

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

Bill Barrett Corporation
BBC Pumpkin Creek I

ENVIRONMENTAL ASSESSMENT –WY-070-07-53

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Bill Barrett Corporation’s BBC Pumpkin Creek Coal Bed Natural Gas (CBNG) POD comprised of the following 17 Applications for Permit to Drill (APDs), as follows:

#	Well Name	Well #	QTR/QTR	Sec	TWP	RNG	Lease #
1	BBC PUMPKIN CREEK 1 PC	14-4BG*	SWSW	4	47N	76W	WYW71546
2	BBC PUMPKIN CREEK 1 PC	23-4BG	NESW	4	47N	76W	WYW71546
3	BBC PUMPKIN CREEK 1 PC FED	34-4BG	SWSE	4	47N	76W	WYW71546
4	BBC PUMPKIN CREEK 1 PC FED	12-8BG	SWNW	8	47N	76W	WYW35216
5	BBC PUMPKIN CREEK 1 PC FED	14-8BG	SWSW	8	47N	76W	WYW35216
6	BBC PUMPKIN CREEK 1 PC FED	32-8BG	SWNE	8	47N	76W	WYW35216
7	BBC PUMPKIN CREEK 1 PC FED	21-8BG	NENW	8	47N	76W	WYW35216
8	BBC PUMPKIN CREEK 1 PC FED	23-8BG	NESW	8	47N	76W	WYW35216
9	BBC PUMPKIN CREEK 1 PC FED	34-8BG	SWSE	8	47N	76W	WYW35216
10	BBC PUMPKIN CREEK 1 PC FED	41-8BG	NENE	8	47N	76W	WYW35216
11	BBC PUMPKIN CREEK 1 PC FED	43-8BG	NESE	8	47N	76W	WYW35216
12	BBC PUMPKIN CREEK 1 PC FED	14-9BG	SWSW	9	47N	76W	WYW35216
13	BBC PUMPKIN CREEK 1 PC FED	12-9BG	SWNW	9	47N	76W	WYW0301372
14	BBC PUMPKIN CREEK 1 PC FED	21-9BG	NENW	9	47N	76W	WYW0301372
15	BBC PUMPKIN CREEK 1 PC FED	23-9BG	NESW	9	47N	76W	WYW35216
16	BBC PUMPKIN CREEK 1 PC FED	32-9BG	SWNE	9	47N	76W	WYW0301372
17	BBC PUMPKIN CREEK 1 PC FED	41-9BG	NENE	9	47N	76W	WYW0301372

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number	Contributing Outfall
1	P4-1	SWSE	4	47	76	WYW0301372	001 & 005
2	P4-2	SESE	4	47	76	WYW71546	001 & 005
3	P9-1	SWNE	9	47	76	WYW322678	005

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.

- Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
 - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
 3. Alternative C will not result in any undue or unnecessary environmental degradation.
 4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
 5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
 6. Alternative C is the environmentally-preferred Alternative.
 7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
 8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Bill Barrett Corporation
BBC Pumpkin Creek I
PLAN OF DEVELOPMENT
WY-070-07-53**

INTRODUCTION

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

1. PURPOSE AND NEED

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Bill Barrett Corporation’s BBC Pumpkin Creek Plan of Development (POD) for 17 coal bed natural gas well APD’s and associated infrastructure. A water management plan was developed and submitted as part of this POD to handle the produced water from all the Pumpkin Creek wells.

Proposed Well Information: There are 17 wells proposed within this POD, as follows:

#	Well Name	Well #	QTR/QTR	Sec	TWP	RNG	Lease #
1	BBC PUMPKIN CREEK 1 PC	14-4BG*	SWSW	4	47N	76W	WYW71546
2	BBC PUMPKIN CREEK 1 PC	23-4BG	NESW	4	47N	76W	WYW71546
3	BBC PUMPKIN CREEK 1 PC FED	34-4BG	SWSE	4	47N	76W	WYW71546
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5	BBC PUMPKIN CREEK 1 PC FED	14-8BG	SWSW	8	47N	76W	WYW35216
6	BBC PUMPKIN CREEK 1 PC FED	32-8BG	SWNE	8	47N	76W	WYW35216
7	BBC PUMPKIN CREEK 1 PC FED	21-8BG	NENW	8	47N	76W	WYW35216
8	BBC PUMPKIN CREEK 1 PC FED	23-8BG	NESW	8	47N	76W	WYW35216
9	BBC PUMPKIN CREEK 1 PC FED	34-8BG	SWSE	8	47N	76W	WYW35216
10	BBC PUMPKIN CREEK 1 PC FED	41-8BG	NENE	8	47N	76W	WYW35216
11	BBC PUMPKIN CREEK 1 PC FED	43-8BG	NESE	8	47N	76W	WYW35216
12	BBC PUMPKIN CREEK 1 PC FED	14-9BG	SWSW	9	47N	76W	WYW35216
13	BBC PUMPKIN CREEK 1 PC FED	12-9BG	SWNW	9	47N	76W	WYW0301372
14	BBC PUMPKIN CREEK 1 PC FED	21-9BG	NENW	9	47N	76W	WYW0301372
15	BBC PUMPKIN CREEK 1 PC FED	23-9BG	NESW	9	47N	76W	WYW35216
16	BBC PUMPKIN CREEK 1 PC FED	32-9BG	SWNE	9	47N	76W	WYW0301372
17	BBC PUMPKIN CREEK 1 PC FED	41-9BG	NENE	9	47N	76W	WYW0301372

County: Johnson

Applicant: Bill Barrett Corporation

Surface Owners: Iberlin Ranch, David Flora & Judy Mason, Bureau of Land Management

The proposed action entails developing the following:

- Drilling of 17 total federal CBM wells in the Big George coal zone to depths of approximately 1285 feet.
- An unimproved and improved road network.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: BBC will discharge approximately 50% of the produced CBNG water into 3 stock water reservoirs and will direct discharge the other 50% into ephemeral draws that are tributary to Beaver Creek through 5 discharge points within the Upper Powder River Watershed.
- A buried gas, water and power line network.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP(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 MSRP, 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. Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
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

Modifications, or alternatives, to the original proposal received from the operator, were identified as the result of the pre-approval onsite inspection(s). The following changes and mitigation measures to the proposed action resulting from the on-site will be analyzed in Alternative C.

Implementation of committed mitigation measures contained in the Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. 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. 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 or minimize environmental effects of the operator’s proposal. The specific changes identified for the BBC Pumpkin Creek POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well #	Aliquot	Section	T	R	Onsite Notes
14-4BG*	SWSW	4	47N	76W	location moved due to proximity to ground nest, new access, spot upgrade note: dirt from road will be incorporated into pad
23-4BG	NESW	4	47N	76W	access rd, SU: gravel first 300 ft, top of slope to where it levels out
12-8BG	SWNW	8	47N	76W	eyebrow location incorporated into rd, SU note: cut from Pad will be used for rd construction
14-8BG	SWSW	8	47N	76W	location moved due to proximity to raptor nest ~ 660 ft, access will be 2 track, no dirt work for pad
34-8BG	SWSE	8	47N	76W	location moved due to topography, access/utilities rerouted to decrease impact to sage-grouse habitat, will follow fence line
43-8BG	NESE	8	47N	76W	eyebrow location, access to SE was rerouted to stay off of ridge w/ highly erosive soils
21-9BG	NENW	9	47N	76W	Due to proximity to drainage: adjust pad, no cut at SW corner, Round NW corner, deeper cut at well stake for fill on east side of pad

Well #	Aliquot	Section	T	R	Onsite Notes
41-9BG	NENE	9	47N	76W	access rerouted due to topography
14-9BG	SWSW	9	47N	76W	location moved due to topography and proximity to drainage

Water Management

- Outfall 002 was moved so that it discharged into the main stem of the UT-1 watershed.
- Headcuts in the main channels of the UT-1 watershed will be monitored for erosion and the use of upstream discharge points will be discontinued if erosion problems develop.
- LWC 3-1 was added downstream of Reservoir P4-1.
- Reservoir P3-1 was deleted due the presence of a sage grouse lek.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

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

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

2.3.2.3. Soils

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

2.3.2.4. Vegetation

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

2.3.2.5. Wetland/Riparian

1. Power line corridors will avoid wetlands to the extent possible in order to reduce the chance of waterfowl hitting the lines. Where avoidance cannot occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only when dry conditions persist (e.g., late summer or fall) or when the ground is frozen during the winter.
3. No waste material will be deposited in riparian areas, floodplains, or in natural drainage ways.
4. Soil or other material stockpiles will be located outside of active floodplains.
5. Disturbed channels will be reshaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.6. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
4. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced,

they will be designed and constructed to prevent entrapment and drowning.

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

2.3.2.7. Threatened, Endangered, or Sensitive Species

2.3.2.7.1. Bald Eagle

1. The BLM will monitor all take of bald eagle habitat associated with the preferred alternative. The actual measurement of disturbed habitat is the responsibility of BLM but can be delegated to BLM' agent (consultant, contractor, etc.) A written summary will be provided to the USFWS' Wyoming Field Office semi-annually. The semi-annual report will include field survey reports for endangered, threatened, proposed and candidate species for all actions covered under the PRB FEIS and ROD. The semi-annual reports will include all actions completed up to 30 days prior to the reporting dates. The first report will be due 6 months after the signing of the ROD and on the anniversary date of the signing of the ROD. Reporting will continue for the life of the project.
2. The BLM will monitor all road-associated carcasses, jackrabbit sized and larger, along project (operator-maintained) roads.
3. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.
4. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
5. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.7.2. Ute Ladies'-tresses Orchid

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

2.3.2.8. Visual Resources

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

2.3.2.9. Noise

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

2.3.2.10. Air Quality

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

2.3.3. Site specific mitigation measures

Well specific mitigation measures to minimize disturbance and impacts from well pad dirt work.

Well #	Aliquot	Section	TWP	RNG	Site Specific
23-4BG	NESW	4	47N	76W	pit spoils will be placed at S end of pit
12-8BG	SWNW	8	47N	76W	engineered drawing will be field adjusted at time of construction, cut from Pad will used for SU road construction
21-8BG	NENW	8	47N	76W	reclamation COAs
21-9BG	NENW	9	47N	76W	engineered drawing will be field adjusted at time of construction
32-9BG	SWNE	9	47N	76W	pit spoils will be placed N of well stake

1. The approval of this project does not grant authority to use off lease Federal lands. No access or surface activity is allowed on or off the affected leases on Federal lands until right-of-way grants become authorized.
2. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

Grade	Drainage Spacing
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-16%	150 ft
3. To prevent rilling, and decrease impacts from vehicle traffic; 4” of aggregate will be placed where grades exceed 8%.
4. 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 BBC Pumpkin Creek I POD is Carlsbad Canyon, 2.5Y 6/2.

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

Species	% in Mix	Lbs PLS*
<i>Thickspike Wheatgrass</i> (<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>)	20	2.4
<i>Bluebunch Wheatgrass</i> (<i>Pseudoroegneria spicata</i> ssp. <i>Spicata</i>)	15	1.8
<i>Prairie sandreed</i> (<i>Calamovilfa longifolia</i>)	30	3.6
<i>Needleandthread</i> (<i>Hesperostipa comata</i> ssp. <i>comata</i>)	20	2.4
<i>Prairie coneflower</i> (<i>Ratibida columnifera</i>)	5	0.6
<i>White or Purple Prairie Clover</i> (<i>Dalea candidum</i> , <i>purpureum</i>)	5	0.6
<i>Scarlet Globemallow</i> (<i>Sphaeralcea coccinea</i>) / or <i>Blue flax</i> (<i>Linum lewisii</i>)	5	0.6
Total	100%	12 lbs/acre

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

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

6. A Pesticide Use Proposal (PUP) will be developed and submitted to the Bureau of Land Management, Buffalo Field Office presenting methods to treat, control and prevent the spread of the identified noxious weeds impacted by this project on BLM administered public lands. The identified weeds and/or invasive plants within the Pumpkin Creek I POD include salt cedar and were identified during the onsite inspections at the following locations: below direct discharge points 002, 003 and 004. The PUP shall be approved prior to any water disposal at these discharge points. It is recommended that Bill Barrett consult with the Campbell (307-682-4369) and Johnson County (307) 684-5715 Weed and Pest Officers for further information as to specific treatments and methodology.
7. The following road and well location are identified as areas requiring additional reclamation efforts beyond traditional methods.
- The access road in NW1/4, Sec. 8, T. 47 R.76 to the 21-8 well site.
Well site 21-8

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:
- Large rills or gullies.
 - 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.

Water Management

- 1. If any headcut downstream of discharge points 002, 003 or 004 become excessively unstable due to erosion then water from the corresponding upstream discharge point will be turned off, or reduced so that all water is lost to infiltration/evaporation before reaching the problem area. If such conditions occur, BBC should contact Chris Williams, BLM Hydrologist at 307-684-1195 to discuss the action to be taken.

Wildlife

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

<i>Township/Range</i>	<i>Sec.</i>	<i>Affected Wells and Infrastructure</i>
47/76	4	Wells: 14-4, 23-4, and 34-4 Reservoirs: None ALL project related activities within this section west of the 34-4 well.
47/76	8	Wells: 12-8, 14-8, 23-8, and 41-8 Reservoirs: None ALL project related activities within the NENE ¼/¼ and the SW ¼ (south of the 12-8 well and west of the 34-8 well) of this section.
47/76	9	Wells: 21-9 Reservoirs: None ALL project related activities within the north ½ of the NW ¼ of this section.

- b. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
- c. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results

will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to the following nest(s):

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE
4034	Red-tailed hawk	417821E 4878604N	SWSW Sec. 8 T47N, R76W	Cottonwood tree, live
None	Ferruginous hawk	419389E 4880317N	SWSW Sec. 4 T47N, R76W	Ground, hillside

- d. 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.
 - e. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
2. Following nest productivity surveys (no earlier than June 1 or later than June 30), if nest 4034 (SWSW Section 8, T47N, R76W) is active, Bill Barrett Corporation will monitor the activity of the raptors at the nest for the remainder of the nesting period (until July 31 or the young have fledged) during operations and maintenance visits to the 14-8 well location for the first five years following project completion. Monitoring will occur as follows:

A biologist is required to monitor the nest during well metering, maintenance and other site visits (excluding emergencies) and document the birds' behavior in response to human activity, equipment activity and noise throughout the entire buffer. The biologist must be in position to monitor the nest at least ½ hour before the monitoring or maintenance crews arrive and begin work and ½ hour after the monitoring or maintenance crews leave for the day. The biologist will record all of the bird's activity and document weather conditions and submit a report of the activity to the BLM biologist.

3. The following conditions will minimize the impacts to sage-grouse:
 - a. No surface disturbing activities are permitted within 2 miles of a sage grouse lek between March 1 and June 15, prior to completion of a greater sage grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following:

<i>Township/Range</i>	<i>Sec.</i>	<i>Affected Wells and Infrastructure</i>
47/76	4	Wells: 14-4, 23-4, and 34-4 Reservoirs: P4-1 and P4-2 ALL project related activities within this ENTIRE section.
47/76	8	Wells: 21-8, 23-8, 32-8, and 43-8 Reservoirs: None ALL project related activities within the NE ½ of this section <i>except the 41-8 well.</i>
47/76	9	Wells: 12-9, 14-9, 21-9, 23-9, 32-9, and 41-9 Reservoir: P9-1 ALL project related activities within this ENTIRE section.

- 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. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.

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

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

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on August 3, 2006 Field inspections of the proposed BBC Pumpkin Creek I CBNG project were conducted on December 5, 2006 by:

BLM Representatives: Eric Holborn, Chris Williams, Lee Haralson, Lee Grench, Jennifer Morton

Bill Barrett Corporation Representations: Paul McElvery, Floyd Wilson

WWC Engineering: Greg Hoechst.

Pearl Development: Eric Rolli

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			Jennifer Morton
Floodplains		X		Eric Holborn,
Wilderness Values		X		Eric Holborn
ACECs		X		Eric Holborn
Water Resources	X			Chris Williams
Air Quality		X		Eric Holborn
Cultural or Historical Values		X		Leigh Grench
Prime or Unique Farmlands			X	Eric Holborn
Wild & Scenic Rivers			X	Eric Holborn
Wetland/Riparian	X			Chris Williams
Native American Religious Concerns		X		Leigh Grench
Hazardous Wastes or Solids			X	Eric Holborn
Invasive, Nonnative Species	X			Eric Holborn
Environmental Justice		X		Eric Holborn

3.1. Topographic Characteristics of Project Area

The project area is located 30 miles southwest of Gillette, WY and 7 miles east of the Powder River in eastern Johnson County and western Campbell County, Township 47 North, Range 76 West, Sections 4, 8, and 9, Sixth Principal Meridian. The project area contains private and federal surface overlying federal minerals. The project area is bounded by Yates’ Cat Shadow POD to the south and west, Williams’ Schoonover Road Unit 4 to the east, and Williams’ Schoonover Road Unit 3 and 4 to the north. There is currently no CBNG development directly southeast of the project area. Current land uses in the region

also include grazing of cattle, sheep and conventional oil production.

The topography is generally rolling with ridgelines and draws. The main POD area is located within two unnamed tributaries of Beaver Creek, tributary to the Powder River.

Land cover within the project area consists of Wyoming big sagebrush. Areas within and surrounding the project area contain some juniper; lone, scattered cottonwoods are present in some drainages.

3.2. Vegetation & Soils

Using the Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, in the 10-14" Northern Plains precipitation zone, the landform and the soils for the proposed project consist of Loamy, Shallow Loamy and Sandy ecological sites.

The predominant ecological site observed within the proposed POD is classified as Shallow Loamy.

This site was observed throughout the POD, on undulating slopes and ridge tops, but may occur on all slopes. This site occurs on nearly level to 50% slopes with the typical landforms as follows: Hill sides, ridges and escarpments. The soils of this site are shallow (less than 20" to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind, except igneous, is virtually impenetrable to plant roots. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam.

Throughout the project area sandy inclusions were observed within the shallow loamy ecological sites. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The main soil limitations include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high wind erosion potential. Vegetation observed in the inclusions consisted of yucca, prairie sandreed, needleandthread and Indian ricegrass. The low annual precipitation should be considered when planning seeding.

Bottom land with in the project area consisted of loamy soils. The soils of this site are deep to moderately deep (greater than 20" to bedrock), well drained & moderately permeable. Layers of the soil most influential to the plant community varies from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture.

Erosion potential varies from moderate to very high depending on the soil type, vegetative cover and slope.

The plant community observed with in the project area, excluding the sandy inclusions, is defined as Mixed Sagebrush/Grass with a species composition of; Bluebunch wheatgrass, Western wheatgrass, Blue grama, Green needlegrass, Little bluestem, Needleandthread, Wyoming big sagebrush.

3.2.1. Wetlands/Riparian

Channels of tributaries UT-1 and UT-2 within and downstream of the POD boundaries downstream of discharge points 002, 003, 004, and 005 are ephemeral. Discontinuous areas of enhanced vegetation in riparian zones are found here, but no obvious wetland areas were noted. A stand of cottonwood trees are located near the confluence of UT-1 and Beaver Creek just downstream of the POD boundary.

3.2.2. Invasive Species

One state-listed noxious weed was discovered during the onsite. Salt cedar was identified in the channels below direct discharge points 002,003, 004 and 005. No invasive/exotic plant infestations were

discovered by a search of Buffalo Field Office Geographic Information Systems data developed from Federal, State and County weed data or during subsequent field investigation by the project proponent.

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Western EcoSystems Technology, Inc. (WEST). WEST performed surveys for bald eagles, Ute ladies'-tresses orchid habitat, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006.

A BLM Biologist conducted a field visit on December 5, 2006. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose. A Biological Assessment was prepared by a BLM biologist. The Biological Assessment was submitted to the U.S. Fish and Wildlife Service (USFWS) for consultation.

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

3.3.1. Big Game

Big game species expected to be within the BBC Pumpkin Creek 1 project area include pronghorn antelope and mule deer. The project area is part of the Pumpkin Butte pronghorn antelope herd unit. The 2004 estimated herd population was 27,109 with a population objective of 18,000 (WGFD 2004).

Mule deer belong to the Pumpkin Buttes herd unit. Mule deer populations within this herd unit have been increasing since 1998 with a 2004 population estimate of 14,800 animals, and a herd objective of 11,000 (WGFD 2004).

The WGFD has designated the entire project area as winter-yearlong range for pronghorn antelope and yearlong range for mule deer. Populations of pronghorn antelope and mule deer within their respective hunt areas are above WGFD objectives.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of Beaver Creek, a tributary of the Powder River. No natural springs were identified within the project area (SWCA 2006). Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

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

3.3.4. Raptors

One raptor nest was identified by WEST within 0.5 mile of the project area. An additional nest was identified by the BLM biologist during the onsite visit, both of which were active in 2006 (Table 4.).

Table 4. Documented raptor nests within the BBC Pumpkin Creek 1 project area in 2006.

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2006
4034	Red-tailed hawk	417821E 4878604N	SWSW Sec. 8 T47N, R76W	Cottonwood tree, live	Good	Active
None	Ferruginous hawk	419389E 4880317N	SWSW Sec. 4 T47N, R76W	Ground, hillside	Good	Active

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 three species that are Threatened or Endangered under the Endangered Species Act.

3.3.5.1.1. Black-footed ferret

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

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

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

The BBC Pumpkin Creek 1 project area is located approximately 16 miles northeast of the Midwest proposed reintroduction area. No black-tailed prairie dog colonies were identified during site visits by WEST within the project area. Black-footed ferret habitat is not present within the Pumpkin Creek 1 project area.

3.3.5.1.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000, but as yet no final decision has been made.

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

The BBC Pumpkin Creek 1 project has very few mature trees associated with it. No potential nests were identified during consultants (Good 2006) or BLM biologist's site visits, within the immediate project area or extending one mile from proposed activities. Suitable nesting and roosting habitat exists approximately 0.5 mile north of the project area. Two observations of bald eagles were recorded during surveys for winter roosts. One group of two bald eagles (one adult and one juvenile) and one individual adult bald eagle were observed on February 8, 2005. Both observations were of eagles perched in a mature cottonwood greater than one mile from the project area. No bald eagles were observed during surveys in December or January of 2005, and no bald eagles were observed during surveys in the winter of 2005-2006.

3.3.5.1.3. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

Produced water will be discharged into three on-channel reservoirs. No springs or other potential habitat are present. Suitable orchid habitat is not present within the BBC Pumpkin Creek 1 project area.

3.3.5.2. Sensitive Species

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

3.3.5.2.1. Black-tailed prairie dog

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

No black-tailed prairie dog colonies are located within the project area.

3.3.5.2.2. Greater sage-grouse

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

Suitable sage-grouse habitat is present through out the project area. One documented sage-grouse lek is present within two miles of the project area (Table 6). Sage-grouse were observed by WEST on this lek in 2006.

Table 6. Documented sage-grouse leks within two miles of the Pumpkin Creek 1 project in 2006.

Lek ID	UTM NAD83	Legal Location	Status (Peak Males) in 2006	Distance From Project Area (Miles)
Beaver Creek lek	420602E 4881120N	SENE Sec. 4 T47N, R76W	23	0.5

3.3.5.2.3. Mountain plover

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

Mountain plover breeding and nesting habitat does not exist within the project area due to rolling topography and the dominance of Wyoming big sagebrush 20-30” in height. Surveys for mountain plover occupancy according to Service protocol were conducted within suitable habitat located within ¼ mile of the project area during the 2006 nesting season (Good 2006). No mountain plovers were observed.

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 been firmly established in the United States and has continued to spread west. Birds are the natural vector host and serve not only to amplify the virus, but spread it rapidly throughout the country since they are the only known animal to infect mosquitoes. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting the virus to humans, horses, and wildlife. The *Culex* genus appears to be the most important mosquito group that vector, WNV.

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3

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 4 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 some *Culex* species, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

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

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be

provided educational material by their employers about WNV to reduce the risk of WNV transmission. The letter encouraged companies to contact either local Weed and Pest Districts or the Wyoming Department of Health for surface water treatment options.

3.5. Water Resources

The project area is within the Upper Powder River drainage system. Most of the POD area is located within the boundaries of two ephemeral tributaries (designated as UT-1 and UT-2) to Beaver Creek, which is a major tributary of the Powder River. In this area Beaver Creek is perennialized with CBNG discharge from an upstream operator. The main stem channels within the POD are generally well defined, have moderate gradients and a well developed floodplain is present. Several headcuts ranging from one to five feet that may be exposed to CBNG discharge were identified on these channels. Smaller tributaries and headwater reaches in the area generally are narrow with steep channel gradients, create dissected and steep topography and sometimes appear as incised gullies.

3.5.1. Groundwater

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for TDS: 500 mg/l TDS for Drinking Water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

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

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

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

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

The on-going shallow groundwater impoundment monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two of these other

sites also are showing an increasing TDS level as water infiltrates while two other sites are not.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 7 registered stock and domestic water wells within the POD boundary with depths ranging from 326 to 630 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Beaver Creek drainage which is tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels range from well vegetated grassy swales without defined bed and banks to steep gradient v-shaped channels lacking vegetation, to main stems with well defined low flow channels and floodplains.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River watershed, the EC ranges from 1,797 at Maximum monthly flow to 3,400 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 at Arvada, WY, Station ID 06317000 (PRB FEIS page 3-49).

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the BBC Pumpkin Creek I project prior to on-the-ground project work (BFO project no.70060268). SWCA Environmental Consultants conducted a block Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project.

Leigh Grench, 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 cultural resources are located in or near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48JO2207	Historical Debris Scatter	Not Eligible
48JO2232	Multi-Component	Not Eligible
48JO2545	Multi-Component	Not Eligible
48JO2546	Historical Debris Scatter	Not Eligible
48JO2547	Multi-Component	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action POD, which resulted in development of Alternative C as the preferred alternative, have reduced the potential impact to the environment which will result from this action. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Of the 17 proposed well locations, 12 can be drilled without a well pad being constructed and 5 will require a constructed (cut & fill) well pad. As such, surface disturbance would occur with the drilling of the majority (12) of the wells. This disturbance will involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 10 feet x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 12 wells will involve approximately 0.1 acre/well for 1.2 total acres. The other 5 wells requiring cut & fill pad construction would disturb approximately .28 acres/well pad for a total of 1.4 acres. The total estimated disturbance for all 17 wells will be 2.6 acres. This would be a short-term impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 0.42 miles of improved roads would be constructed to provide access to various well locations. Approximately 0.97 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 0.27 miles of pipeline would be constructed outside of 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, etc.) would ensure land productivity/stability is regained and maximized.

The proposed action will affect areas of soils with a limited potential for successful reclamation (Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B). The disturbances are within the areas identified as requiring additional reclamation measures, the programmatic/standard COA’s will be complimented with a site specific performance based reclamation related COA.

The following road and well location are identified as areas requiring additional reclamation efforts beyond traditional methods.

- The access road in NW1/4, Sec. 8, T. 47 R.76 to the 21-8 well site.
Well site 21-8

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 only 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	12	0.1/acre	1.7	Long Term
Constructed Pad	5		3.4	
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments	3		17.25	Long Term
On-channel	3	Site Specific	17.0	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	5	Site Specific or 0.01 ac/WDP	0.25	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Proposed Engineer Road				
With Corridor	0.45	50'	2.8	Long Term
Improved Roads				Long Term
No Corridor	0.42	20'	1.0	
With Corridor	3.06	40'	14.9	
2-Track Roads				Long Term
No Corridor	0			
With Corridor	0.97	30'	3.5	
Pipelines				Short Term
No Corridor	0.27	30'	1.0	
Overhead Powerlines	0.3	30'	1.1	Long Term
Additional Disturbance		Site Specific	0	

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

4.1.1. Wetland/Riparian

There are a few cottonwood trees within the POD boundary and a stand of trees downstream of the POD near the confluence with Beaver Creek that may be stressed due to rising water tables. The operator intends to manage CBNG water does to minimize flow into Beaver Creek and increase flow rates made perennial by CBNG discharge from adjacent operators. If this goal is not achieved, added flow to Beaver Creek could contribute to impacts to downstream riparian vegetation and flooding of bottom land areas.

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).

“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 ephemeral channels in Tributary UT-1 and UT-2 within and downstream of the POD boundaries downstream of discharge points 002, 003, 004, and 005 will be perennialized by sustained CBNG discharge. As the hydrologic regime change, riparian species composition may change to those that are more adept to inundated root zones. Existing riparian vegetation may be impacted by the influx of these more water resistant species, some of which are undesirable such as salt grass, foxtail barley and salt cedar (tamarisk). If salt cedar growth is not controlled in these tributary channels, perennialized stream flow would create favorable conditions for rapid spread of the plant. Proliferation of undesirable species may out compete more desirable grazing species such as western wheatgrass. As well, soil chemistry may change due to exposure to CBNG discharge which can influence species success. Specifically, salts can become elevated in the riparian soils, thus favoring salt tolerant plant species for growth.

The operator intends to manage CBNG water does not flow into Beaver Creek and increase flow rates made perennial by CBNG discharge from adjacent operators. If this goal is not achieved, added flow to Beaver Creek could contribute to impacts to downstream riparian vegetation and flooding of bottom land areas.

4.1.2. Invasive Species

Utilization of existing facilities and 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.

An Integrated Pest Management Plan (IPMP) was provided by Bill Barrett Corporation (BBC). Bill Barrett Corporation is aware of the identified salt cedar locations and has committed to working with the downstream landowner/lessee in conjunction with their IPMP for the BBC Pumpkin Creek I POD.

BBC has also committed to using preventive practices such as;

- Prompt reseeding and revegetation of areas of disturbed soils with certified weed-free seed
- Cleaning of equipment and vehicles prior to entering and leaving each worksite
- Herbicide application
- Mowing newly revegetated areas during the first season of establishment, prior to seed formation on the weeds of concern to avoid the transport and spread of noxious weeds into the area .

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 14.7% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The WMP for the Willow Creek POD proposes that produced water will not contribute excessive flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

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

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

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

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. In order to survive below the maintenance level, requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978)

further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged to three proposed reservoirs. If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to over

heating or chilling of eggs or chicks. The prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

Table 5. Infrastructure within close proximity to documented raptor nests within the BBC Pumpkin Creek 1 project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL / RES NUMBER	DISTANCE (MILES)
4034	417821E 4878604N	Red-tailed hawk	Active	Well: 12-8	0.45
4034	417821E 4878604N	Red-tailed hawk	Active	Well: 14-8	0.19 moved out of line-of-sight
4034	417821E 4878604N	Red-tailed hawk	Active	Well: 23-8	0.35
None	419389E 4880317N	Ferruginous hawk	Active	Well: 14-4	0.11 moved next to existing oil well and out of line-of-sight
None	419389E 4880317N	Ferruginous hawk	Active	Well: 23-4	0.36
None	419389E 4880317N	Ferruginous hawk	Active	Well: 34-4	0.46
None	419389E 4880317N	Ferruginous hawk	Active	Well: 41-8	0.39
None	419389E 4880317N	Ferruginous hawk	Active	Well: 21-9	0.43

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

The proposed 14-4BG well was relocated approximately 400' southwest due to its proximity to a ferruginous hawk nest. The proposed 14-8BG well was relocated west-southwest due to its proximity to a red-tailed hawk nest. This well remains within ¼ mile of the red-tailed hawk nest and may still disturb nesting activities, thereby reducing productivity and possibly result in nest abandonment. In order to evaluate this well's effect on nesting activity, Bill Barrett Corporation will be required to monitor the activity of nesting raptors in association with well maintenance and operation visits.

4.2.4.1. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221. No additional mitigation measures are required.

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment and a summary is provided in Table 4.3. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat not present.
Threatened Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	S	LAA	Overhead power proposed.
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	Historically perennial water 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.

Effect Determinations

Listed Species

LAA Likely to adversely affect

NE No Effect.

NLAA May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-footed ferret

Because there are no black-tailed prairie dog colonies within the BBC Pumpkin Creek 1 project area, implementation of the proposed development should have no effect on the black-footed ferret.

4.2.5.1.2. Bald eagle

Based on the raptor nesting and bald eagle winter roost surveys and lack of suitable habitat, it is unlikely bald eagles nest or roost within the BBC Pumpkin Creek 1 project area. The proposed project should not affect bald eagle nesting or winter roosting. Bald eagle foraging within the project area is highly likely.

There are 1.5 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. BBC is proposing an additional 0.3 mile of overhead three-phase distribution lines. There are currently 0.6 miles of two-track roads and 2.8 miles of improved roads within the project area, with 1.0 mile and 3.5 miles proposed respectively.

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

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

Produced water will be stored in 3 proposed reservoirs which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.1.3. Ute's Ladies Tresses Orchid

All of the reservoirs are located within ephemeral drainages of Beaver Creek. No springs have been identified within the project area (SWCA 2006). Suitable habitat is not present within the BBC Pumpkin Creek 1 project area.

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial,

however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project should not affect the Ute ladies' - tresses orchid as suitable habitat is not present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIH	New reservoirs may increase usage during migration.
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.	NP	NI	No prairie dog towns exist in the project area.
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	MIH	Grassland habitat will be affected.
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. Black-tailed prairie dog

No black-tailed prairie dog colonies are located within the project area.

4.2.5.2.2. Greater sage-grouse

One documented sage-grouse lek is present within two miles of the project area.

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

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

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

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

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

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

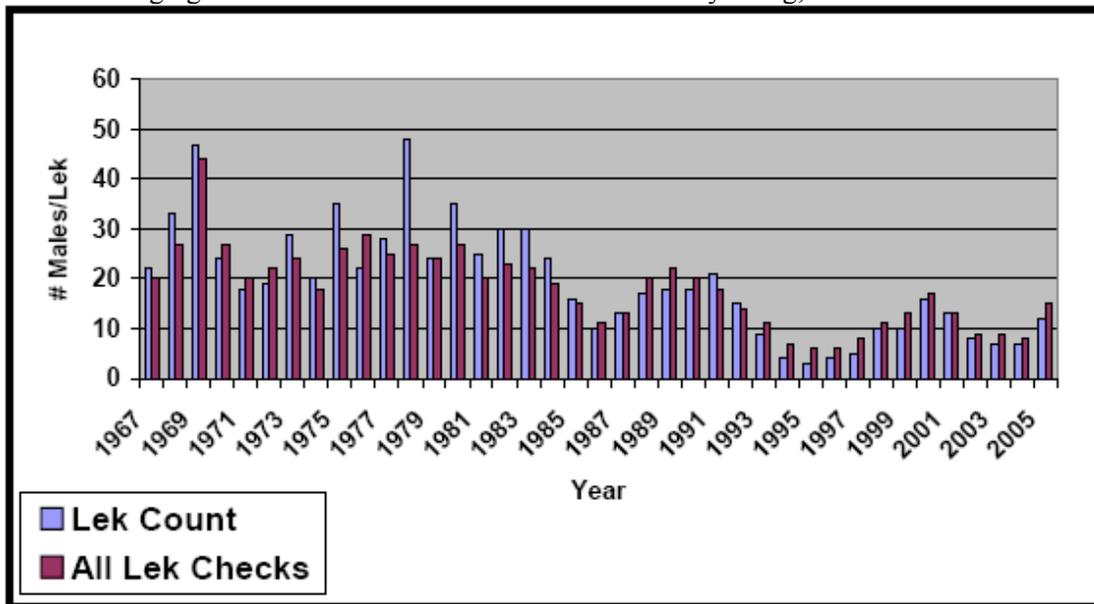
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan’s north-central Montana study area.

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

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

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



Sage-grouse populations within the PRB are declining independent of coalbed natural gas development. CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (Oedekoven 2004). The Powder River Basin Oil and Gas Project Final Environmental Impact Statement estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003). Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

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

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

4.2.5.2.3. Mountain plover

Mountain plover breeding and nesting habitat does not exist within the project area due to rolling topography and the dominance of Wyoming big sagebrush. The project should not affect mountain plovers. Additional analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus

The PRB FEIS and ROD included a programmatic mitigation measure that states, “The BLM will consult with appropriate state agencies regarding WNV. If determined to be necessary, a COA will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant.” This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNV species and its effects in Wyoming.

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

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed, and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should minimize project area and downstream potential 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 30.0 gpm per well or 510 gpm (1.14 cfs or 823 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 area was 171,423 acre-feet in 2006 (maximum production is estimated in 2006). As such, the volume of water resulting from the production of these wells is 0.5% of the total volume projected for 2006, which will result in an insignificant increase to the present volume of water produced from coal bed natural gas in the Powder River Basin. 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 204 gpm will infiltrate at or near the discharge points and impoundments (32.3 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is 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 326 to 630 feet compared to approximately 1,200 to 1,500 feet below ground surface 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 of the proposed wells.

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

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

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and is currently being revised as the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which should be approved by June, 2006. Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

Development of CBM 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 CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. Surface Water

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

Table 4.5 Comparison of Regulated Water Quality Parameters to Predicted Water

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Upper Powder River Watershed at Arvada, WY USGS #06317000 Gauging Station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		4.76 7.83	1,797 3,400
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	
WDEQ Water Quality Requirements for WYPDES Willow Creek General Watershed Permit At discharge point At Irrigation Compliance point	5,000 Na	na Na	7,500 na
Predicted Produced Water Quality Big George Coal	1,430	21.3	2,240

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 1430.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal.

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 30.0 gallons per minute (gpm) is projected is to be produced from these 17 wells, for a total of 510.0 gpm for the POD (See Table 4.5).

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

There are 5 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 3 impoundments (56.8 acre-feet) would potentially be constructed within the project area. These impoundments will disturb approximately 17.0 acres including the dam structures

and all are on-channel reservoirs. All water management facilities were evaluated for compliance with best management practices during the onsite.

The WMP for this POD proposes to direct discharge to tributaries of Beaver Creek, consequently, the volume of water produced from these wells could at a maximum result in the addition of 0.14 cfs to Beaver Creek. However, the operator proposes to limit this discharge such that no water reaches Beaver Creek. The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge in channels downstream of discharge points will potentially allow for wetland-riparian species establishment.

Phased reclamation plans for the impoundments will be submitted and approved on a site-specific; case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 17 wells is anticipated to be a total of 510.0 gpm or 1.14 cfs to impoundments and direct discharge. Since this POD will direct discharge to Beaver Creek tributaries, this action may add a maximum 1.14 cfs to the Upper Powder River flows, or less than 0.001% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River (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).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 3). Based on the area of the UT-1 and UT-2 watersheds above the POD (8.9 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 70 wells which could produce a maximum flow rate of 14,700 gpm (33 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

1. New wells will be phased in over several years, and
2. 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, 33 cfs, is much less than the runoff rate estimated from the 2-year storm event for the combined UT-1 and UT-2 drainages at 285.6 cfs. .

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

The operator has applied for a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ and has committed to providing a copy to BLM upon approval.

The following are typical effluent limitst effluent limits that are set for WYPDES permits in the area:

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	299.7 µg/l max
Dissolved manganese	629 µg/l max
Total Barium	1800 µg/l max
Chlorides	46 mg/l

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

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

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

In-channel downstream impacts are addressed in the WMP for the Pumpkin Creek I POD prepared by Western Water Consultants for Bill Barrett Corporation.

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 2005, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 83,072 acre-ft of water compared to the predicted 565,096 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 14.7% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Figure 4.1 Actual vs predicted water production in the Upper Powder River watershed

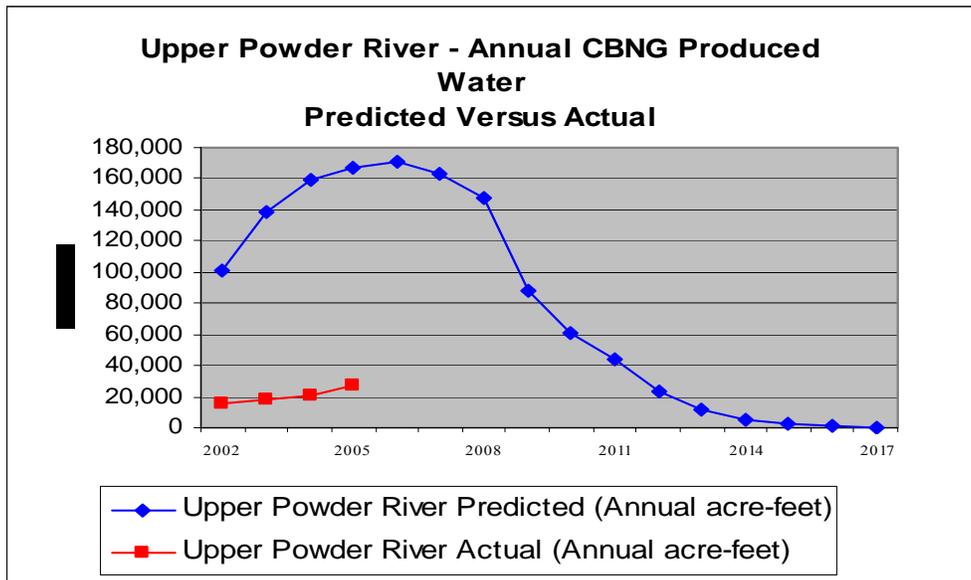


Table 4.6 Actual vs predicted water production in the Upper Powder River watershed 2005 Data Updated 4-5-06

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	27,658	16.5	83,072	14.7
2006	171,423	736,519				
2007	163,521	900,040				
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					

The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where

available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. 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 in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are anticipated to be minimal due to the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 14.7% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of WYPDES permits that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

The environmentally preferred alternative would affect no known cultural resources. The Bureau has electronically notified the Wyoming State Historic Preservation Officer (SHPO) following section V (B) of the Wyoming State Protocol on 01/09/07 that no historic properties were affected in the proposed project area.

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 Conditions of Approval* (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Sarah Needles	Acting State Historic Preservation Officer	Wyoming SHPO	No
Paul McElvery	Water Resources Eng.	Bill Barrett Corporation	Yes
Floyd Wilson	Drilling Supervisor	Bill Barrett Corporation	Yes
Greg Hoechst	Project Manager	WWC Engineering	Yes
Brad Rogers	Wildlife Biologist	US Fish and Wildlife Service	No

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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