Bates Creek passes under a cottonwood containing an active nest (#3723). The corridor under this nest will be a pipeline only to prevent displacing the birds. Traffic will use the existing road to the east.

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. No additional mitigation measures are required.

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 to Threatened and Endangered Species are provided in Table 4.3 and 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 (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Two small prairie dog towns present.
Threatened Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	S	NLAA	Known populations in watershed. None in project area or down stream from discharge.

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

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

The proposed development will have **no effect** on the black-footed ferret. No prairie dog towns will be impacted.

4.2.5.1.2. Ute's Ladies Tresses Orchid

Areas that will receive water were surveyed for Ute ladies'-tresses habitat and suitable habitat that may be impacted was surveyed during the 2007 flowering season (Arcadis 2007b). Survey results were negative. Suitable habitat is present in Spring and Bates Creeks. The proposed action may increase the amount of discharged water in the Spring Creek and Bates Creek drainages. These increased flows may affect unknown Ute ladies'-tresses populations. Arcadis analyzed the potential impacts from produced water and indicated the produced water would not adversely impact downstream water quality such that Ute ladies'-tresses populations (if they exist downstream) could be impacted. It is approximately 10 miles from the project down Spring Creek to Antelope Creek. Known Ute ladies'-tresses populations exist in Antelope Creek. Based on negative survey results, ten downstream miles to a documented seed source, and good water quality being discharged the proposed action **may affect, but is not likely to adversely affect** the Ute ladies'-tresses orchid population.

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 (<i>Rana pipiens</i>)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will effect existing waterways.
Spotted frog (<i>Ranus pretiosa</i>)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	K	MIIH	Overhead power proposed, occupied habitat present.
Baird's sparrow (<i>Ammodramus bairdii</i>)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Brewer's sparrow (<i>Spizella breweri</i>)	Basin-prairie shrub	K	MIIH	Sagebrush cover will be affected.
Burrowing owl (<i>Athene cucularia</i>)	Grasslands, basin-prairie shrub	S	NI	Marginal habitat
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	K	MIIH	Active nest present.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	S	MIIH	Produced water in playa may affect individuals.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	S	MIIH	Habitat is present. All habitat was not surveyed.
Northern goshawk (<i>Accipiter gentilis</i>)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (<i>Falco peregrinus</i>)	cliffs	NP	NI	No nesting habitat present.

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Plants				
Porter's sagebrush (<i>Artemisia porteri</i>)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (<i>Cymopterus williamsii</i>)	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.

MIH 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

The project area has suitable bald eagle roosting habitat. Protocol winter roost surveys were conducted for the POD in 2006/2007 and 11 bald eagles were seen in the project area. No roosts or nests were identified within one mile of the proposed project. A historic roost is located on Bates Creek 1.5 miles south and west from the 14-18 well.

There are 4.33 miles of proposed overhead distribution lines within the project area. All proposed power will be constructed in compliance with the 2006 Avian Power Line Interaction Committee's (APLIC) suggested practices and with the Service's standards (USFWS 2007). There is existing power in the project area serving ranch operations and conventional oil wells. These older lines may not be in compliance with current APLIC standard. Where the proposed lines tie into existing lines, the existing pole that is used shall be upgraded to meet 2006 APLIC standards.

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. 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%). The proposed project will increase traffic on State Highways 387 and 50, which may result in bald eagle / vehicle strikes in the winter when migratory eagles are in the area.

Produced water will be stored in three reservoir(s) which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of CBNG reservoirs on eagles are unknown. The reservoirs 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

Black-tailed prairie dogs were not found in the project area. No impact to black-tailed prairie dogs is anticipated.

4.2.5.2.3. Greater sage-grouse

The closest lek to the project is approximately three miles to the north of the project. One pile of grouse droppings was found at the onsite in section 5. The project area has patchy suitable sage-grouse habitat that will be impacted. Sage-grouse habitat will be 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.

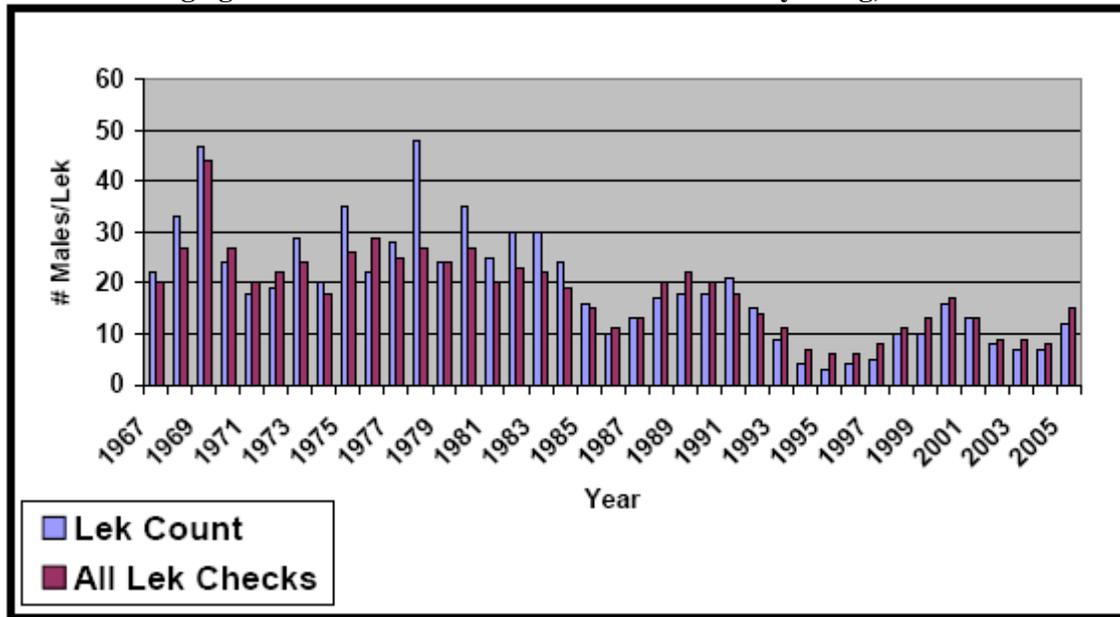
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km (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 Holloran 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 4.5 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) have 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).

4.2.5.2.4. 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 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).

The project area has suitable mountain plover habitat. Only the eastern half of the project was surveyed for the species. Suitable mountain plover habitat that was not surveyed occurs in sections 31, 6, and 18. In order to protect undocumented mountain plover nests, wells 23-31, 32-18 or any new overhead power in section 31, 6 and 18 shall not be constructed prior to a protocol Mountain Plover survey.

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 Antelope Creek watershed and a 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.

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 WMP for this POD used discharge from 20 wells in the analysis and all references below stem from that analysis. The maximum water production is predicted to be 15.0 gpm per well or 435.0 gpm (1.0 cfs or 702 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 CBM Wells under Alternatives 1, 2A and 2B pg 2-26). For the Antelope Creek drainage, the projected volume produced within the watershed area was 17,385 acre-feet in 2006 (maximum production is estimated in 2006 at 17,684 acre-feet). As such, the volume of water resulting from the production of these wells is 0.4 % of the total volume projected for 2006. 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 28% to groundwater aquifers and coal zones in the Antelope Creek drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 121.8 gpm will infiltrate at or near the discharge points and impoundments (197 acre feet per year), however, this value is likely substantially high because some water will be direct discharged to local drainages. 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 wells produce from depths which range from 1 to 720 feet compared to 900 feet to 1,200 feet to the Wyodak coal seam. 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 "...re-saturate and re-pressurize 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 Formation, Tongue River Member 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 and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with 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 Formation, Tongue River Member 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 4.6 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		10	2,000
Least Restrictive Proposed Limit		10	2,500
Antelope Creek near Teckla,, WY, USGS Gauging Station 06364700			
Historic Data Average at Maximum Flow		2.82	2,354
Historic Data Average at Minimum Flow		2.60	1,800
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # WY0051578			
At discharge point	5,000	10	2,000
Predicted Produced Water Quality Wyodak Coal Zone	na	7.0	472

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 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the Wyodak target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 15.0 gallons per minute (gpm) is projected is to be produced from these 28 wells, for a total of 420.0 gpm for the POD. See Table 4.5.

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

There are 8 discharge points (1 is existing) proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 2 new impoundments (22.2 acre feet) would potentially be constructed within the project area. These impoundments will disturb approximately 9.36 acres including the dam structures. Both of these water impoundments would be on-channel reservoirs. One existing impoundment will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. In addition two natural depressions or plays will receive discharge water at the landowners' request. 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). Consequently, the volume of water produced from these wells that is stored in impoundments, which is not more than 50% of the water produced, may result in the addition of 33 gpm or 0.1 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 2004 at a total contribution to the mainstem of the Antelope Creek of 12 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 29 wells is anticipated to be a total of 435.0 gpm or 0.97 cfs to impoundments, playas or direct discharge. The addition of the water produced from these wells will not significantly impact the water quantity in the mainstem of the Antelope Creek. 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).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 3). Based on the area of the 38.8 square miles in the Spring Creek watershed above the POD and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 461 wells which could produce a maximum flow rate of 15.4 cfs of water. The BLM agrees with the operator that this is not expected to occur because:

1. Some of these wells have already been drilled and are producing.
2. New wells will be phased in over several years, and
3. A decline in well discharge generally occurs after several months of operation.

The potential maximum flow rate of produced water within the watershed upstream of the project area, 221 cfs, is much less than the rate of runoff estimated from the 2-year storm event for the Spring Creek of the drainage.

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 a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES page 2):

Sodium Adsorption Ratio	10
pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	2000 mg/l max
Sulfates	3000 mg/l max
Radium 226	5 pCi/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	910 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	2.4 µg/l max
Chlorides	46 mg/l
Total Flow (MGD)	0.25

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance identified for this permit is end of pipe.

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. 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 permit domestic and stock water wells within the circle of influence of the proposed CBNG wells.

The development of coal bed natural gas and the production and discharge of water in the area surrounding the existing natural spring may affect the flow rate or water quality of the spring.

In-channel downstream impacts are addressed in the WMP for the SW Reno Flats POD prepared by WWC Engineering for Coleman Oil and Gas, Inc.

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 Antelope Creek watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

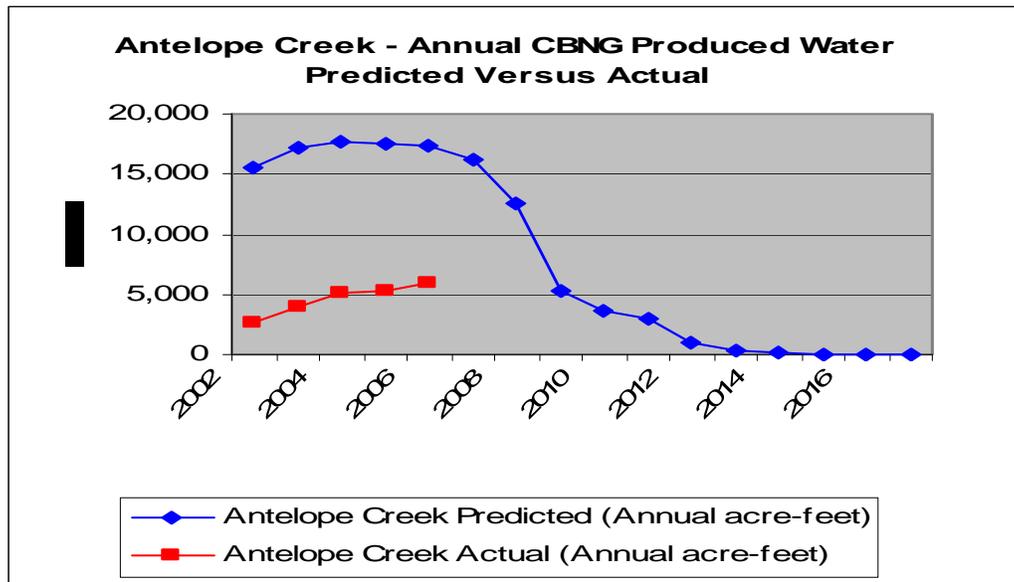
As of December 2006, all producing CBNG wells in the Antelope Creek watershed have discharged a cumulative volume of 22,994 acre-ft of water compared to the predicted 85,304 acre-ft disclosed in the PRB FEIS (Table 2-8 pages 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1. This volume is 27% of the total predicted produced water analyzed in the PRB FEIS for the Antelope Creek watershed.

Table 4.7 Actual vs. predicted water production in the Antelope Creek watershed 2006 Data Update 3-16-07

Year	Antelope Creek Predicted (Annual acre-feet)	Antelope Creek Predicted (Cumulative acre-feet from 2002)	Antelope Creek Actual (Annual acre-feet)		Antelope Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	15,460	15,460	2,668	17.3	2,668	17.3
2003	17,271	32,731	4,042	23.4	6,710	20.5
2004	17,685	50,416	5,181	29.3	11,891	23.6
2005	17,503	67,919	5,234	29.9	17,125	25.2
2006	17,385	85,304	5,869	33.8	22,994	27.0
2007	16,180	101,484				
2008	12,613	114,097				
2009	5,226	119,323				
2010	3,574	122,897				
2011	2,956	125,853				
2012	1,041	126,894				
2013	363	127,257				
2014	124	127,381				
2015	40	127,421				

Year	Antelope Creek Predicted (Annual acre-feet)	Antelope Creek Predicted (Cumulative acre-feet from 2002)	Antelope Creek Actual (Annual acre-feet)		Antelope Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2016	13	127,434				
2017	3	127,437				
Total	127,437		22,994			

Figure 4.8 Actual vs. predicted water production in the Antelope Creek 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.

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 Antelope Creek drainage, which is approximately 27 % 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

Antelope Creek watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

Seven cultural sites and 8 Isolated Resource Finds were reported in the project area. None of these localities have been recommended Eligible to the National Register. None of the sites are located in Areas of Effect for this project, and cultural clearance is recommended. 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	Organization	Present at Onsite
Anna Morgan	Coleman	Yes
Larry Johnson	Coleman	Yes
Edie Reno	Landowner	Yes
Jerry Dilts	Landowner	Yes
Pete Reno	Landowner	Yes
Brian Heath	Arcadis Consulting	Yes
Crystal Lesmeister	Western Water Consulting	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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