

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR**

Williams Production RMT Company
Schoonover Road 4 POD

ENVIRONMENTAL ASSESSMENT –WY-070-08-179

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Williams Production RMT Company’s Schoonover Road 4 POD Coal Bed Natural Gas (CBNG) POD comprised of the following 29 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	Schoonover Rd 4 Iberlin Ranch	12-3*	SWNW	3	47N	76W	WYW137920
2	SCHOONOVER RD 4 FEDERAL	14-3	SWSW	3	47N	76W	WYW135622
3	Schoonover Rd 4 Iberlin Ranch	23-3	NESW	3	47N	76W	WYW135622
4	SCHOONOVER RD 4 FEDERAL	34-3	SWSE	3	47N	76W	WYW135622
5	Schoonover Rd 4 Iberlin Ranch	41-3	NENE	3	47N	76W	WYW135622
6	Schoonover Rd 4 Iberlin Ranch	43-3	NESE	3	47N	76W	WYW135622
7	Schoonover Rd 4 Iberlin Ranch	12-4	SWNW	4	47N	76W	WYW32267
8	Schoonover Rd 4 Iberlin Ranch	21-4	NENW	4	47N	76W	WYW134913
9	SCHOONOVER RD 4 FEDERAL	32-4	SWNE	4	47N	76W	WYW32267
10	SCHOONOVER RD 4 FEDERAL	12-10	SWNW	10	47N	76W	WYW147327
11	SCHOONOVER RD 4 FEDERAL	14-10	SWSW	10	47N	76W	WYW147327
12	SCHOONOVER RD 4 FEDERAL	21-10	NENW	10	47N	76W	WYW147327
13	SCHOONOVER RD 4 FEDERAL	23-10	NESW	10	47N	76W	WYW147327
14	SCHOONOVER RD 4 FEDERAL	32-10	SWNE	10	47N	76W	WYW147327
15	SCHOONOVER RD 4 FEDERAL	34-10	SWSE	10	47N	76W	WYW147327
16	SCHOONOVER RD 4 FEDERAL	41-10	NENE	10	47N	76W	WYW147327
17	SCHOONOVER RD 4 FEDERAL	43-10	NESE	10	47N	76W	WYW147327
18	SCHOONOVER RD 4 SRU	34-27	SWSE	27	48N	76W	WYW133621
19	SCHOONOVER RD 4 SRU	14-33	SWSW	33	48N	76W	WYW134915
20	SCHOONOVER RD 4 SRU	21-33	NENW	33	48N	76W	WYW129041
21	SCHOONOVER RD 4 SRU	34-33	SWSE	33	48N	76W	WYW134915
22	SCHOONOVER RD 4 SRU	41-33	NENE	33	48N	76W	WYW129041
23	SCHOONOVER RD 4 SRU	12-34	SWNW	34	48N	76W	WYW134915
24	SCHOONOVER RD 4 SRU	21-34	NENW	34	48N	76W	WYW134915
25	SCHOONOVER RD 4 SRU	23-34	NESW	34	48N	76W	WYW134915
26	SCHOONOVER RD 4 SRU	32-34	SWNE	34	48N	76W	WYW129041
27	SCHOONOVER RD 4 SRU	41-34	NENE	34	48N	76W	WYW129041
28	SCHOONOVER RD 4 SRU	43-34	NESE	34	48N	76W	WYW134231
	The following well will not be approved until 10-09-2008 in accordance with 43 CFR 3162.3-1 (d), which requires 30 day public posting.						
29	SCHOONOVER RD 4 SRU*	44-34	SESE	34	48N	76W	WYW129041

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
Williams Production RMT Company
Schoonover Road 4 POD
PLAN OF DEVELOPMENT
WY-070-08-179**

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to produce coal bed natural gas (CBNG) on 10 Federal oil and gas mineral leases issued to the applicant by the BLM.

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: Williams Production RMT Company’s Schoonover Road 4 POD Plan of Development (POD) for 31 coal bed natural gas well APD’s and associated infrastructure.

1. Proposed Well Information: There were 31 wells proposed within this POD; the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from 1 coal seam. Proposed well house dimensions are 4 ft wide x 4 ft length x 6 ft height. Well house color is Covert Green (PANTONE for Architecture Color Guide 18-0617 TPX), selected to blend with the surrounding vegetation. Proposed wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	Schoonover Rd 4 Federal	12-10	SWNW	10	47N	76W	WYW147327
2	Schoonover Rd 4 Federal	14-10	SWSW	10	47N	76W	WYW147327
3	Schoonover Rd 4 Federal	14-3	SWSW	3	47N	76W	WYW135622
4	Schoonover Rd 4 Federal	21-10	NENW	10	47N	76W	WYW147327
5	Schoonover Rd 4 Federal	23-10	NESW	10	47N	76W	WYW147327
6	Schoonover Rd 4 Federal	32-10	SWNE	10	47N	76W	WYW147327
7	Schoonover Rd 4 Federal	32-4	SWNE	4	47N	76W	WYW32267
8	Schoonover Rd 4 Federal	34-10	SWSE	10	47N	76W	WYW147327
9	Schoonover Rd 4 Federal	34-3	SWSE	3	47N	76W	WYW135622
10	Schoonover Rd 4 Federal	41-10	NENE	10	47N	76W	WYW147327
11	Schoonover Rd 4 Federal	43-10	NESE	10	47N	76W	WYW147327
12	Schoonover Rd 4 Federal	43-4	NESE	4	47N	76W	WYW71546
13	Schoonover Rd 4 Iberlin Ranch	12-3*	SWNW	3	47N	76W	WYW137920
14	Schoonover Rd 4 Iberlin Ranch	12-4	SWNW	4	47N	76W	WYW32267
15	Schoonover Rd 4 Iberlin Ranch	21-4	NENW	4	47N	76W	WYW134913
16	Schoonover Rd 4 Iberlin Ranch	23-3	NESW	3	47N	76W	WYW135622
17	Schoonover Rd 4 Iberlin Ranch	41-3	NENE	3	47N	76W	WYW135622
18	Schoonover Rd 4 Iberlin Ranch	43-3	NESE	3	47N	76W	WYW135622
19	SCHOONOVER RD 4 SRU	12-34	SWNW	34	48N	76W	WYW148333X
20	SCHOONOVER RD 4 SRU	14-33	SWSW	33	48N	76W	WYW148333X
21	SCHOONOVER RD 4 SRU	21-33	NENW	33	48N	76W	WYW148333X
22	SCHOONOVER RD 4 SRU	21-34	NENW	34	48N	76W	WYW148333X
23	SCHOONOVER RD 4 SRU	23-33	NESW	33	48N	76W	WYW148333X
24	SCHOONOVER RD 4 SRU	23-34	NESW	34	48N	76W	WYW148333X
25	SCHOONOVER RD 4 SRU	32-34	SWNE	34	48N	76W	WYW148333X
26	SCHOONOVER RD 4 SRU	34-27	SWSE	27	48N	76W	WYW148333X
27	SCHOONOVER RD 4 SRU	34-33	SWSE	33	48N	76W	WYW148333X
28	SCHOONOVER RD 4 SRU	34-34	SWSE	34	48N	76W	WYW148333X
29	SCHOONOVER RD 4 SRU	41-33	NENE	33	48N	76W	WYW148333X
30	SCHOONOVER RD 4 SRU	41-34	NENE	34	48N	76W	WYW148333X
31	SCHOONOVER RD 4 SRU	43-34	NESE	34	48N	76W	WYW148333X

County: Campbell

Applicant: Williams Production RMT Company

Surface Owners: John Iberlin, BLM

Project Description:

The proposed action involves the following:

- Drilling of 31 total federal CBM wells in Big George coal zone to depths of approximately 1002 to 1275 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 shall be accomplished by telemetry. Metering would entail 4 to 8 visits per month to each well.
- Water Management Proposal: The original water management strategy for this POD was to store water in 27 on-channel impoundments with 27 discharge points. Onsites to review these impoundment locations were held in March of 2007. The water management plan (WMP) was subsequently changed. Since that time, the operator has completely revised their water management strategy. The current plan calls for moving all CBNG product water from the Schoonover Road Unit 4 POD to:
 - storage in reservoirs approved for the Schoonover Road Unit 1, 2, 3, and 5 PODs;
 - treatment at the operator's Beaver Creek Ranch EMIT facility with discharge to Beaver Creek;
 - direct discharge to Beaver Creek; managed irrigation (Land Application Disposal, LAD) on lands owned by the operator; a future option to transport water to Anadarko's pipeline inlet in Bowman Flat with subsequent injection into Madison formation aquifers (Class V Injection).
 The joining of infrastructure which allows for the above options was approved in a sundry, EA-070-08-013, which was approved on October 19, 2007. The Beaver Creek EMIT facility and its outfall were moved to their present locations in a sundry, EA-070-08-046, approved on March 28, 2008.
- An unimproved and improved road network.
- An existing above ground power line network. 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 7 power drops. Noise levels from the generators are anticipated to be less than 80 decibels at 100 feet from the unit.
- A storage tank of 1,000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 12 months. Fuel deliveries are anticipated to be 2 times per week.
- A buried gas, water, and power line network, and 0 central gathering/metering facilities and 1 existing compression facility.

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

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

incorporated and analyzed in this alternative.

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to 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 Schoonover Road 4 POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well #	Aliquot	Sec	Twp	Rng	Changes as a Result of the Onsite
12-3*	SWNW	3	47N	76W	Move well out of sight of sage-grouse lek and raptor nest.
34-3	SWSE	3	47N	76W	Rerouted access road to come from 41-10 location to centralize disturbance.
41-3	NENE	3	47N	76W	Access changed by operator for fee well development.
43-3	NESE	3	47N	76W	Redesigned pad to reduce disturbance. Access changed to avoid construction.
12-4	SWNW	4	47N	76W	Redesigned pad to reduce disturbance.
32-4	SWNE	4	47N	76W	Relocated well to the west to avoid pad construction.
43-4	NESE	4	47N	76W	Well dropped due to proximity of sage-grouse lek and raptor nest.
14-10	SWSW	10	47N	76W	Access changed due to steep slopes and erosive soils.
21-10	NENW	10	47N	76W	Relocated well to the east side of road to avoid pad construction and move out of the line of sight of a raptor nest.
23-10	NESW	10	47N	76W	Redesign pad and submit a site specific reclamation plan.
41-10	NENE	10	47N	76W	Access changed due to erosive sandy soils.
34-27	SWSE	27	48N	76W	Moved well to avoid pad construction.
14-33	SWSW	33	48N	76W	Rerouted access road to SW of sagebrush stand.

Well #	Aliquot	Sec	Twp	Rng	Changes as a Result of the Onsite
21-33	NENW	33	48N	76W	Well can be drilled using a slotted area rather than a pad.
23-33	NESW	33	48N	76W	Well dropped due to proximity to golden eagle nest.
34-33	SWSE	33	48N	76W	Relocated well out of line of sight of the golden eagle nest.
12-34	SWNW	34	48N	76W	Rerouted utility corridor to run to the SE.
21-34	NENW	34	48N	76W	Access route rerouted to avoid rock outcrop and skirt sagebrush stand.
34-34	SWSE	34	48N	76W	Relocated well 600' to the east to avoid sagebrush habitat disturbance. New well now 44-34 well.

The onsite to review water management infrastructure were held on 8-9 March 2007. Since that time, the operator has completely revised their water management strategy. The current plan calls for moving all CBNG product water from the Schoonover Road Unit 4 POD to:

- storage in reservoirs approved for the Schoonover Road Unit 1, 2, 3, and 5 PODs;
- treatment at the operator's Beaver Creek Ranch EMIT facility with discharge to Beaver Creek;
- direct discharge to Beaver Creek; managed irrigation (Land Application Disposal, LAD) on lands owned by the operator;
- a future option to transport water to Anadarko's pipeline inlet in Bowman Flat with subsequent injection into Madison formation aquifers (Class V Injection).

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. Surface Water

1. Channel Crossings:
 - a) 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.
 - b) 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.

2.3.2.2. 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.

2.3.2.3. Vegetation

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

2.3.2.4. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
4. The lower edge of soil or other material stockpiles will be located outside the active floodplain.
5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphologic configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

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

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. 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 winter roost sites. A seasonal minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
2. 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).

2.3.2.7. 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

General

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's 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 Schoonover Road POD is Covert Green (PANTONE for Architecture Color Guide 18-0617 TPX).
3. The approval of this project does not grant authority to use off lease federal lands without approved right of way grants. No 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 grant is signed by the authorized officer of the BLM.
4. Please contact Kathy Brus, Supervisory Natural Resource Specialist, @ (307) 684-1087, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Drilling

1. The operator intends to eventually produce several coal zones at the same time from one wellbore. The operator is required to submit a Sundry for approval to commingle these coals.
2. If the source of water used to mix casing cement is from any other source than a municipal water supply, the operator will provide a copy of the water analysis from the source to the BLM Petroleum Engineer prior to use for cementing.

Surface Use

1. The operator included proposed overhead power in a deficiency submission dated 09-18-08. This proposal was not included at the time of the onsite, and therefore was not evaluated in the field. **Installation of new overhead power will not be authorized with this approval.** The operator will submit a Sundry notice to be evaluated concurrently with the Right of Way submitted by Powder River Energy Corporation.
2. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.
3. The operator is responsible for having a licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
4. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

<u>Grade</u>	<u>Drainage Spacing</u>
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
13-15%	150 ft.

5. "Roughed-in" or "Pioneer" roads shall be constructed according to the line and grade shown in the approved engineering designs. Non-engineered roads shall be constructed to a line and grade established to meet the BLM Gold Book and 9113 guidelines as approved in the SUP, and shaped according to an approved design template for that road. The following access roads must be surfaced prior to drilling: All the wells in Section 10 T47N R76W.
6. Adequate drainage control must be in place at all stages of construction and culverts installed as soon as feasible.

7. Final grading and surfacing shall occur immediately after utility installation is complete. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.
8. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
Reclamation Standards:
 - C. 3. The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 - C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 - C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 - C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.
9. There are several places where noxious weed species (Salt Cedar) have invaded. In addition to control of the invasive species, the operator will be required to clean construction equipment on site prior to moving at the following locations:
 - a. 41-3-4776
 - b. 34-27-4876
10. Material Safety Data Sheets must be maintained on site during the drilling phase.
11. Due to erosive soils and steep slopes, the access route to the following wells and the well locations will require interim reclamation and slope stabilization to be completed within 30 days of the beginning of construction: All the wells, access and utility corridors in Section 10.
12. To reduce the amount of disturbance to habitat, the access routes to the following wells will be maintained at 25 feet wide:
 - a. 12-3-4776
 - b. 21-34-4876
 - c. 41-34-4876
13. Well 23-34-4876 – the operator will mow an area only 40 east of well to reduce habitat disturbance.
14. Prior to drilling and construction of these wells, the operator will stake the limits of disturbance permitted for each location. All drilling and construction activity including driving will be confined within these limits.
15. The drilling pits will be lined at the following locations:
 - d. 12-10-4776
 - e. 21-33-4876
16. At the onsite, the access route to 41-3 was relocated. The operator will be required to reclaim the original route.
17. At Well 12-34-4876, all drilling and construction activity will avoid rock outcrops on the south edge of the location.
18. The operator's plan of development includes several long sections of utility corridor which cross topography with challenging reclamation potential, as listed below. The BLM requests that these

utility corridors be installed using a road bore technique to reduce surface impacts and remove the reclamation challenges.

- f. From the 41-33 south to the 32-33 line
 - g. From the 12-33 to the 32-34.
 - h. From the 21-4 to the access route near the 34-33.
 - i. From the 12-10 to the access to the 14-10.
19. The utility corridor from the access route to the north to the 32-3 well as proposed will not be approved at this time. The operator has agreed to investigate alternative routes to avoid excessive surface disturbance.
20. 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 loss. 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:

Loamy and Sandy Sites:

Species	% in Mix	Lbs PLS*
Western Wheatgrass (<i>Pascopyrum smithii</i>)	25	3.0
Bluebunch Wheatgrass (<i>Pseudoroegneria spicata ssp. Spicata</i>)	20	2.4
Green needlegrass (<i>Nassella viridula</i>)	15	1.8
Thickspike Wheatgrass (<i>Elymus lanceolatus ssp. lanceolatus</i>)	15	1.8
Indian Rice Grass (<i>Oryzopsis hymenoides</i>)	10	1.2
Prairie coneflower (<i>Ratibida columnifera</i>)	5	0.6
Rocky Mountain beeplant (<i>Cleome serrulata</i>)	5	0.6
Lewis - Appar, Blue, or Scarlet flax	5	0.6
Totals	100%	12 lbs/acre

Wildlife

All conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall be complied with.

The following conditions will alleviate impacts to bald eagles:

- 1. No project related actions shall occur within one mile of Beaver Creek annually from November 1 through April 1, prior to a winter roost survey or from February 1 through August 15 prior to a nesting survey. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
48/76	33	14-33, 34-33
	34	44-34, 23-34
47/76	3	12-3, 41-3, 43-3
	4	12-4, 21-4, 32-4

- a. If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
 - b. If a nest is identified and construction has not been completed, 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).
2. 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.

Burrowing Owls

The following conditions will alleviate impacts to burrowing owls:

1. No surface disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities within the prairie dog town. This timing limitation will be in effect unless surveys determine the nest to be inactive. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
4776	4	34-33

Raptors

1. The following conditions will alleviate impacts to raptors:
 - a. No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect all infrastructure on the September 8, 2008 Western Lands Services Map:
 - 1) Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.
 - 2) Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to all nest(s) within 0.5 miles of the project area.
 - b. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
 - c. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).
 - d. Any activity other than routine well checks between February 1- July 31 will require BLM notification and a biological monitor to ensure activities do not interfere with breeding

activities (i.e. flushing adults or immature birds from nest-tree or adults off nest) at the following wells: **43-34, 14-33, 14-33, 12-10, and the 12-3.**

Sage Grouse

1. The following conditions will alleviate impacts to sage-grouse:
 - a. No surface disturbing activities are permitted within 2 miles of the Beaver Creek sage-grouse lek(s) between March 1 and June 15, prior to completion of a greater sage grouse lek survey. **Areas covered by this condition are depicted on the attached Wildlife COA Map. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the entire POD.**
 - 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). 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.
 - c. Well metering, maintenance and other site visits within 2.0 miles of documented sage grouse lek sites should be minimized as much as possible during the breeding season (March 1– June 15).
 - d. Maximum design speed on all operator-constructed and maintained roads will not exceed 25 miles per hour **except** travel along roads within 1/2 mile of the Beaver Creek lek. These roads will be posted at 10 mph.

Water Management

1. No new impoundments are included in this approval. All impoundments originally submitted for approval with the original POD have been dropped. If in the future it is determined that additional impoundment storage is required, the operator shall submit a Sundry notice for approval prior to the installation of additional impoundments.

Cultural

All earth moving activity in the following areas will be monitored by BLM cultural resource use permittee. The Bureau has identified these areas as containing the potential for buried cultural deposits. The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of all monitoring work. All monitored areas must be plotted on a map provided with the monitoring report.

1. All earth moving activity associated with the construction of the well pad, well pit, access and corridor for well 43-3 to the junction with the existing road. It is noted that some portions of this monitoring area may be outside alluvial and aeolian deposits, the exact areas to be monitored are left to the discretion of the archeological monitor.
2. All earth moving activity associated with the construction of the pit for the 41-3 well.
3. All earth moving activity associated with the construction of the utility corridor for well 34-33 in Section 33. All earth moving activity associated with the construction of the pit for the 34-33 well.
4. All earth moving activity associated with the construction of the utility corridor, access and pit for well 14-33 to the junction with the existing road. It is noted that some portions of this monitoring area may be outside alluvial and aeolian deposits, the exact areas to be monitored are left to the discretion of the archeological monitor.

5. All earth moving activity associated with the construction of the utility corridor, access and pit for well 12-3 to the junction with the proposed improved road.
6. All earth moving activity associated with the construction of the utility corridor and improved road from the junction of the 12-3 access rd., north to the junction with the existing improved road.
7. All earth moving activity associated with the construction of the utility corridor from the 32-3 well north to the existing infrastructure.

2.4. Alternatives considered but not analyzed in detail

The operator did not provide documentation that it considered any options for water management. However, based on the multiple iterations of their submitted water management plans, it appears that they considered and rejected reservoir storage as an option.

2.5. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposal (Alternative C) are presented in Table 2.1.

Table 2.1 Summary of the Alternatives

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Total CBNG Wells	11	31	29
Total Locations		31	29
Nonconstructed Pads		24	24
Slotted Pads		0	1
Constructed Pads		7	4
Conventional Wells	4		
Gather/Metering Facilities	0	0	0
Compressors	1		
Monitor Wells	0	0	0
Impoundments			0
On-channel	00	27	0
Off-channel	1	0	0
Water Discharge Points		27	0
Treatment Facilities	1(downstream)	0	0
Improved Roads			
No Corridor	8.0		1.1
With Corridor		1.0	3.3
2-Track Roads			

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
No Corridor	0.4	0	0.5
With Corridor	0	16.4	5.0
Buried Utilities			
No Corridor	1.5	9.3	0.2
With Corridor	0	5.1	3.6
Overhead Powerlines	4.7	2.3	0
Communication Sites	0	0	0
Staging/Storage Areas	0	0	5
Other Disturbance			
Acres of Disturbance		220.4	85.6

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 09-29-2006. Field inspections of the proposed Schoonover Road 4 POD CBNG project were conducted March 6, 7, 8, 9, 14 & 21 2007.

NAME	TITLE	AGENCY
Ben Kniola	Natural Resource Specialist	BLM
Bill Ostheimer	Wildlife Biologist	BLM
Arnie Irwin	Soils Scientist	BLM
Ben Adams	Hydrologist	BLM
Lee Harrelson	Civil Engineer	BLM
Seth Lambert	Archaeologist	BLM
Duane Joslyn	Operations Superintendent	Williams
Jim Mobley	Construction	Williams
Rex Linde	Drilling Supervisor	Williams
Rich Kintzi	Office and Operations Manager	Western Land Services
Allen Aksamit	Wildlife Biologist	Western Land Services
Richard Jarvis	Senior Landman	Williams
Allen Jones	Hydrologist	Western Land Services
John Iberlin	Landowner	
James Iberlin	Landowner	

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Floodplains		X		Ben Adams
Wilderness Values			X	Kathy Brus
ACECs			X	Kathy Brus
Water Resources	X			Ben Adams
Air Quality	X			Kathy Brus
Cultural or Historical Values	X			Seth Lambert
Prime or Unique Farmlands			X	Kathy Brus
Wild & Scenic Rivers			X	Kathy Brus
Wetland/Riparian	X			Ben Adams
Native American Religious Concerns			X	Seth Lambert
Hazardous Wastes or Solids		X		Kathy Brus
Invasive, Nonnative Species	X			Kathy Brus
Environmental Justice		X		Kathy Brus

3.1. Topographic Characteristics of Project Area

The Schoonover Road 4 POD is located approximately 20 miles southwest of Gillette, south of the Schoonover county road at the west edge of Campbell County, WY. The area is typical of the high plains transitioning to the Powder River Breaks, with rolling hills, gently sloping to incised drainages with steep draws and rough breaks. The POD area (3821 acres) is dissected from SE to NW by Beaver Creek, a tributary to the Powder River. The Powder River is approximately 9 miles west of the project area. Elevations range from 4280 to 4620 feet above sea level. The surface is primarily privately owned with 33% managed by the BLM. Primary land use has historically been ranching and livestock operations with some conventional oil and gas development. Recently, the area has been intensely industrialized with Coal Bed Natural Gas development. The following table lists the PODs which have been or are proposed to be developed in the area:

Operator	POD Name	Location	CBNG Wells, #	Date Approved	Acres
Berenergy	Empire	47N-76W	15	8/1/2008	2713
Bill Barrett	BBC Pumpkin Creek 1	47N-76W	17	3/9/2007	1397
Bill Barrett	BBC Pumpkin Creek II	47N-76W	53	9/21/2007	5514
Williams	SRU and	48N-75,76W	19	7/27/2000	See Below
Williams	SRU 2	48N-76W	65	11/26/03	18087
Williams	Schoonover Road 3	47,48N-76,77W	92	04/29/05	8507
Yates	Cat Shadow	46,47N-76,77W	98	05/05/05	11847
Yates	Veranda	46N-76W	32	Pending	3269

Due to large tracts of contiguous public surface, this is also a popular area for hunting. A Cooperative Wyoming Game and Fish walk-in hunting area (#77) encompasses the northern half of the POD area.

3.2. Soils and Vegetation

General vegetation communities within the project area consist of mixed sagebrush/grassland mosaic. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the project area. 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.

Common grasses noted during the onsite investigation include needle and thread, western wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and buffalo grass. Broom snakeweed, rubber rabbitbrush, and prickly pear are found interspersed throughout the area.

3.2.1. Soils

Soils have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams. Soils have surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive, though vary with texture, slope, elevation and other characteristics. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8+ inches in bottomland. Erosion potential varies from slight to severe depending on the soil type, vegetative cover, and slope. Approximately 1000 acres (27%) of the POD has been classified as having severe water erosion potential. Reclamation potential of soils varies throughout the project area. Approximately 2,049 acres (54%) within the POD boundary have been identified as having poor reclamation potential. The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes. The proponent planned their project and the BLM made further recommendations on the onsite to avoid those areas where possible. Disturbances approved within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA.

Soils within the project area were identified from the South Campbell County Survey Area, Wyoming (WY605). The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

The map unit symbols within this project area were filtered and map units representing 3.0% or greater in extent within the pod boundary are displayed. Dominant soil map units are listed in the table below with their individual acreage and percentage of the area within the POD boundary.

Table 3.2 Dominant soils affected by the proposed action

Map Unit	Map Unit Name	Acres	Percent
233	USTIC TORRIORTHENTS, GULLIED	1019.7	27%
217	THEEDLE-SHINGLE LOAMS, 3 TO 30 PERCENT SLOPES	982.2	26%
216	THEEDLE-KISHONA-SHINGLE LOAMS, 3 to 30 Percent Slopes	413.2	11%
124	CUSHMAN-SHINGLE LOAMS, 6 TO 15 PERCENT SLOPES	377.4	10%
153	HAVERDAD-KISHONA ASSOCIATION, 0 to 6 Percent Slopes	344.4	9%
122	CUSHMAN-CAMBRIA LOAMS, 6 TO 15 PERCENT SLOPES	137.8	4%
211	SHINGLE-WORF LOAMS, 3 TO 30 PERCENT SLOPES	120.2	3%

For more detailed soil information, see the NRCS Soil Survey 605 – South Campbell County. Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.2.

3.2.2. Vegetation

Ecological Site Descriptions are used to provide site 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 for the soils identified above and the associated ecological sites for the identified soil map unit symbols found within the POD boundary are listed in the table below.

Table 3.3 Ecological Sites

Map Unit	Ecological Site
233	Badlands (Miscellaneous Areas)
217	Loamy 10-14" Northern Plains
216	Loamy 10-14" Northern Plains
124	Loamy 10-14" Northern Plains
153	LOWLAND (10-14 NP)
122	Loamy 10-14" Northern Plains
211	SANDY (10-14 NP)

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure are loamy sites and “Miscellaneous Areas” described as Badlands, in the 10-14 inch precipitation zone of the Northern Plains.

Loamy Sites occur 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. These soils are moderately deep to very 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 present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season mid-grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant vegetation include needleandthread, western wheatgrass, green needlegrass, blue grama, prairie junegrass and Sandberg bluegrass. Other grasses occurring on the state include Cusick’s and Sandberg bluegrass, and prairie junegrass. Cheatgrass has invaded the site. Other vegetative species identified at onsite include: pricklypear and fringed sagewort.

“Miscellaneous Areas”, Badlands areas occur on steep slopes and ridge tops, but may occur on all slopes which include landforms such as hillsides, ridges and escarpments. Badlands have essentially no soil and support little or no vegetation and are steep or very steep, commonly non-stony, barren land dissected by many intermittent drainage channels. Badlands are most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

The areas identified as potentially having a highly erosive map unit were identified at the onsite and will be avoided.

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

Table 3.4 Summary of Ecological Sites

Ecological Site	Acres	Percent
Loamy 10-14" Northern Plains	2231.2	58%
Badlands	1019.7	27%
LOWLAND (10-14 NP)	344.4	9%
SHALLOW LOAMY (10-14 NP)	120.2	3%
SANDY (10-14 NP)	104.5	3%

3.2.3. Wetlands/Riparian/Floodplains

Beaver Creek, under natural conditions, was one of the Powder River's larger ephemeral tributaries. Large ephemeral drainages often exhibit areas of transient wetlands and, during runoff events, can develop short-lived riparian areas. The reaches of Beaver Creek within this POD's boundary are characterized by a broad, flat-bottomed floodplain with a primary flow channel which appears and disappears. Individual and isolated stands of cottonwood trees can be found throughout the area, especially where larger ephemeral draws enter Beaver Creek's floodplain. The groundwater table in Beaver Creek, under natural conditions, is fairly shallow, contributing to areas where water can remain in potholes long after runoff events have ended. During wet climatic cycles, Beaver Creek may begin to exhibit characteristics of intermittent streams.

Continuous discharge of CBNG produced water by the operator at an existing outfall within this POD boundary and other operators upstream have created perennial flow at least from the NENE Section 4 T47N R76W west to the Powder River confluence.

3.2.4. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info):

- diffuse knapweed
- Scotch thistle

The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Additionally, the operator or BLM documented additional weed species during subsequent field investigations:

- Canada thistle
- salt cedar
- cheatgrass

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

3.3. Wildlife

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the POD wildlife reports, 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 Western Lands Services (WLS 2008, 2007, 2006). The consultant performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in 2006, 2007, 2008. Habitat surveys were

conducted for Ute ladies'-tresses orchid. PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM biologist conducted field visits on March 6, 7, 8, 9, 14 and 21, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species identified in the project area or 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 pronghorn antelope and mule deer. The WGFD has determined the entire project area to be Spring/Summer/Fall range for antelope. For mule deer the area is split into Winter/Yearlong range in the southwest ¼ and Yearlong in the remainder. A Wyoming Game and Fish walk-in hunting area (#77) encompasses the northern half of the POD area.

Big game range definitions and maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD. The project area is part of the Pumpkin Buttes pronghorn antelope and mule deer herds. The Wyoming Game and Fish summaries for these herds set a 2007 Post-season Objective of 18,000 with a 2007 Post-season Population Estimate of 39,600 for pronghorn and a 2007 population objective of 25,000 and a population estimate of 27,600.

3.3.2. Aquatics

The project area is drained by Beaver Creek, a historically ephemeral tributary of the Powder River. Coal Bed Natural Gas produced water has changed Beaver Creek to a primarily perennial stream system feeding the Powder River. Native and introduced fish, particularly smaller bodied fish such as fathead minnow use Beaver Creek seasonally. No springs were documented within the project area (BHEC 2008). Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

The Powder River Basin is one of the last free-flowing prairie stream ecosystems left in the United States, with existing flows, turbidity, and water quality within historic ranges. The Powder River supports an intact native fish community including several rare or declining species. These species have evolved life history strategies that allow them to survive in extreme conditions (Hubert 1993). Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carpsucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, white sucker and others. Six of these are designated by the WGFD as either Native Species Status (NSS) 1, 2, or 3 species. Species in these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act.

NSS1 species (sturgeon chub and western silvery minnow) are those that are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions are declining or vulnerable. NSS2 species (goldeye, shovelnose sturgeon, and sauger) are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. NSS3 species (plains minnow) are widely distributed throughout their native range and appear stable; however, habitats are declining or vulnerable. For these species, the WGFD has been directed by the Wyoming Game and Fish Commission to recommend that no loss of habitat function occur. Some modification of the habitat may occur, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged).

The sturgeon chub was petitioned for listing under the Endangered Species Act in 2000. The sturgeon chub is a small minnow native to WY and is known to occur only in the Powder River and in one location on Crazy Woman Creek. The sturgeon chub requires large, free-flowing rivers characterized by swift flows, high variable flow regimes, braided channels, high turbidity, and sand/gravel substrates. On April 18, 2001, the U.S. Fish and Wildlife Service determined that the listing was not warranted, due to the sturgeon chub population being more abundant and better distributed throughout their range than previously believed.

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Confluence Consulting, Inc. identified the following species present within the Clear Creek and Powder River watersheds: Woodhouse’s toad, Northern leopard frog, gopher snake, and garter snake (2004). Because sampling at the upper two sites on Clear Creek occurred late in the season, seasonality may have influenced the lack of reptiles and amphibians observed at these sites.

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. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). 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

Raptors species expected to occur in suitable habitats within the Powder River Basin include northern harrier, golden eagle, red-tailed hawk, Swainson’s hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper’s hawk, northern goshawk, long-eared owl, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities.

Twenty six raptor nest sites were identified within 0.5 mile of the project area. Of these, four nests were active in 2008 (WLS 2008). The nest locations and 2008 status is reflected on the project work map dated September 8, 2008 and in the table below:

Table 3.5. Documented raptor nests within the project area in 2008.

BLM ID	UTME	UTMN	Species	Substrate
1378	419687	4882165	UNRA	Live Cottonwood
2815	419353	4882033	UNRA	Dead Cottonwood
2822	419707	4881992	GOEA	Live Cottonwood
4032	420190	4881975	UNRA	Dead Cottonwood
4168	420190	4881975	UNRA	Dead cottonwood
4290	422054	4877771	RETA	Live Cottonwood
4372	421798	4883667	UNRA	Live Cottonwood
4373	422326	4881123	GRHO	Live Cottonwood
4374	420981	4879195	UNRA	Live Cottonwood
4377	422176	4881914	UNRA	Live Cottonwood
4378	420819	4881153	RETA	Live Cottonwood
4379	420714	4880139	UNRA	Live Cottonwood
4607	420793	4881697	UNRA	Live Cottonwood
4608	421161	4881265	UNRA	Live Cottonwood

BLM ID	UTME	UTMN	Species	Substrate
4754	421050	4879231	GRHO	Live Cottonwood
4759	420163	4878319	RETA	Man made structure
5421	419925	4882241	UNRA	Live Cottonwood
5422	421275	4881407	UNRA	Live Cottonwood
5686	419999	4882233	UNRA	Live Cottonwood
5687	418793	4882116	UNRA	Live Cottonwood
5689	420823	4879721	UNRA	Live Cottonwood
5690	420739	4881076	RETA	Live Cottonwood
5787	419421	4883365	UNRA	Live Cottonwood
5789	421959	4879636	GRHO	Live Cottonwood
5790	421080	4880281	UNRA	Live Cottonwood
5878	420210	4882929	GHOW	Live Cottonwood

UNRA; Unknown. RTHA; Red-tailed hawk. AMKE; American Kestrel. GOEA; Golden Eagle. GHOW; Great-horned owl.

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 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

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, separated by no more than 1.5km, for survival (USFWS 1989).

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

Five black-tailed prairie dog colonies were identified within the project area totaling approximately 75 acres (WLS 2008). Black-footed ferret habitat is not present within the project area.

3.3.5.1.2. Ute 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. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties.

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. In Wyoming, *Spiranthes diluvialis* blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Drainages in project area are ephemeral. No springs were identified. Suitable orchid habitat was assessed; marginal habitat is present along Beaver Creek within the project area (BHEC 2008).

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. Two habitat types, prairie dog colonies and sagebrush ecosystems, specifically, are the most common among habitat types within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. These are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail. 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.

3.3.5.2.1. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs; in other words, species requiring sagebrush for some part of their life cycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, and sage thrasher. Brewer's sparrows and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Other sagebrush obligate species include sagebrush vole, pronghorn antelope, and sagebrush lizard

3.3.5.2.2. 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 the protection of 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) (USFWS 2007) 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 can make up the primary prey base. The diets of wintering bald eagles are often more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, carcasses of domestic sheep and big game 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.

There is marginal nesting substrate along Beaver Creek within one mile of proposed activities. Mature cottonwoods and a recently perennialized stream could attract nesting bald eagles. The BLM database indicates one bald eagle roost area approximately one mile west of the project area. A summary of the documented eagles is below:

Survey Date	UTM N	UTM E	T_N	R_W	Sec.	QQ	Observations/Comments
12/5/2007	4887220	416784	48	76	32	NWNW	3 mature Bald eagles
12/13/2007	4883042	417601	48	76	32	NWNW	1 mature Bald eagle
12/17/2007	4883042	417601	48	76	32	NWNW	1 mature/1 immature separate trees
	4883023	417375	48	76	31	NENE	1 mature Bald eagle
12/26/2007	4883100	417443	48	76	32	NWNW	2 mature Bald eagles/same tree
	4882762	418358	48	76	32	SWNW	1 mature Bald eagle
1/7/2008	4883168	417515	48	76	31	NENE	2 mature Bald eagles
1/14/2008	4883508	416089	48	76	31	NWNW	1 mature Bald eagle
1/21/2008	4883168	417515	48	76	31	NENE	1 mature Bald eagle
1/29/2008	4883023	417375	48	76	31	NENE	2 mature Bald eagles
2/2/2008	4883184	417521	48	76	32	NWNW	2 mature Bald eagles
2/23/2008	4881992	419707	48	76	33	SESW	1 mature Bald eagle at nest, 1 mature to east

3.3.5.2.3. Black-tailed prairie dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 (USFWS 2000). On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. BLM Wyoming considers prairie dogs as a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Five black-tailed prairie dog colonies were identified within the project area totaling approximately 75 acres (WLS 2008).

3.3.5.2.4. Burrowing owl

The burrowing owl is a small, long-legged owl found throughout open landscapes of North and South America. Burrowing owls can be found in grasslands, rangelands, agricultural areas, deserts, or any dry open area with low vegetation where abandoned burrows dug by mammals such as ground squirrels (*Spermophilus spp.*), prairie dogs (*Cynomys spp.*), and badgers (*Taxidea taxus*) are available. Black-tailed prairie dog colonies provide the primary habitat for burrowing owls (Klute et al. 2003).

The western burrowing owl has declined significantly throughout its North American range. Current population estimates for the United States are not well known but trend data suggest significant declines (McDonald et al. 2004). The last official population estimate placed them at less than 10,000 breeding pairs. The majority of the states within the owl's range have recognized that western burrowing owl populations are declining. It is listed as a sensitive species by the BLM throughout the west and by the USDAFS. Primary threats across the North American range of the burrowing owl are habitat loss and fragmentation primarily due to intensive agricultural and urban development, and habitat degradation due to declines in populations of colonial burrowing mammals (Klute et al. 2003).

Burrowing owl nesting habitat consists of open areas with mammal burrows. Individual burrowing owls

have moderate to high site fidelity to breeding areas and even to particular nest burrows (Klute et al. 2003). Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully during the previous year. Favored nest burrows are those in relatively sandy sites (possibly for ease of modification and drainage), areas with low vegetation around the burrows (to facilitate the owl's view and hunting success), holes at the bottom of vertical cuts with a slight downward slope from the entrance, and slightly elevated locations. In Wyoming, egg laying begins in mid-April. Incubation is assumed to begin at the mid-point of the laying period and lasts for 26 days (Olenick 1990). Young permanently leave the primary nest burrow around 44 days from hatch (Landry 1979). Juveniles will continue to hunt with and associate with parents until migration (early September through early November) (Haug 1985).

The BLM BFO databases and the survey information provided by Big Horn Environmental for Schoonover Road 4 POD indicate one burrowing owl nest within, or within 0.25 mile, of the project area in 2006 on the prairie-dog town along the border of sections 4 and 33 (UTM 420248E. 4881608N) BHC 2006. Schoonover Road 4 project surveys, which occurred in 2006, 2007 and 2008 did not locate burrowing owls. (WLS 2008).

3.3.5.2.5. Grouse

3.3.5.2.5.1. Greater sage-grouse

The greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS 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. In 2007, the U.S. District Court remanded that decision, stating that the USFWS’ decision-making process was flawed and ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

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 nesting habitat is present throughout the project area, particularly in Sections 26, 27, 33, 34, and 35. Brood rearing habitat is present along Beaver Creek and its major tributaries. Moderately dense sagebrush is present in patches throughout the project area. Sage-grouse habitat models indicate that 95% of the project area contains high quality sage-grouse nesting habitat and high quality sage-grouse wintering habitat (Walker et al. 2007). BLM records identified six sage-grouse leks within 4 miles of the project area. The 4-mile distance was recommended by the State wildlife agencies' ad hoc committee for consideration of oil and gas development effects to nesting habitat (WGFD 2008). These six lek sites are identified below (Table 6).

Table 3.6. Occupied Sage-grouse leks within 4 miles of the project area.

Lek Name	Twn	Rng	Sec	UTME	UTMN	2008 max males
Kaufman Draw	47N	75W	18	425629	4878069	29
Morgan Draw	48N	76W	11	422762	4889420	23
Napier	48N	76W	15	421474	4886681	3
Negro Butte	47N	77W	2	414223	4880420	0
Beaver Creek	47N	76W	4	420602	4881120	15
Upper Kauffman Draw	47N	76W	24	425059	4875473	27

3.3.5.2.5.2. Sharp-tailed grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is found where grasslands are intermixed with shrublands, especially wooded draws, shrubby riparian area, and wet meadows.

The project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter.

3.3.5.2.6. Mountain plover

The mountain plover was proposed for listing in 1999 (USFWS). In 2003, the USFWS withdrew a proposal to list the Mountain Plover as a Threatened species, stating that the population was larger than had been thought and was no longer declining. Mountain plovers, which are a BLM sensitive species, are typically associated with high, dry, short grass prairies (BLM 2003). Mountain plover nesting habitat is often associated with heavily grazed areas such as prairie dog colonies and livestock pastures. Suitable mountain plover habitat is present within the project area; however three years of surveys have not found plovers (WLS 2008).

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 3.7 Historical West Nile Virus Information

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

*Wyoming Department of Health Records September 12, 2007.

Human cases of WNV in Wyoming occur primarily in the late summer or early fall. There is some evidence that the incidence of WNV tapers off over several years after a peak following initial outbreak (Litzel and Mooney, personal conversations). If this is the case, occurrences in Wyoming are likely to

increase over the next few years, followed by a gradual decline in the number of reported cases.

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

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

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

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

3.5. Water Resources

The project area lies within the boundaries of the Beaver Creek watershed. Under natural conditions, Beaver Creek was one of the Powder River's larger ephemeral tributaries.

3.5.1. Groundwater

Wyoming Department of Environmental Quality (WDEQ) water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for Total Dissolved Solids (TDS) and the classes of groundwater; 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 PRB EIS Record of Decision 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 related to groundwater, the plan identified the following (PRB EIS ROD page E-4):

- The effects of infiltrating 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 CBNG impoundments
- Shallow groundwater wells would be installed and monitored where necessary

As stated in the MMRP, an Interagency Working Group was established to implement an adaptive management approach. BLM is working with the WDEQ and the Interagency Working Group regarding the monitoring information being collected and assessed to determine if changes in mitigation are warranted.

The BLM 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 had a battery of nineteen wells which were installed and monitored jointly by the BLM and USGS starting in August of 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment site, which has since been reclaimed, 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 indicated 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.

The WDEQ implemented requirements for monitoring shallow groundwater of Class III or better quality under unlined CBNG water impoundments effective August 1, 2004. The intent is to identify locations where the impoundment of water could potentially degrade any existing shallow groundwater aquifers. These investigations are conducted where discharged water will be detained in existing or proposed impoundments. If shallow groundwater is detected and the water quality is determined to fall within the Class III or better class of use (WDEQ Chapter 8 classifications for livestock use), operators are required to install batteries of 1 to 3 wells, develop a monitoring plan and monitor water levels and quality. The results of these investigations are being analyzed and interpreted as they are received by the WDEQ.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 9 registered stock and domestic water wells within 1 mile of the POD with depths ranging from 0 (flowing well) to 550 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). Three unpermitted water wells were identified by the operator's consultant during their field investigations.

3.5.2. Surface Water

Beaver Creek, under natural conditions, is one of the Powder River's larger ephemeral (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) tributaries. Large ephemeral drainages often exhibit areas of transient wetlands and, during runoff events, can develop short-lived riparian areas. The reaches of Beaver Creek within this POD's boundary are characterized by a broad, flat-bottomed floodplain with a primary flow channel which appears and disappears. Isolated stands and individual cottonwood trees can be found throughout the area, especially where larger ephemeral draws enter Beaver Creek's floodplain. The groundwater table in Beaver Creek, under natural conditions, is fairly shallow, contributing to areas where water can remain in potholes long after runoff events have ended. During wet climatic cycles, Beaver Creek may begin to exhibit characteristics of intermittent streams. The ephemeral tributaries to Beaver Creek grade rapidly from steep, deeply incised and actively eroding gully systems to flat-bottomed swales bounded by nearly vertical gully walls.

Continuous discharge of CBNG produced water by the operator at an existing outfall within this POD boundary and other operators upstream have created perennial flow at least from the NENE Section 4 T47N R76W west to the Powder River confluence.

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 Upper Powder River, the EC ranges from 1797 $\mu\text{mhos/cm}$ at Maximum monthly flow to 3400 $\mu\text{mhos/cm}$ at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located on the Powder River at Arvada, WY (PRB FEIS page 3-49).

The operator has stated that no natural springs were located within this POD's boundary. They have also stated that, should any be found during POD development, they will be documented, sampled and monitored for the life of this project.

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the Schoonover Road Unit 4 project prior to on-the-ground project work (BFO project no. 70070110). Western Land Services conducted a block and linear Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. Seth Lambert, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located within the project area.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48CA1587	Prehistoric	NE
48CA5584	Prehistoric	NE
48CA5585	Prehistoric/Historic	NE
48CA6129	Prehistoric/Historic	NE
48CA6224	Prehistoric	NE
48CA6225	Prehistoric	NE
48CA6226	Historic	NE
48CA6227	Historic	NE
48CA6228	Prehistoric	NE
48CA6229	Historic	NE
48CA6230	Prehistoric/Historic	NE
48CA6231	Historic	NE
48CA6232	Prehistoric/Historic	NE
48CA6233	Prehistoric/Historic	NE
48CA6234	Historic	NE
48CA6235	Prehistoric	NE
48CA6236	Prehistoric/Historic	NE
48CA6237	Historic	NE
48CA6238	Prehistoric/Historic	NE
48CA6239	Prehistoric	NE
48CA6240	Prehistoric	NE
48CA6241	Historic	NE
48CA6242	Prehistoric/Historic	NE
48CA6243	Prehistoric/Historic	NE
48CA6244	Prehistoric/Historic	NE
48CA6245	Historic	NE
48CA6246	Historic	NE
48CA6247	Prehistoric	NE
48CA6248	Unknown	NE

Site Number	Site Type	National Register Eligibility
48CA6249	Prehistoric	NE
48CA6250	Prehistoric	NE
48CA6251	Historic	NE
48CA6252	Prehistoric/Historic	NE
48CA6253	Prehistoric	NE
48CA6254	Prehistoric/Historic	NE
48CA6255	Prehistoric/Historic	NE
48CA6256	Prehistoric/Historic	NE
48CA6257	Prehistoric/Historic	NE
48CA6258	Historic	NE
48CA6259	Prehistoric/Historic	NE
48CA6260	Prehistoric	NE

Some of the project area analyzed in this EA occurs on deep alluvial deposits. Alluvial deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory.

3.7. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NO_x]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NO_x, particulate matter, and other emissions from diesel trains and,
- SO₂ and NO_x from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 29 proposed well locations, none are on existing or reclaimed conventional well pads, 24 can be drilled without a well pad being constructed, 1 will require slot construction and 4 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 24 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 25 x 40 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 24 wells and the 1 slotted well would involve approximately 0.5 acre/well for 12.5 total acres. The other 4 wells requiring cut & fill pad construction would disturb approximately 0.6 acres/well pad for a total of 2.34 acres. The total estimated disturbance for all 29 wells would be 14.84 acres.

Approximately 4.4 miles of improved roads would be constructed to provide access to various well locations. Approximately 5.5 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. Approximately 2.1 miles of pipeline would be constructed outside of access corridors and 1.6 miles outside of utility corridors. 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, etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	24	0.5/acre	12.0	Long Term
Slotted Pad	1	or Site Specific	0.5	
Constructed Pad	4		2.3	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	1	Site Specific	1.0	Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments	0		0	Long Term
Improved Roads				Long Term
No Corridor	1.1	40' Width or Site Specific	6.0	
With Corridor	3.3		18.2	
2-Track Roads				Long Term
No Corridor	0.9	12' Width	1.7	
With Corridor	4.6	25' Width	14.0	
Pipelines				Short Term
No Corridor	1.6	40' Width	8.6	
With Corridor	2.1		11.3	
Buried Power Cable		12' Width or Site Specific		Short Term
No Corridor	0		0	
Overhead Powerlines	0	30' Width	0	Long Term
Additional Disturbance		Site Specific	0	
Staging areas	5	2 acres	10	Short Term
TOTAL			85.6	Short Term
			55.7	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”.

The effects to soils resulting from well pad, access roads and pipeline construction include:

- Mixing of horizons where construction on roads, pipelines or other activities take place. Mixing results in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Loss of soil vegetation cover, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.
- Modification of hill slope hydrology.

These impacts would increase the potential for valuable soil loss due to increased water and wind erosion, invasive plant spread establishment, and increased sedimentation and salt loads to the watershed system.

Several areas proposed for development within this POD fall in areas identified as having sandy soils with poor reclamation potential. The installation of the wells and infrastructure, listed below, must be expediently stabilized in order to reduce the wind and water erosion and promote reclamation success. The operator will be required to stabilize any disturbed area within 30 days of the disturbance.

Locations of concern are all the wells, access corridors and utility corridors within Section 10, T47N, R76W. The operator has submitted a summary of Best Management Practices to be used for the reclamation of the 23-10 location.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). BLM reclamation goals emphasize ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

The operator has agreed to design and implement site specific reclamation strategies to address these areas of concern. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures would ensure land productivity/stability is regained and maximized. The seed mix for the Schoonover Road 4 POD was determined based on soil map unit types, the dominant ecological sites found within the project area, and the mixing of soil horizons in disturbed areas. A shallow loamy/sandy seed mix was created for the entire POD (see site specific COAs). In addition, the operator will adhere to COAs which limit the surface disturbance allowable for construction and improvements.

Cumulative Effects: Most soil disturbances would be short term impacts with expedient, successful interim reclamation and site stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in COAs.

4.1.1. Wetland/Riparian/Floodplains

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. “Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas.” (PRB FEIS Page 4-175).

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that “...(they) may be lost by bank undercutting caused by the increased surface water flows in channels.” Included in the ROD is programmatic mitigation “...which may be appropriate to apply at the time of APD approval if site specific conditions warrant.”(ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: “To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.”(ROD Page A-32).

4.1.2. Invasive Species

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

1. Control Methods: the operator will employ an integrated pest management strategy to control existing infestations and prevent additional invasion.
 - a. Physical removal of small infestations and isolated plants.
 - b. Biological control where applicable using animals or approved biological control agents.
 - c. Chemical application of herbicides approved for use on BLM surface and proven to be effective will be used in the control of the target species.
2. Preventive practices will include:
 - a. Minimizing surface disturbance.
 - b. Using certified seed and mulch to prevent introduction.
 - c. Expediently reclaiming disturbed areas.
 - d. Clean construction equipment prior to leaving areas of known infestations. A COA has been applied for cleaning at two locations in this POD, the 41-3 and the 34-27 wells.
3. Education: The operator provides periodic weed education and awareness programs for all employees and contractors. Field employees and contractors will be notified of noxious weeds and weeds of concern identified in the project area and instructed to report any new infestations identified.

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

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

4.1.3. Cumulative Effects

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

The operator has two permitted discharges directly to Beaver Creek, one for untreated water up to approximately 3 cfs, and one for treated water, up to 10 cfs. These flow rates have served to “perennialize” Beaver Creek. Wetland and riparian areas have begun to develop with their attendant communities of cattails, sedges, and saturated soils. The increase in the groundwater of the floodplain will contribute to saturation of steep side banks along meanders. These side banks will begin to calve off much more rapidly than would have occurred under natural flood events. The extent of calving during future high runoff events may be much more severe than would have occurred without pre-moistening of

the cliff bases. Cliff dwellers may be adversely affected as these faces fall. The temporary dams caused by these cliff failures will cause Beaver Creek to back up, spread over the floodplain and seek/create new channels. This channel “creation” will contribute large amounts of sediment to the water flowing down Beaver Creek and will eventually enter the Powder River.

During winter the formation of “anchor ice” and subsequent buildup will also cause water to spread over the floodplain. Formation of new channels will be less likely to occur unless severe icing is followed by a large runoff event, such as snowmelt.

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 Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 19% of that total (see section 4.4.2.1).
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

Additional mitigation measures may be required as this and other PODs are developed and as new impacts/adverse effects are identified during monitoring. The terms of the operator’s discharge permit for the Beaver Creek Ranch EMIT facility include a detailed monitoring program of Beaver Creek from the plant’s discharge point to the creek’s confluence with the Powder River.

4.2. Wildlife (Alternative C – Environmentally Preferred) EFFECTS ANALYSIS

During the environmental analysis process, the BLM identified project modifications resulting in an environmentally preferred alternative (Alternative C). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be reduced. 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 or minimize environmental impacts.

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Spring/Summer/Fall range for pronghorn antelope and Winter Yearlong and Yearlong range for mule deer will 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 indicates 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 mule deer avoid mineral activities, and after three years of drilling activity the deer have not become accustomed to 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. Survival 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.

CBNG activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that must expend increased energies to avoid such activities.

The existing WYGFD walk-in hunting area in the northwestern ¼ of the project area is currently developed for Federal, Private, and State CBNG. Roads in the area are signed for no vehicle access; however the area has a relatively high density of roads. The proposed Federal CBNG development will add 18 wells and four miles of roads in the walk-in area. The proposed development should decrease the number of walk-in hunters as most walking hunters would not select a CBNG field to hunt due to the number of roads and traffic. This walk-in area is already compromised.

The WYGFD describes the impact of CBNG development on the Pumpkin Creek hunt unit as: “Increased presence of CBM development throughout the herd unit also has a negative effect on hunter access, as landowners become concerned about safety of both hunters and CBM employees on their property.” (WYGFD 2006)

4.2.1.1. Big Game 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 managed by a multi-pronged approach. Water will be: routed for storage in reservoirs approved under the Schoonover Road Unit 1, 2, 3, and 5 PODs; delivered to “Managed Irrigation” (Land Application Disposal or LAD) on lands owned by the operator; discharged directly to Beaver Creek; treated and discharged directly to Beaver Creek (both discharges are more than 10 stream miles from the Powder River); piped to Bowman Flat for subsequent injection in Anadarko’s Class V injection facility at Midwest.

The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses.

Altering water temperatures, flow timing and magnitude, turbidity and chemical composition of the Powder River could harm native fish species that inhabit the Powder River. Alterations could also allow for non native species to become established. Any water development that alters discharge patterns,

reduces turbidity, changes water quality, modifies sediment transport, or blocks migratory routes for fish is likely to result in changes in the fish community. Additionally, altering of tributaries may have adverse effects to aquatic species. Tributaries provide spawning and nursery habitat for riverine fishes and support unique fish assemblages. Seasonal movements of riverine fishes into tributaries may be essential to the continued maintenance of several species found in the Powder River (Hubert 1993).

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 (pools, riffles, runs, backwaters, side channels, or a combination), and seasonal habitat use, therefore, it is difficult to fully understand how changes in water quality may affect native aquatic fauna.

The WGFD 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 PRB Interagency Working 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, Inc. reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their report on the Powder River (2004). This report indicated that CBNG discharges could affect native species in the drainage. See Section 3.5.2 of this EA for water quality information associated with this project.

Change in Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a dynamic hydrography 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 may 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.

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Addition of the produced water would facilitate beneficial uses such as livestock supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

The volume of water permitted for direct discharge is based upon the water quality effects related to irrigation downstream in Montana. The flow rate is permitted to mimic seasonal highs and lows and adjusted accordingly.

4.2.2.1. Aquatics Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained. 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).

Habitat fragmentation results in more than just a quantitative loss in the total area of habitat available; the remaining habitat area is also qualitatively altered (Temple and Wilcox 1986). Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

CBNG activities that occur in the spring may be detrimental to migratory bird survival. Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity and nests may be destroyed by equipment.

The use of the proposed water treatment facilities can increase the potential for migratory bird mortality in the evaporation ponds that receive a backwash stream from the conditioning ponds. This evaporation pond will contain a concentrated brine solution. Birds entering this pond can ingest the brine and die from sodium toxicity. Salt toxicosis has been reported in ponds with sodium concentrations over 17,000 mg/L. Ingestion of water containing high sodium levels can chronically affect aquatic birds, especially if a source of fresh water is not available nearby. Aquatic birds ingesting hypersaline water can be more susceptible to avian botulism. During cooler temperatures, sodium in the hypersaline water can crystallize on the feathers', affecting thermoregulatory and buoyancy functions, and causing the bird to die of hypothermia or drowning (Windingstad et al.2004). Effective wildlife exclusionary devices, such as netting, will be required to prevent access by migratory birds, or other options should be utilized to contain and dispose of the brine solution should sodium concentrations rise over 17,000 mg/L.

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.

Migratory bird species within the Powder River Basin nest in the spring and early summer and are

vulnerable to the same affects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Migratory Birds Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

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 overheating or chilling of eggs or chicks. 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.

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

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.

Infrastructure within close proximity (0.5 mile) to documented raptor nests within the project area is depicted on the September 8, 2008 WLS map. Timing limitations will apply to the infrastructure portrayed on that map. Eight raptor nests (likely representing one golden eagle pair, one red-tailed hawk pair, and three great-horned owl pairs) will be affected by the proposed development.

Of the 29 proposed well locations, 17 locations were staked within ½ mile of raptor nests. At the onsite, to reduce impacts to nesting raptors, the BLM recommended dropping the 23-33 well, moving the 12-3 and 34-3 wells, and dropping three reservoirs. These recommendations were implemented.

The road to the 43-3 well location comes within about 300 feet of a nest occupied by a great-horned owl in 2007 and 2008. At the onsite, the owls were on the nest and did not flush while we drove within 200 feet of the tree on 4-wheelers. Operations traffic to the 43-34 should not bother this pair of owls. The 14-33 location is located 0.1 mile and out of sight of nest 2815. This nest (most probably a red-tailed hawk) was not occupied in 2006, 2007 or 2008. A red-tailed hawk pair was found in 2008 nesting

approximately one mile west of this nest. Operations at 14-33 may preclude Red-tailed hawk use of the 2815 nest. The 12-10 well is 0.2 miles from nest 5689 but out of view. The same situation exists for well 12-3 and nest 5690. These nesting locations may be compromised by project activities. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Raptors Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered Species

Table 4.2 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	No Effect	No suitable habitat present.
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	No Effect	No suitable habitat present.

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.

4.2.5.1.1. Black-Footed Ferret Direct and Indirect Effects

Because the project area contains small (< 1000 acre) black-tailed prairie dog colonies and is isolated from any major prairie dog complexes, implementation of the proposed development will have **no effect** on the black-footed ferret.

4.2.5.1.2. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

Potential, marginal habitat is present within the project area at roads and utilities crossing Beaver Creek. Due to the amount of private mineral rights along Beaver Creek, the roads and pipelines crossing Beaver Creek were constructed as a non-federal action. The proposed action will not disturb potential habitat and shall have **no effect** on Ute ladies'-tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22A states: "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species

categories would not be necessary.”

4.2.5.2.1. Prairie dog colony obligates

Wells, roads, pipelines and other infrastructure associated with energy development constructed within prairie dog colonies will directly remove habitat for prairie dog colony obligate species. Activities that disturb these species could lead to temporary or even long-term or permanent abandonment. Direct loss of species may also occur from vehicle traffic. Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem.

4.2.5.2.2. Sagebrush obligates

Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003)

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as a remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of shrub-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return until after habitat reestablishment.

Table 4.3 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 may affect frog habitat. Prairie not mountain habitat.
Spotted frog (<i>Ranus pretiosa</i>)	Mountain ponds, sloughs, and small streams	NP	NI	
Birds				
Baird's sparrow (<i>Ammodramus bairdii</i>)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	K	MIIH	Project includes overhead power.
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	K	MIIH	Prairie dog colony will be impacted.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Basin-prairie shrub will be affected.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	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	NP	NI	Habitat not present.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
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	NP	NI	No known records in or near the project area.
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	NI	Permanently wet meadows not present.
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.	K	MIIH	Some impact to prairie dogs is anticipated.
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	NI	Habitat present.
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 Direct and Indirect Effects

Based on the completed and continuing raptor nesting and bald eagle winter roost surveys, suitable roosting and marginal nesting habitat exists in the project area. A documented roost is located approximately one mile to the west of the project area. The nearest nest is located on the Powder River approximately 20 miles from the project area.

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

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 risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water discharged at Bowman Flats may keep portions of the Powder River ice-free during winter months when the river would historically be frozen over. Open water during the winter may attract eagles if reliable prey is present, most likely in the form of waterfowl.

4.2.5.2.2. Grouse

4.2.5.2.2.1. Greater sage-grouse Direct and Indirect Effects

Seven sage-grouse leks are known within 4 miles of the project. The proposed action will adversely impact breeding, nesting, brood rearing, late summer, and winter habitat. Proposed project elements that are anticipated to negatively impact grouse are listed in the project impact table (Table # 4.1). Using 0.6 miles as a distance for effective sage-grouse habitat loss from (Holloran et al. 2007, Aldridge and Boyce 2007), will be 3,600 acres from existing overhead power, 5,000 acres from roads, and 21,000 acres from 29 well locations. These numbers are not additive since each well location has an associated road and power and in many cases wells are closer than 0.6 miles to each other. Therefore, the above numbers over-represent anticipated impacts within the project area if totaled, however since most well locations are within 0.6 miles of each other the entire project area (approximately 4,000 acres) can be considered affected.

Based on the best available science, which is summarized below, the proposed action will most likely contribute to the extirpation of the Beaver Creek lek within the project boundary and could affect the local grouse population and contribute to the subsequent abandonment of the six other leks within four miles of the project.

4.2.5.2.2.1.1. Greater sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and associated infrastructure the project area does contain existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the six earlier listed sage-grouse leks. As of September 2, 2008, there are approximately 1056 existing wells and associated infrastructure within four miles of these leks - an area of 162 square miles. The existing well density is approximately 6.5 wells/section across the area defined by the four-mile buffers around the six leks.

There are 400 proposed wells (29 are the wells from this project) within four miles of the six leks. With the addition of the 400 proposed wells that are not associated with this proposed action, the well density within four miles of the six leks increases to 8.9 wells/section. With approval of alternative C (29 proposed well locations) the well density 9.1 wells/section.

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 (WGFD 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

The Powder River Basin Oil and Gas Project FEIS (BLM 2003) concluded that “Activities associated with the proposed project would affect sage-grouse in several ways. These effects may include: (1) increased direct mortality (including legal hunting, poaching, and collision with power lines and vehicles); (2) the introduction of new perches for raptors and thus the potential change in rate of predation; (3) direct loss or degradation of habitats; (4) indirect disturbance resulting from human activity (including harassment, displacement, and noise); (5) habitat fragmentation (particularly through construction of roads); and (6) changes in population (pg. 4-257).” The FEIS goes on to state that “implementation of several mitigation measures would reduce the extent of each impact addressed by those measures. Despite these measures, the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270).”

The Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) included a Mitigation Monitoring and Reporting Plan (MMRP). The uncertainties as to where and at what level development was to proceed as well as the uncertainties associated with the assumptions that were used to predict impacts suggests that one-time determination of impacts that is included in the EIS may not occur as projected. The MMRP helps to continually assess the effects of the project and the adequacy of the mitigation. Such a plan/process provides a mechanism to continuously modify management practices in order to allow development while continuing to protect the environment (E-1).” In other words, development pace and patterns may not occur as predicted, and so the BLM may use the adaptive management process provided for in the BFO RMP.

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004). Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce

2007). Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied. The 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). As interpreted by coordinated effort with state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately 1 well pad per square mile with the associated infrastructure, results in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (Holloran 2005, Walker et al. 2007)

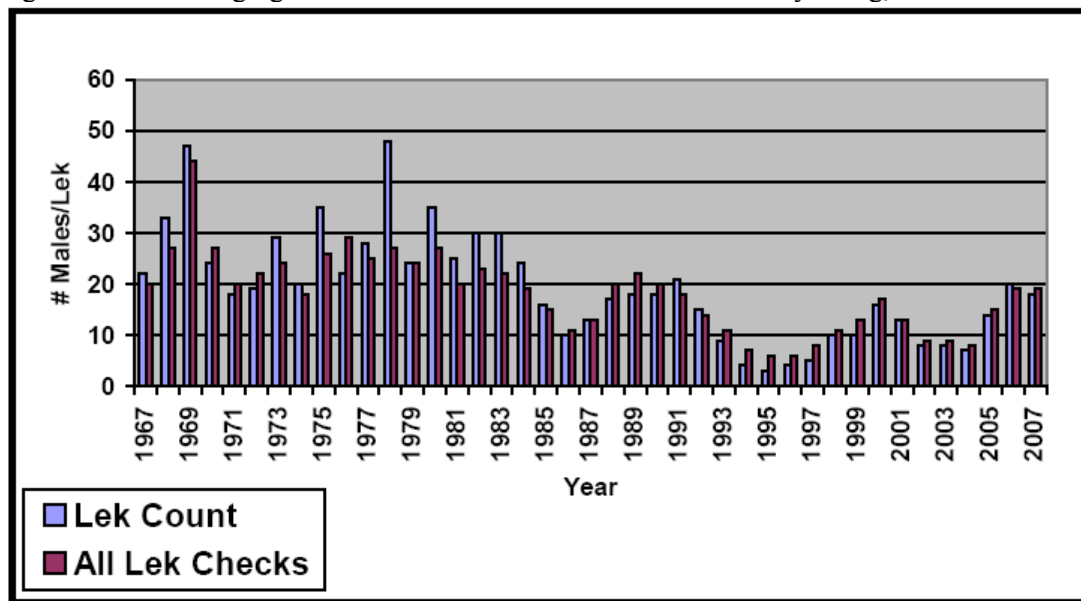
Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active drilling rigs within 5 km (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et al. documented approximately 200 CBNG facilities within one mile of sage-grouse leks. Sage-grouse numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct habitat losses from the facilities themselves, roads and traffic, and the associated noise were found to be the likely reason for this finding.

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. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size has decreased by more than 63% in the past forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 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). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-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 sage-grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 1) (WGFD 2005). The figure illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Long-term harvest trends are similar to that of lek attendance (WGFD 2005).

Figure 4.1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



The BFO Resource 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) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 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 breeding lek (BLM 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 only 36% of their grouse nesting within 3 km of the capture lek. 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. 2007). Habitat conditions and sage-grouse biology within the Buffalo Field Office are more similar to Moynahan’s north-central Montana study area than the Upper Green River area.

A two-mile timing limitation, given the long-term population decline and that less than 50% of sage-grouse are expected to nest within the limitation area, is insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connelly et al. 2000), recommend increasing the protective distance around sage-grouse leks. The BLM and University of Montana are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Thus far, this research suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008). 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. In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007).

Walker et al, 2007 indicates the size of a no-development buffer sufficient to protect leks would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Also, rather than limiting mitigation to only timing restrictions, research suggests more effective mitigation strategies include, at a minimum, burying power lines (Connelly et al. 2000 b); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007).

The multi-state recommendations presented to the WGFD for identification of core sage grouse areas acknowledges there may be times when development in important sage grouse breeding, summer, and winter habitats cannot be avoided. In those instances they recommend, "...infrastructure should be minimized and the area should be managed in a manner that effectively conserves sagebrush habitats (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008).

Williams agreed to drop the 43-4 well and moved the 34-34 to a 44-34 location in order to reduce impacts to sage-grouse nesting habitat. Williams also modified the proposed action to eliminate all new reservoir locations which reduced impacts to brood-rearing habitat.

4.2.5.2.3. Sharp-tailed grouse Direct and Indirect Effects

Effects similar to sage-grouse.

4.2.5.2.4. Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is present within the project area. The project should not impact mountain plovers due to minimal impact to prairie dog colonies and no plovers found in three years of surveys.

Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline corridors and roads, may be attractive to plovers, while human activities within one-quarter mile may be disruptive.

4.2.5.3. Sensitive Species 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 water produced from these Federal mineral wells will be added to existing infrastructure located in the surrounding PODs. Water management options include treatment and discharge to Beaver Creek or the Powder River, direct discharge to Beaver Creek, discharge to existing impoundments in the surrounding PODs or reinjection. Previous WMPs incorporated sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed commitments to comply with Wyoming State water laws/regulations. Qualified hydrologists 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 maximum water production is predicted to be 11 gpm per well or 319 gpm (0.7 cfs or 514 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 Upper Powder River drainage, the projected volume produced within the watershed was 147,481 acre-feet in 2008 (maximum production was predicted to occur in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 0.3% of the total volume projected for 2008. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 128 gpm will infiltrate at or near the discharge points and impoundments (206 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "...the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). However, there is potential for infiltration of produced water to influence the quality of the antecedent groundwater.

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). This guidance document became effective August 1, 2004, and was revised as the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved in June, 2006.

The Wyoming DEQ established an Impoundment Task Force which drafted an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments began in the spring of 2006.

As of April of 2008, approximately 1,774 impoundment sites had been investigated through over 1,988

borings. Of these impoundments, 259 met the criteria to require “compliance monitoring” if constructed and used for CBNG water containment. Only 109 impoundments requiring monitoring are presently being used. As of the first quarter of 2008, only 16 of those monitored impoundments caused a change in the “Class of Use” of the underlying aquifer water.

For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

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 0 (flowing well) to 550 feet compared to a range of 1,115-1,410 feet to the Big George 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 “...resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years.” (PRB FEIS page 4-38).

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water “...cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly

1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC found in the POD’s representative water sample. Treatment facility effluent is to meet the ambient Powder River water quality at the time of discharge.

Table 4.4 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2	1000
Least Restrictive Proposed Limit		10	3200
Powder River at Arvada Gaging Station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		4.76 7.83	1797 3400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	500 2,000 5,000	8	
Predicted Produced Water Quality Big George	1490	17.4	2380

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 1490 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). Direct land application on lands owned by the operator and evaluated in the SRU3 POD is included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application within the SRU-4 POD, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the Big George coal zone by these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 11 gallons per minute (gpm) is projected is to be produced from these 29 wells, for a total of 319 gpm for the POD. See Table 4.5.

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

Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

The operator proposes to pipe all produced water from this POD into water handling infrastructure approved in previous PODs. For a complete discussion, see the Project Description—Water Management Proposal section on page 5 of this document.

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 may result in the addition of 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 precipitation caused

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. These conditions were agreed to by the operator in the previous approved actions.

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 in the Powder River watershed would occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 29 wells is anticipated to be a total of 319 gpm or 0.7 cfs to impoundments, direct discharge, treatment and discharge, or injection. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in Beaver Creek from this action (0.1 cfs) may add a maximum 0.09 cfs to the Upper Powder River flows, or 0.1% of the predicted total CBNG produced water contribution. This incremental flow rate is well below the measurement capabilities for flow rates in the Powder River without highly specialized techniques and equipment (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The operator did not provide an analysis of the potential development or potential maximum discharge in the Beaver Creek Watershed. However, based on a 114 square mile watershed, with one well every 80 acres (8 wells per square mile) and an assumed water production rate of 11 gpm per well, a total of 912 wells could be drilled with a total production of 10,032 gpm or 23 cfs. This is unlikely to occur because:

1. Many 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, 23 cfs, is less than the volume of runoff estimated from the 2-year storm event for Beaver Creek.

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 obtained a number of Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of water produced from prior approved submissions. For detailed information on the specific requirements imposed by the WDEQ through these permits, refer to their (WDEQ's) website. The following permits are affected by this plan of development:

WY0046922	Direct discharge to Beaver Creek—NENE, Sec4, T47N, R76W
WY0048321	Discharge to 26 containment reservoirs in approved PODs
WY0056049	Treatment and discharge to Beaver Creek—SESE, Sec25, T48N, R76W

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

In-channel downstream impacts are not addressed in the WMP for the Schoonover Road Unit 4 POD prepared by Western Land Services for Williams Production RMT Company.

4.4.2.1. Surface Water Cumulative Effects

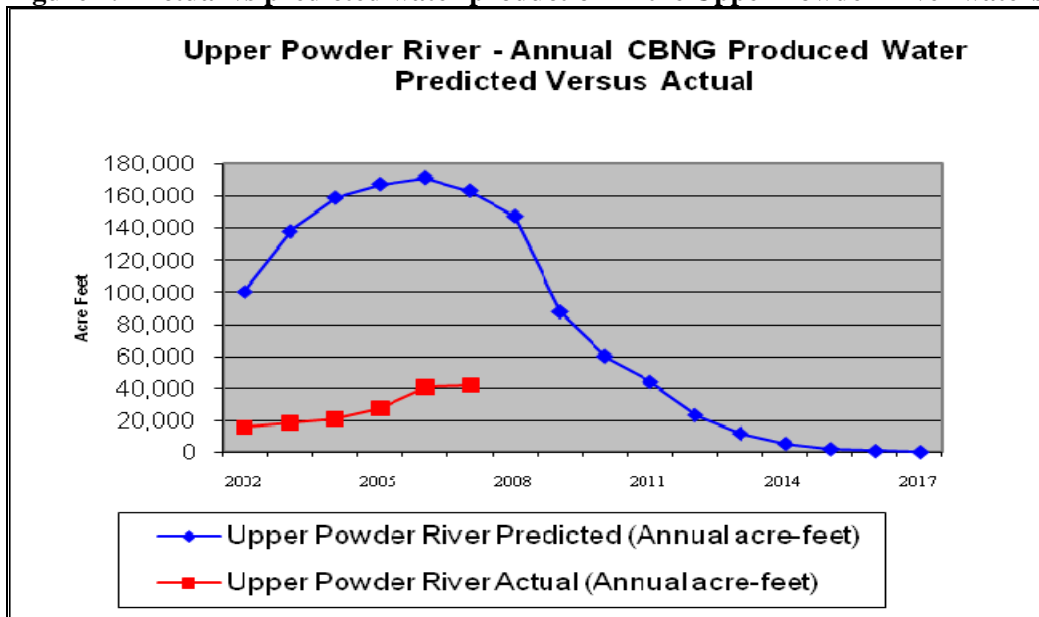
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2007, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 19 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.5 Actual vs predicted water production in the Upper Powder River watershed 2007 Data Update 3-08-08

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		166,096			

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



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

The PRB FEIS states that “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim MOC (Memorandum of Cooperation) that the two DEQs (Wyoming and Montana Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of instream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117) However, this MOC expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR. Therefore the Wyoming DEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Litigation between Wyoming and Montana which was entered into after issuing the PRB FEIS ROD will now determine the water quality and quantity parameters which will be applied to CBNG produced water disposal into waters flowing from Wyoming into Montana.

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 Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 19% of that total (see section 4.4.2.1).
2. The WDEQ enforcement of the terms and conditions of the WYPDES permits that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume and flow rate of water discharged.

Additional mitigation measures may be required as this and other PODs are developed and as new impacts/adverse effects are identified during monitoring. The terms of the operator’s discharge permit for the Beaver Creek Ranch EMIT facility include a detailed monitoring program of Beaver Creek from the plant’s discharge point to the creek’s confluence with the Powder River.

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

4.5. Cultural Resources

Non eligible sites 48CA6232, 48CA6236, 48CA6237, 48CA6240, 48CA6250, 48CA6251, 48CA6257, 48CA6260, 48CA1587, 48CA5585, and 48CA6129 will be impacted by the proposed project. No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 9/22/08 that no historic properties exist within the APE. 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).

When a project is constructed in area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the State Historic Preservation Office (SHPO) as far as mitigation or avoidance. Due to the presence of alluvial deposits in the project area, the operator will be required to have an archeologist monitor all earth moving activities associated with certain construction in the Beaver Creek drainage, as described in the COA’s.

4.6. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBM well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Duane Joslyn	Operations Superintendent	Williams	Yes
Jim Mobley	Construction	Williams	Yes
Rex Linde	Drilling Supervisor	Williams	Yes
Rich Kintzi	Office and Operations Manager	Western Land Services	Yes
Allen Aksamit	Wildlife Biologist	Western Land Services	Yes
Richard Jarvis	Senior Landman	Williams	Yes
Allen Jones	Hydrologist	Western Land Services	Yes
John Iberlin	Landowner		Yes

James Iberlin	Landowner		Yes
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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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