FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Bill Barrett Corporation
BBC Pumpkin Creek II
ENVIRONMENTAL ASSESSMENT –WY-070-07-186

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Bill Barrett Corporation's Pumpkin Creek II Coal Bed Natural Gas (CBNG) POD comprised of the following 51 Applications for Permit to Drill (APDs):

#	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	BBC PUMPKIN CR II IBERLIN	12-1BG*	SWNW	1	46N	76W	WYW0311402
2	BBC PUMPKIN CR II IBERLIN	14-1BG	SWSW	1	46N	76W	WYW0311402
3	BBC PUMPKIN CR II IBERLIN	12-2BG	SWNW	2	46N	76W	WYW0311402
4	BBC PUMPKIN CR II IBERLIN	14-2BG	SWSW	2	46N	76W	WYW0311402
5	BBC PUMPKIN CR II IBERLIN	21-2BG	NENW	2	46N	76W	WYW0311402
6	BBC PUMPKIN CR II IBERLIN	23-2BG	NESW	2	46N	76W	WYW0311402
7	BBC PUMPKIN CR II IBERLIN	21-3BG	NENW	3	46N	76W	WYW161359
8	BBC PUMPKIN CR II IBERLIN	41-3BG	NENE	3	46N	76W	WYW161359
9	BBC PUMPKIN CR II MANKIN	12-14BG	SWNW	14	47N	76W	WYW28680
10	BBC PUMPKIN CR II MANKIN	14-14BG	SWSW	14	47N	76W	WYW28680
11	BBC PUMPKIN CR II MANKIN	21-14BG	NENW	14	47N	76W	WYW28680
12	BBC PUMPKIN CR II MANKIN	23-14BG	NESW	14	47N	76W	WYW28680
13	BBC PUMPKIN CR II MANKIN	32-14BG	SWNE	14	47N	76W	WYW28680
14	BBC PUMPKIN CR II MANKIN	34-14BG	SWSE	14	47N	76W	WYW28680
15	BBC PUMPKIN CR II MANKIN	41-14BG	NENE	14	47N	76W	WYW28680
16	BBC PUMPKIN CR II MANKIN	43-14BG	NESE	14	47N	76W	WYW28680
17	BBC PUMPKIN CR II MARY HEY	23-15BG	NESW	15	47N	76W	WYW0301379
18	BBC PUMPKIN CR II FEDERAL	32-22BG	SWNE	22	47N	76W	WYW0301379
19	BBC PUMPKIN CR II FEDERAL	34-22BG	SWSE	22	47N	76W	WYW0301379
20	BBC PUMPKIN CR II FEDERAL	41-22BG	NENE	22	47N	76W	WYW0301379
21	BBC PUMPKIN CR II FEDERAL	43-22BG	NESE	22	47N	76W	WYW0301379
22	BBC PUMPKIN CR II FEDERAL	14-23BG	SWSW	23	47N	76W	WYW0301379
23	BBC PUMPKIN CR II MANKIN	23-23BG	NESW	23	47N	76W	WYW0301379
24	BBC PUMPKIN CR II FEDERAL	34-23BG	SWSE	23	47N	76W	WYW0301379
25	BBC PUMPKIN CR II MANKIN	43-23BG	NESE	23	47N	76W	WYW0301379
26	BBC PUMPKIN CR II FEDERAL	12-26BG	SWNW	26	47N	76W	WYW0301379
27	BBC PUMPKIN CR II FEDERAL	14-26BG	SWSW	26	47N	76W	WYW0301379
28	BBC PUMPKIN CR II FEDERAL	21-26BG	NENW	26	47N	76W	WYW0301379
29	BBC PUMPKIN CR II FEDERAL	23-26BG	NESW	26	47N	76W	WYW0301379
30	BBC PUMPKIN CR II FEDERAL	32-26BG	SWNE	26	47N	76W	WYW0301379
31	BBC PUMPKIN CR II FEDERAL	34-26BG	SWSE	26	47N	76W	WYW0301379
32	BBC PUMPKIN CR II FEDERAL	41-26BG	NENE	26	47N	76W	WYW0301379
33	BBC PUMPKIN CR II FEDERAL	43-26BG	NESE	26	47N	76W	WYW0301379
34	BBC PUMPKIN CR II IBERLIN	14-27BG	SWSW	27	47N	76W	WYW58944
35	BBC PUMPKIN CR II FEDERAL	23-27BG	NESW	27	47N	76W	WYW58944
36	BBC PUMPKIN CR II FEDERAL	32-27BG	SWNE	27	47N	76W	WYW0301379
37	BBC PUMPKIN CR II FEDERAL	34-27BG	SWSE	27	47N	76W	WYW0301379
38	BBC PUMPKIN CR II FEDERAL	41-27BG	NENE	27	47N	76W	WYW0301379

#	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
39	BBC PUMPKIN CR II FEDERAL	43-27BG	NESE	27	47N	76W	WYW0301379
40	BBC PUMPKIN CR II IBERLIN	21-34BG	NENW	34	47N	76W	WYW71546
41	BBC PUMPKIN CR II IBERLIN	32-34BG	SWNE	34	47N	76W	WYW71546
42	BBC PUMPKIN CR II IBERLIN	41-34BG	NENE	34	47N	76W	WYW71546
43	BBC PUMPKIN CR II IBERLIN	43-34BG	NESE	34	47N	76W	WYW71546
44	BBC PUMPKIN CR II IBERLIN	12-35BG	SWNW	35	47N	76W	WYW71546
45	BBC PUMPKIN CR II FEDERAL	14-35BG	SWSW	35	47N	76W	WYW71546
46	BBC PUMPKIN CR II IBERLIN	21-35BG	NENW	35	47N	76W	WYW71546
47	BBC PUMPKIN CR II IBERLIN	23-35BG	NESW	35	47N	76W	WYW71546
48	BBC PUMPKIN CR II IBERLIN	32-35BG	SWNE	35	47N	76W	WYW71546
49	BBC PUMPKIN CR II IBERLIN	34-35BG	SWSE	35	47N	76W	WYW71546
50	BBC PUMPKIN CR II IBERLIN	41-35BG	NENE	35	47N	76W	WYW71546
51	BBC PUMPKIN CR II IBERLIN	43-35BG	NESE	35	47N	76W	WYW71546

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Mary Hey	NESW	15	47	76	2.35	3.525	WYW0301379
2	EX34-1-76	NWNW	34	47	76	18.1	27.15	WYW071546
3	P34-1-47-76	SWSW	34	47	76	15.3	22.95	Fee
4	EX35-1-47-76	SESW	35	47	76	20	30	WYW071546
5	P35-1-47-76	SWSW	35	47	76	13	19.5	WYW071546
6	P2-1-46-76	SWNW	2	46	76	20	30	WYW0311402
7	EX 11-1-47-76	SWSE	11	47	76	0.6	0.9	Fee
8	P14-1-47-76	NESE	14	47	76	15.3	22.95	WYW028680
9	P14-2-47-76	NWNE	14	47	76	17	25.5	WYW028680
10	P23-1-47-76	NESW	23	47	76	5.7	8.55	WYW0301379
11	P33-1-47-76	NENE	33	47	76	15.9	23.85	Fee
12	EX3-1-46-76	NENE	3	46	76	13.6	20.4	WYW153363
13	P3-1-46-76	SENE	3	46	76	10.8	16.2	WYW161359
14	POCP14-1-47-76	SESW	23	47	76	48.5	72.75	WYW028680

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

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

1. The Operator, in their POD, has committed to:
    - Comply with all applicable Federal, State and Local laws and regulations.
    - Obtain the necessary permits from other agencies for the drilling, completion and

production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.

- Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
- Provide water analysis from a designated reference well in each coal zone.

2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

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

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

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

Field Manager:_____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Bill Barrett Corporation
Pumpkin Creek II
PLAN OF DEVELOPMENT
WY-070-07-186

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, quantify, and produce coal bed natural gas (CBNG) on six valid federal oil and gas mineral leases issued to the applicant by the BLM. 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 Pumpkin Creek II Plan of Development (POD) for 53 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 51 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from the Big George coal seam. Proposed well house dimensions are 6 ft wide x 8 ft length 6.5 ft height. Well house color is Carlsbad Canyon, selected to blend with the surrounding vegetation. Wells are located as follows:

#	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	BBC PUMPKIN CR II IBERLIN	12-1BG*	SWNW	1	46N	76W	WYW0311402
2	BBC PUMPKIN CR II IBERLIN	14-1BG	SWSW	1	46N	76W	WYW0311402
3	BBC PUMPKIN CR II IBERLIN	12-2BG	SWNW	2	46N	76W	WYW0311402
4	BBC PUMPKIN CR II IBERLIN	14-2BG	SWSW	2	46N	76W	WYW0311402
5	BBC PUMPKIN CR II IBERLIN	21-2BG	NENW	2	46N	76W	WYW0311402
6	BBC PUMPKIN CR II IBERLIN	23-2BG	NESW	2	46N	76W	WYW0311402
7	BBC PUMPKIN CR II IBERLIN	21-3BG	NENW	3	46N	76W	WYW161359
8	BBC PUMPKIN CR II IBERLIN	41-3BG	NENE	3	46N	76W	WYW161359
9	BBC PUMPKIN CR II MANKIN	12-14BG	SWNW	14	47N	76W	WYW28680
10	BBC PUMPKIN CR II MANKIN	14-14BG	SWSW	14	47N	76W	WYW28680
11	BBC PUMPKIN CR II MANKIN	21-14BG	NENW	14	47N	76W	WYW28680
12	BBC PUMPKIN CR II MANKIN	23-14BG	NESW	14	47N	76W	WYW28680
13	BBC PUMPKIN CR II MANKIN	32-14BG	SWNE	14	47N	76W	WYW28680
14	BBC PUMPKIN CR II MANKIN	34-14BG	SWSE	14	47N	76W	WYW28680
15	BBC PUMPKIN CR II MANKIN	41-14BG	NENE	14	47N	76W	WYW28680
16	BBC PUMPKIN CR II MANKIN	43-14BG	NESE	14	47N	76W	WYW28680
17	BBC PUMPKIN CR II MARY HEY	23-15BG	NESW	15	47N	76W	WYW0301379
18	BBC PUMPKIN CR II FEDERAL	32-22BG	SWNE	22	47N	76W	WYW0301379
19	BBC PUMPKIN CR II FEDERAL	34-22BG	SWSE	22	47N	76W	WYW0301379
20	BBC PUMPKIN CR II FEDERAL	41-22BG	NENE	22	47N	76W	WYW0301379
21	BBC PUMPKIN CR II FEDERAL	43-22BG	NESE	22	47N	76W	WYW0301379
22	BBC PUMPKIN CR II FEDERAL	14-23BG	SWSW	23	47N	76W	WYW0301379
23	BBC PUMPKIN CR II MANKIN	23-23BG	NESW	23	47N	76W	WYW0301379
24	BBC PUMPKIN CR II FEDERAL	34-23BG	SWSE	23	47N	76W	WYW0301379
25	BBC PUMPKIN CR II MANKIN	43-23BG	NESE	23	47N	76W	WYW0301379
26	BBC PUMPKIN CR II FEDERAL	12-26BG	SWNW	26	47N	76W	WYW0301379
27	BBC PUMPKIN CR II FEDERAL	14-26BG	SWSW	26	47N	76W	WYW0301379
28	BBC PUMPKIN CR II FEDERAL	21-26BG	NENW	26	47N	76W	WYW0301379
29	BBC PUMPKIN CR II FEDERAL	23-26BG	NESW	26	47N	76W	WYW0301379
30	BBC PUMPKIN CR II FEDERAL	32-26BG	SWNE	26	47N	76W	WYW0301379
31	BBC PUMPKIN CR II FEDERAL	34-26BG	SWSE	26	47N	76W	WYW0301379
32	BBC PUMPKIN CR II FEDERAL	41-26BG	NENE	26	47N	76W	WYW0301379
33	BBC PUMPKIN CR II FEDERAL	43-26BG	NESE	26	47N	76W	WYW0301379
34	BBC PUMPKIN CR II IBERLIN	14-27BG	SWSW	27	47N	76W	WYW58944
35	BBC PUMPKIN CR II FEDERAL	23-27BG	NESW	27	47N	76W	WYW58944
36	BBC PUMPKIN CR II FEDERAL	32-27BG	SWNE	27	47N	76W	WYW0301379
37	BBC PUMPKIN CR II FEDERAL	34-27BG	SWSE	27	47N	76W	WYW0301379
38	BBC PUMPKIN CR II FEDERAL	41-27BG	NENE	27	47N	76W	WYW0301379
39	BBC PUMPKIN CR II FEDERAL	43-27BG	NESE	27	47N	76W	WYW0301379
40	BBC PUMPKIN CR II IBERLIN	21-34BG	NENW	34	47N	76W	WYW71546
41	BBC PUMPKIN CR II IBERLIN	32-34BG	SWNE	34	47N	76W	WYW71546
42	BBC PUMPKIN CR II IBERLIN	41-34BG	NENE	34	47N	76W	WYW71546
43	BBC PUMPKIN CR II IBERLIN	43-34BG	NESE	34	47N	76W	WYW71546
44	BBC PUMPKIN CR II IBERLIN	12-35BG	SWNW	35	47N	76W	WYW71546
45	BBC PUMPKIN CR II FEDERAL	14-35BG	SWSW	35	47N	76W	WYW71546
46	BBC PUMPKIN CR II IBERLIN	21-35BG	NENW	35	47N	76W	WYW71546

#	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
47	BBC PUMPKIN CR II IBERLIN	23-35BG	NESW	35	47N	76W	WYW71546
48	BBC PUMPKIN CR II IBERLIN	32-35BG	SWNE	35	47N	76W	WYW71546
49	BBC PUMPKIN CR II IBERLIN	34-35BG	SWSE	35	47N	76W	WYW71546
50	BBC PUMPKIN CR II IBERLIN	41-35BG	NENE	35	47N	76W	WYW71546
51	BBC PUMPKIN CR II IBERLIN	43-35BG	NESE	35	47N	76W	WYW71546

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	Mary Hey	NESW	15	47	76	2.35	3.525	WYW0301379
2	EX34-1-76	NWNW	34	47	76	18.1	27.15	WYW071546
3	P34-1-47-76	SWSW	34	47	76	15.3	22.95	Fee
4	EX35-1-47-76	SESW	35	47	76	20	30	WYW071546
5	P35-1-47-76	SWSW	35	47	76	13	19.5	WYW071546
6	P2-1-46-76	SWNW	2	46	76	20	30	WYW0311402
7	EX 11-1-47-76	SWSE	11	47	76	0.6	0.9	Fee
8	P14-1-47-76	NESE	14	47	76	15.3	22.95	WYW028680
9	P14-2-47-76	NWNE	14	47	76	17	25.5	WYW028680
10	P23-1-47-76	NESW	23	47	76	5.7	8.55	WYW0301379
11	P33-1-47-76	NENE	33	47	76	15.9	23.85	Fee
12	EX3-1-46-76	NENE	3	46	76	13.6	20.4	WYW153363
13	P3-1-46-76	SENE	3	46	76	10.8	16.2	WYW161359
14	POCP14-1-47-76	SESW	23	47	76	48.5	72.75	WYW028680

County: Campbell

Applicant: Bill Barrett Corporation

Surface Owners: Mankin, BLM, Iberlin

Project Description:
The proposed action involves the following:

- Drilling of 53 total federal CBM wells in the Big George coal zone to depths of approximately 1,300 feet. Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

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

- A Water Management Plan (WMP) within the Upper Powder River watershed where

approximately half of the CBNG discharge water from 13 discharge points will be stored in 14 stock water reservoirs and the remainder will be directly discharged into tributaries of Beaver Creek to be consumed by infiltration, evaporation, and evapotranspiration. A series of 24 existing erosion control ponds and berms (the landowner intends to build more) located on private surface will also detain water that flows downstream of the POD boundary.

- An unimproved and improved road network.

- A six mile above ground power line network is in place for conventional and fee wells. Two and ¼ miles of additional line will be constructed by a contractor. The proposed route has been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and may not be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at any of the 20 power drops that do not yet have live power.

  A storage tank of 500-1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for four months. Fuel deliveries are anticipated to be one time per week. Noise level is expected to be 100 decibels at 1 meter distance.

- A buried gas, water and power line network, and no central gathering/metering facilities or compression facilities are proposed.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

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

inspected to insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the Pumpkin Creek II POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

#	Well #	QTR	Sec	TWP	RNG	Lease	changes
1	32-22BG	SWNE	22	47N	76W	WYW0301379	follow road with pipeline.
2	34-22BG	SWSE	22	47N	76W	WYW0301379	use 10 inch poly pipe for relief culverts. Sandy soils on road may need extraordinary measures to prevent erosion.
3	43-22BG	NESE	22	47N	76W	WYW0301379	Shorten access.
4	14-23BG	SWSW	23	47N	76W	WYW0301379	Sandy soils on road may need extraordinary measures to prevent erosion.
5	34-23BG	SWSE	23	47N	76W	WYW0301379	Moved well 300' and changed access to minimize impacts to sage-grouse nesting and brood rearing habitat
6	12-26BG	SWNW	26	47N	76W	WYW0301379	2 raptor nests within 1/2 mile in line of sight. No well maintenance will be allowed 2/1-7/31 without written approval from the Buffalo BLM
7	21-26BG	NENW	26	47N	76W	WYW0301379	Well moved 480' to avoid raptor nest. Sandy soils on ridge road may need extraordinary measures to prevent erosion.
8	23-26BG	NESW	26	47N	76W	WYW0301379	BBC moved 300' to south side of road to reduce wind erosion.
9	32-26BG	SWNE	26	47N	76W	WYW0301379	Moved 300' to road to minimize impacts to sage-grouse nesting habitat.
10	34-26BG	SWSE	26	47N	76W	WYW0301379	Sandy soils on road may need extraordinary measures to prevent erosion.
11	41-26BG	NENE	26	47N	76W	WYW0301379	Moved 200' to minimize impacts to sage-grouse nesting habitat
12	43-26BG	NESE	26	47N	76W	WYW0301379	Moved 240' to minimize impacts to sage-grouse nesting habitat
13	41-27BG	NENE	27	47N	76W	WYW0301379	Moved 480' and removed reservoir to minimize impacts to sage-grouse nesting and brood rearing habitat

#	Well #	QTR	Sec	TWP	RNG	Lease	changes
14	14-35BG	SWSW	35	47N	76W	WYW71546	Moved 275' to place it behind a conventional well tank and out of sight of a raptor nest.
15	12-1BG*	SWNW	1	46N	76W	WYW0311402	Moved 150' to minimize impacts to sage-grouse nesting habitat
16	34-1BG	SWSE	1	46N	76W	WYW0311402	Moved 400' to edge of sage-grouse CSU. Changed pipeline route to use existing road and fence line.
17	12-2BG	SWNW	2	46N	76W	WYW0311402	Changed pipeline to follow road
18	23-2BG	NESW	2	46N	76W	WYW0311402	Moved well 330' to minimize impacts to sage-grouse nesting habitat
19	14-27BG	SWSW	27	47N	76W	WYW58944	Moved 60' east
20	41-34BG	NENE	34	47N	76W	WYW71546	Moved 100' to minimize impacts to sage-grouse nesting habitat
21	21-35BG	NENW	35	47N	76W	WYW71546	Moved well 220' to minimize impacts to sage-grouse nesting habitat
22	23-35BG	NESW	35	47N	76W	WYW71546	Moved well 300’ and access to minimize impacts to sage-grouse nesting habitat.
23	32-35BG	SWNE	35	47N	76W	WYW71546	Moved 700' out of view of golden eagle nest. Sandy road.
24	41-35BG	NENE	35	47N	76W	WYW71546	Moved 200' to minimize impacts to sage-grouse nesting habitat.
25	43-35BG	NESE	35	47N	76W	WYW71546	Moved 260' to adjust for the 32-35 move. Pipeline to 34-35
26	14-14BG	SWSW	14	47N	76W	WYW28680	Moved 250' to minimize impacts to raptor nest
27	23-23BG	NESW	23	47N	76W	WYW0301379	Moved 500' out of view of raptor nest.

The following wells are not being considered due to proximity of the Gilkie Ranch sage-grouse lek:

1	BBC PUMPKIN CR II IBERLIN	12-1BG*	SWNW	1	46N	76W	WYW0311402
2	BBC PUMPKIN CR II IBERLIN	23-1BG	NESW	1	46N	76W	WYW0311402

Water Management Plan:

- Reservoir 25-1 was dropped in lieu of periodic direct discharge from Outfall BC 006.
- Reservoir 35-1 was moved approximately 500 feet upstream of large cottonwood trees with a raptor nest.
- The trickle tube outlet below at Reservoir 23-1 was extended to discharge below the downstream headcut.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

2.3.2.2. Surface Water

1. Channel Crossings:
   a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
   b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
   c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.
4. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.
5. The operator will supply to the BLM copies of the WYPDES permits and approval letters for watershed permits for this POD as soon as they available from WDEQ.

2.3.2.3. Soils

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

2.3.2.4. 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. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
2. No waste material will be deposited in riparian areas, flood plains, or in natural drainage ways.
3. Soil or other material stockpiles will be located outside the active floodplain.
4. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
5. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.6. Wildlife

1. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
2. 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.
3. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
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. Mountain Plover

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

2.3.2.7.2. 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 and other facilities on a pole or building and direct them downward to illuminate key areas within the facility while minimizing the amount of light projected outside the facility.

2.3.2.9. Noise

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

2. Where noise impacts to existing sensitive receptors are an issue, noise levels will be required to be no greater than 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 form the BLM authorized officer.

2.3.3. Site specific mitigation measures

All changes made at the onsite will be followed. They have all been incorporated into the proposed action.

Surface

1. 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 this POD is Carlsbad Canyon, 2.5Y 6/2.

2. 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***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	20	2.4
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	15	1.8
Prairie sandreed (Calamovilfa longifolia)	30	3.6
Needleandthread (Hesperostipa comata ssp. comata)	20	2.4
Prairie coneflower (Ratibida columnifera)	5	0.6
White or Purple Prairie Clover (Dalea candidum, purpureum)	5	0.6
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax***(Linum lewisii)	5	0.6
Total	**100%**	**12 lbs/acre**

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.

3. To prevent rilling, and decrease impacts from vehicle traffic; 4" of aggregate will be placed where grades exceed 8%.

4. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
   Reclamation Standards:
   C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:
      a. Large rills or gullies.
      b. Perceptible soil movement or head cutting in drainages.
      c. Slope instability on, or adjacent to, the reclaimed area in question.
   C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
   C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
      a. Successful onsite establishment of species included in the planting mixture or other desirable species.
      b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
   C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

5. Please contact Bill Ostheimer Natural Resource Specialist, @ (307) 684-1117 Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Water Management:

1. The operator will contact Chris Williams (Hydrologist) 307-684-1195 when the first discharge point becomes active for this POD to enable BLM personnel to schedule future site visits to periodically observe channel conditions downstream of discharge points.

Wildlife

1. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time". The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Bill Barrett Corporation will coordinate with the BLM to determine if additional surveys will be required.

2. The following conditions will minimize impacts to raptors;
   a. No surface disturbance shall occur within ½ mile of all identified nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This affects the following wells and **associated infrastructure, pipelines, low water crossings, culverts, temporary access roads, discharge points, and overhead power and drops**;

Project elements within 0.5 miles or raptor nests.

NEST ID	UTM_E	UTM_N	QQ	Sec	T	R	**Project elements w/in 0.5 mile**
638	422265	4870870	NWSW	2	46	76	12-2, 14-2, 23-2, P2-1, P3-1
3121	422560	4876995	SWSW	14	47	76	12-14, 14-14, 23-14, 34-14, 41-22, Pit BC 007
4606	422723	4877154	SESW	14	47	76	12-14, 14-14, 23-14, 34-14, Pit BC 007
4290	422054	4877771	SENE	15	47	76	12-14
4601	420021	4878257	NWNE	16	47	76	water line to P.C. I
4759	420163	4878319	NWNE	16	47	76	water line to P.C. I
4755	420280	4876803	NENE	21	47	76	water line to P.C. I
4293	421000	4876193	SWNW	22	47	76	32-22
4756	422545	4876530	NWNW	23	47	76	14-14, 41-22, 23-23, P23-1, BC007&Pit
4603	422549	4876013	SWNW	23	47	76	41-22, 43-22, 14-23, 23-23, BC 004&005, P23-1
4757	422586	4874866	NWNW	26	47	76	14-23, 12-26, 21-26, 23-26, 32-26, 41-27, BC 005&006
4758	422612	4874813	NWNW	26	47	76	14-23, 12-26, 21-26, 23-26, 32-26, 41-27, BC 005&006
640	422629	4874696	SENW	26	47	76	12-26, 21-26, 23-26, 32-26, 41-27, BC 006
4604	421401	4874211	NESW	27	47	76	14-27, 23-27, 32-27, 34-27, 21-34
3119	420541	4873396	NENE	33	47	76	14-27, 21-34
3112	423096	4873042	SWNE	35	47	76	34-26, 12-35, 21-35, 23-35, 32-35, 41-35, 43-35, PC 004&005
3118	423186	4872911	SWNE	35	47	76	21-35, 23-35, 32-35, 34-35, 41-35, 43-35, PC 004&005
3135	422381	4872521	NWSW	35	47	76	43-34, 12-35, 14-35, 23-35, 41-3, P35-1, 35-1, PC 003&004
4294	423127	4873154	NWNE	35	47	76	34-26, 12-35, 21-35, 23-35, 32-35, 41-35, PC 004

b. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
c. Maintenance activities requiring more than checking the well must be approved by the BLM prior to a nest productivity check for the following wells: 12-26, 32-35, and 14-14.
d. Nest productivity checks shall be completed for all raptor nests within the POD listed in the table below. The productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success/production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year.

Raptor nest location and 2007 status for the project area

NEST ID	UTM_E	UTM_N	QQ	Sec	T_N	R_W	Spec	Sub	Status	Cond
638	422265	4870870	NWSW	2	46	76	UNRA	CTL	INAC	FAIR
4754	421050	4879231	NWSW	10	47	76	GHOW	CTL	ACTI	GOOD
3121	422560	4876995	SWSW	14	47	76	UNRA	CTL	INAC	FAIR
4606	422723	4877154	SESW	14	47	76	UNK	CTL	UNK	GOOD
4290	422054	4877771	SENE	15	47	76	RTHA	CTL	UNK	UNK
4601	420021	4878257	NWNE	16	47	76	UNRA	MMS	INAL	FAIR
4759	420163	4878319	NWNE	16	47	76	RTHA	MMS	ACTI	GOOD
4755	420280	4876803	NENE	21	47	76	UNRA	JUN	INAC	GOOD
4293	421000	4876193	SWNW	22	47	76	UNK	CTL	INACT	POOR
4603	422549	4876013	SWNW	23	47	76	LEOW	JUN	ACTI	GOOD
4756	422545	4876530	NWNW	23	47	76	FEHA	CLF	ACTI	GOOD
3353	424795	4874183	NWSE	25	47	76	UNRA	CTL	INAC	GOOD
640	422629	4874696	SENW	26	47	76	N/A	CTL	DNLO	UNK
4757	422586	4874866	NWNW	26	47	76	UNRA	CTL	INAC	GOOD
4758	422612	4874813	NWNW	26	47	76	UNRA	CTL	INAC	REMN
4604	421401	4874211	NESW	27	47	76	UNK	CTL	UNK	GOOD
3119	420541	4873396	NENE	33	47	76	UNRA	CTL	INAC	FAIR
4295	420168	4872348	SWSE	33	47	76	UNRA	CTL	INAC	GOOD
4752	420170	4872337	SWSE	33	47	76	UNRA	CTL	INAC	GOOD
4753	419965	4872049	SWSE	33	47	76	UNRA	CTL	INAC	GOOD
3112	423096	4873042	SWNE	35	47	76	GOEA	CTL	ACTI	GOOD
3118	423186	4872911	SWNE	35	47	76	AMKE	CTL	ACTI	UNK
3135	422381	4872521	NWSW	35	47	76	RTHA	CTL	ACTI	GOOD
4294	423127	4873154	NWNE	35	47	76	UNK	CTL	UNK	UNK

3. Where the operator ties into existing power poles, the existing pole shall be fitted to meet or exceed 2006 APLIC standards.

4. The following conditions will minimize impacts to sage-grouse**:**
    a. A survey is required for sage-grouse between April 1 and May 7, annually, within the project area for the duration of surface disturbing activities. 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 reviewed prior to surface disturbing activities.
    b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1).
    c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
    d. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 8 AM to 8 PM (Mountain Standard Time).

This will apply to the 14-1 well. Maintenance activities requiring more than checking the well must be approved by the BLM during this time period.

e. In order to protect sage-grouse nesting habitat within the POD, disturbance widths including mowing will be limited to 30 feet on access and 35 feet radius around the well for; 12-1, 14-1, 23-2, 23-15, 23-23, 43-23, 34-26, 32-27, 43-27, 41-27, 41-34, 41-35, 12-35, 23-35, 43-35, 34-35.

Project elements within 2 miles of leks for the project area

LEK NAME	Project elements w/in 2 miles
County Line N	21-3, P34-1
Gilkie Ranch	12-1, 14-1, 12-2, 14-2, 21-2, 23-2, P2-1, 41-3, 43-34, 12-35, 14-35, 23-35, 32-35, 34-35, 41-35, 43-35, PC003,004&005, P35-1
Kaufman Draw	12-14, 21-14, 23-14, 32-14, 34-14, 41-14, 43-14, BC002, P14-1, P14-2, BC007&Pit, 43-23, BC003, 43-23
Upper Kauffman Draw	23-14, 32-14, 34-14, 41-14, 43-14, BC002, P14-1, BC007&Pit, 41-22, 43-22, 14-23, 23-23, 34-23, 43-23, BC003-005, P23-1, 12-26, 14-26, 21-26, 23-26, 32-26, 34-26, 41-26, 43-26, 41-27, 21-35, 32-35, 41-35.

2.4. Alternatives considered but not analyzed in detail

Land application of produced water within the Pumpkin Creek II has been considered. Land application would involve applying the water to cropland at agronomic rates through an irrigation system. Land application is at best a seasonal approach and would require the construction of several reservoirs to store produced water during the non-irrigation season. Due to the high construction and operating costs and lack of landowner interest, land application is not a primary strategy, but several sites are available and the landowner may consider using water from reservoirs for this purpose in the future.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on December 22, 2006. Field inspections of the proposed Pumpkin Creek II CBNG project were conducted on June 26, 27 and 28 2007 by:
Bill Ostheimer; BLM
Chris Williams; BLM
Paul McElvery; BBC
Forrest Todd, WWC Engineering

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species		x		Bill Ostheimer
Floodplains		x		Bill Ostheimer,
Wilderness Values		x		Bill Ostheimer
ACECs		x		Bill Ostheimer
Water Resources	x			Chris Williams
Air Quality	x			Bill Ostheimer
Cultural or Historical Values		x		BJ Earle
Prime or Unique Farmlands		x		Bill Ostheimer
Wild & Scenic Rivers		x		Bill Ostheimer
Wetland/Riparian		x		Bill Ostheimer
Native American Religious Concerns		x		BJ Earle
Hazardous Wastes or Solids		x		Bill Ostheimer
Invasive, Nonnative Species	x			Bill Ostheimer
Environmental Justice		x		Bill Ostheimer

3.1. Topographic Characteristics of Project Area

The proposed project is located 30 miles southeast of Gillette, Wyoming. The project covers all or part of sections 14, 15, 22, 23, 26, 27, 34, and 35 of Township 47 North and Range 76 West and Sections 1, 2, 3 of T. 46N and R. 76W, Sixth Principal Meridian.

The topography is predominantly rounded upland ridges with ephemeral draws leading away from the Beaver Creek / Pumpkin Creek divide. Slopes are gradual until ephemeral draws are encountered where short 45-65 degree side slopes with no vegetation along draws are common. Land cover within the project area consists primarily of Wyoming big sagebrush (*Atremesia tridentata wyomingensis*). Areas within and surrounding the project area contain some juniper; lone scattered cottonwoods are present in some drainages.

3.2. Vegetation & Soils

Species typical of a sagebrush / grassland comprise the project area flora. Species observed throughout the project area include Wyoming big sagebrush with an understory of wheatgrasses (*Agropyron sp.*), and forbs. Where sagebrush was not dominant, invasive brome grasses (*Bromus japonicus and B. tectorum*) or blue grama (*Bouteloua gracilis*) were prolific. Differences in dominant species within the project area vary with soil type, aspect, topography and land use.

Using the Natural Resource Conservation Service, (USDA NRCS,), 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 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, 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.

3.2.1. Wetlands/Riparian

Beaver and Pumpkin Creeks, as well as their major tributaries have patchy mature cottonwood gallery forests. Within the POD, section 35 and the northeastern ¼ of 34 (T47N R76W) contain mature cottonwood stands of 5 – 10 trees. Individual cottonwoods can be found in most of the larger draws.

3.2.2. Invasive Species

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

- black henbane

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

- Salt cedar

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

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Western EcoSystems Technology, Inc in 2006 (WEST 2006). Surveys were updated by Big Horn Environmental Consultants

in 2007 (BHEC 2007). Surveys for greater sage-grouse and plains sharp-tailed grouse on April 4, 14, 21 2006 for new leks and April 12, May 2, May 5, 2006 for known leks. 2007 surveys were April 16, 17, 25, 28, and May 4; the project area was ground searched for raptor nests and prairie dog colonies on May 5, 11, 13 2006. 2007 survey dates were not provided. Protocol surveys were conducted for mountain plover in 2007.

A BLM biologist conducted field visits on June 26, 27 and 28, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the project area include 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 to the north and Pumpkin Creek to the south. Both Beaver and Pumpkin Creek are historically ephemeral tributaries of the Powder River. In recent years water produced from CBNG development has changed portions of each creek into perennial streams capable of supporting both native and non-native fish.

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). Migratory bird species of management concern observed by BHEC and BLM include lark bunting, loggerhead shrike, brewers sparrow, sage thrasher, chestnut-collared longspur, vesper sparrow, and lark sparrow.

3.3.4. Raptors

Twenty raptor nest sites were identified by Big Horn Environmental Consultants (BHEC 2007) and BLM within 0.5 mile of the project area, of these eight nests were active in 2007. Of those eight active nests, three were red-tailed hawks, one golden eagle, one ferruginous hawk, one great-horned owl, one long-eared owl, and one American kestrel.

Table 3.2. Documented raptor nests within the project area in 2007.

NEST ID	UTM_E	UTM_N	QQ	Sec	T_N	R_W	Spec	Sub	Status	Condition
638	422265	4870870	NWSW	2	46	76	Unknown	CTL	INAC	FAIR
4754	421050	4879231	NWSW	10	47	76	Great-horned owl	CTL	ACTI	GOOD
3121	422560	4876995	SWSW	14	47	76	Unknown	CTL	INAC	FAIR
4606	422723	4877154	SESW	14	47	76	Unknown	CTL	UNK	GOOD
4290	422054	4877771	SENE	15	47	76	Red-tailed hawk	CTL	UNK	UNK
4601	420021	4878257	NWNE	16	47	76	Unknown	MMS	INAL	FAIR
4759	420163	4878319	NWNE	16	47	76	Red-tailed hawk	MMS	ACTI	GOOD
4755	420280	4876803	NENE	21	47	76	Unknown	JUN	INAC	GOOD
4293	421000	4876193	SWNW	22	47	76	Unknown	CTL	INACT	POOR
4603	422549	4876013	SWNW	23	47	76	Long-eared owl	JUN	ACTI	GOOD
4756	422545	4876530	NWNW	23	47	76	Ferruginous Hawk	CLF	ACTI	GOOD
3353	424795	4874183	NWSE	25	47	76	Unknown	CTL	INAC	GOOD
640	422629	4874696	SENW	26	47	76	N/A	CTL	DNLO	UNK
4757	422586	4874866	NWNW	26	47	76	Unknown	CTL	INAC	GOOD
4758	422612	4874813	NWNW	26	47	76	Unknown	CTL	INAC	REMN
4604	421401	4874211	NESW	27	47	76	Unknown	CTL	UNK	GOOD
3119	420541	4873396	NENE	33	47	76	Unknown	CTL	INAC	FAIR
4295	420168	4872348	SWSE	33	47	76	Unknown	CTL	INAC	GOOD
4752	420170	4872337	SWSE	33	47	76	Unknown	CTL	INAC	GOOD
4753	419965	4872049	SWSE	33	47	76	Unknown	CTL	INAC	GOOD
3112	423096	4873042	SWNE	35	47	76	Golden eagle	CTL	ACTI	GOOD
3118	423186	4872911	SWNE	35	47	76	Am. Kestrel	CTL	ACTI	UNK
3135	422381	4872521	NWSW	35	47	76	Red-tailed hawk	CTL	ACTI	GOOD
4294	423127	4873154	NWNE	35	47	76	Unknown	CTL	UNK	UNK

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

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

One three acre black-tailed prairie dog colony was identified during site visits by WEST within the project area in the SWSE of Section 1 (T46NR76N). One colony of 100 acres is located approximately 1.5 miles from the POD and 5.5 miles from the town mentioned above. Due to the lack of sufficient prairie dog colonies, black-footed ferret habitat is not present within the project area.

3.3.5.1.2. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

The project area is drained by tributaries of Beaver and Pumpkin Creeks, which are historically ephemeral tributaries of the Powder River. Suitable orchid habitat is not present within the project area due to lack of perennial water and clay soils (WEST 2006, BHEC 2007).

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. Bald eagle

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

Bald eagle nesting habitat is generally areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and

lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

The project has marginal nesting and roosting habitat. The BLM did not require surveys in 2006 or 2007 for the POD. One stand of mature cottonwoods in section 35 (T46N R76W) could be attractive to eagles, particularly in the winter, if the landowner has sheep in the area. Pumpkin and Cottonwood Creeks do contain potential roosting and nesting habitat composed of mature cottonwoods. The closest potential roosting and nesting habitat in Pumpkin and Cottonwood Creeks is 0.9 and 1.4 miles respectively from POD infrastructure. The BLM data base indicates occasional bald eagle use within a mile of the project.

3.3.5.2.2. Black-tailed prairie dog

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

One three acre black-tailed prairie dog colony was identified during site visits by WEST within the project area in the SWSE of Section 1 (T46NR76N). One colony of 100 acres is located approximately 1.5 miles from the POD and 5.5 miles from the town mentioned above.

3.3.5.2.3. 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 throughout the project area. One hen and two chicks were seen 60 meters west of the 34-23 well location. BLM records identified six sage grouse leks within 3 miles of the POD. These leks are identified below.

Table 3.3. **Sage-grouse lek(s) surrounding the** Pumpkin Creek II **project area.**

LEK NAME	2007 Peak Males	QQ	Q	SEC	TWN	RNG	UTM_E	UTM_N	Aprox. Distance to POD
County Line N	11	SE	NE	5	46	76	418804	4871243	2 miles
County Line	UNK	NW	SE	16	46	76	420039	4867883	2.2 miles
Beaver Creek	24	SW	NE	4	47	76	420602	4881120	2 miles
Gilkie Ranch	12	SE	SW	1	46	76	424580	4870600	In POD
Kaufman Draw	76	SE	NW	18	47	75	425629	4878069	1 mile
Upper Kauffman Draw	7	SE	SE	24	47	76	425059	4875473	¾ mile

3.3.5.2.4. Mountain plover

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

Suitable mountain plover habitat is not present within the project area with the exception of oil well pads. The single prairie dog colony noted by WEST in 2006 contained grasses over six inches in the summer of 2007. The POD was protocol surveyed for mountain plover in 2007 with none found. (BHEC 2007)

3.4. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007	119	20	None reported	1

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

Although most of the attention has been focused on human health issues, WNv has had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNv had been detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations have incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNv. During 2003, 36 raptors were documented to have died from WNv in Wyoming including golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, Cooper's hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson's hawk (Cornish et al. 2003). Actual mortality is likely to be greater.

Population impacts of WNv on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNv in the PRB in 2003. While birds infected with WNv have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

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

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

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

3.5. Water Resources

The project area is within the Upper Powder River drainage system. The northern half of POD area is within the Beaver Creek drainage and southern half is within the Pumpkin Creek drainage, both major tributaries to the Powder River. Both Beaver and Pumpkin Creek were historically ephemeral, but recent contributions of water produced from CBNG development have changed some reaches of each creek to perennial flow conditions.

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 30 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 0 to 870 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 and Pumpkin Creek drainages as discussed above, which are within the Upper Powder River watershed. All tributaries to the major drainages in the POD area are ephemeral (flowing only in response to a precipitation event or snow melt). The channels range from well vegetated grassy swales without defined bed and banks, to large drainage ways with well-defined channels and floodplains within valleys deeply incised into the surrounding terrain.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in μmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBNG produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the 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 Pumpkin Creek II project prior to on-the-ground project work (BFO project #70070065, SWCA for Bill Barrett: Pumpkin Creek POD II). A total of 11 sites and 18 Isolated Resources were located and evaluated. No resources of interest to Native American cultural groups or Traditional Cultural Properties are known to occur in the project area.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48 CA 1708	Historic debris	Not eligible
48 CA 4839	Lithic, Historic debris	Not eligible
48 CA 5188	Historic homestead	Eligible
48 CA 6062	Lithic, Historic debris	Not eligible
48 CA 6181	Historic cairn	Not eligible
48 CA 6183	Occupation	Eligible
48 CA 6185	Historic debris	Not eligible
48 CA 6186	Historic debris	Not eligible
48 CA 6187	Historic debris	Not eligible
48 CA 6192	Historic cairn	Not eligible
48 CA 6408	Lithic	Not eligible
NA	18 Isolates or Isolated Resources	Not eligible

The project area is mapped as Tertiary Wasatch, with a Paleontological sensitivity rating of 5, a high ranking. No Paleontological localities are reported in the area, probably due to limited research. Medium sized to micro-mammals, turtles and crocodiles, and other reptiles constitute the principal Paleontological finds in this formation.

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 51 proposed well locations, 8 are on existing or reclaimed conventional well pads and the rest can be drilled without a well pad being constructed. Surface disturbance associated with the drilling of wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 10 x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 51 wells would involve approximately 0.1 acre/well for 5.1 total acres (BBC 2006).

Approximately 0.25 miles of improved roads would be constructed to provide access to various well locations resulting in 1.2 acres of disturbance. Approximately 12.0 miles of new and existing two-track trails would be utilized to access well sites resulting in 42 acres of disturbance. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.7 miles of pipeline would be constructed outside of corridors resulting in 6.2 acres disturbance. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity is regained and soil stability maximized (BBC 2006).

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 (BBC 2006).

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad Constructed Pad	51	0.1/acre or Site Specific	5.1	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments On-channel Off-channel Water Discharge Points	14 13 1 12	 Site Specific Site Specific Site Specific or 0.01 ac/WDP	324.5 251.5 72.8 0.24	Long Term
Channel Disturbance Headcut Mitigation* Channel Modification	 0 0	 Site Specific Site Specific	 0.0 0.0	
Improved Roads No Corridor With Corridor	0.24	40' Width or Site Specific	1.2	Long Term
2-Track Roads	12.0	12' Width or Site Specific	42	Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
No Corridor With Corridor		20' Width or Site Specific		
Pipelines No Corridor With Corridor	1.7	30' Width or Site Specific	6.2	Short Term
Buried Power Cable No Corridor		12' Width or Site Specific		Short Term
Overhead Powerlines	2.2	15' Width	7.9	Long Term
Additional Disturbance		Site Specific	0	
Total			386.6	

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

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment immediately downstream.

Flow contributions from CBNG discharge from the Pumpkin Creek II POD are not expected to have negative impacts because Beaver Creek and Pumpkin Creek already receives flow from other CBNG development and the contributed flow will likely be small because numerous in-channel depressions built by a downstream landowner will capture most of the flow.

Direct discharge of CBNG produced water to tributaries of Beaver Creek within the POD area will create periods stream flow in three ephemeral tributaries to Beaver Creek of one month or less. In between these discharge periods the channels will be allowed to dry. CBNG water will also be periodically released from several reservoirs in the POD to ephemeral tributaries of Pumpkin Creek and Beaver Creek. This periodic release of water is meant to limit changes to riparian species composition by limiting the period when plant root zones are inundated. However, other species more adapt to wet channel conditions such as foxtail barley, sedges, and tamarisk may out compete more desirable grazing species such as western wheatgrass. As well, soil chemistry in channel bottom areas may change with exposure to CBNG discharge and become more salt loaded so that salt tolerant plant species are favored. Channels will monitored to document channel and riparian species changes. The affect to cottonwood stands should be minimal because they are mostly found along the main stem of Beaver Creek and Pumpkin Creek where alluvial groundwater level fluctuations due to CBNG discharges will be very small because these streams already receive water from other upstream CBNG development. Periodic or pulse release of water from reservoirs instead of continuous discharge should limit impacts to downstream cottonwoods in ephemeral draws.

4.1.2. Invasive Species

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

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

Salt cedar (*Tamarix spp*) was seen on the POD at existing reservoir locations. This species can be controlled within the POD boundaries and would be effective since there POD is located at the head of drainages so no seed sources would repopulate the area.

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

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Beaver Creek and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Watershed.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, 386 acres of 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 contained in reservoirs and discharged into ephemeral tributaries of Cottonwood and Pumpkin Creeks, both historically ephemeral tributaries of the Powder River. Little, if any project water is expected to reach either Cottonwood or Pumpkin Creek. Any augmentation of those creeks' flows would be negligible.

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately 1.3 cfs of project treated water to an average flow of 30 cfs into the Powder River is unlikely to affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

4.2.2.1. Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts,

please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

Table 4.2. Wells within close proximity to documented raptor nests within the project area (Timing limitations will apply to these wells).

NEST ID	UTM_E	UTM_N	QQ	Sec	T	R	**Project elements w/in 0.5 mile**
638	422265	4870870	NWSW	2	46	76	12-2, 14-2, 23-2, P2-1, P3-1
3121	422560	4876995	SWSW	14	47	76	12-14, 14-14, 23-14, 34-14, 41-22, Pit BC 007

NEST ID	UTM_E	UTM_N	QQ	Sec	T	R	**Project elements w/in 0.5 mile**
4606	422723	4877154	SESW	14	47	76	12-14, 14-14, 23-14, 34-14, Pit BC 007
4290	422054	4877771	SENE	15	47	76	12-14
4601	420021	4878257	NWNE	16	47	76	water line to P.C. I
4759	420163	4878319	NWNE	16	47	76	water line to P.C. I
4755	420280	4876803	NENE	21	47	76	water line to P.C. I
4293	421000	4876193	SWNW	22	47	76	32-22
4756	422545	4876530	NWNW	23	47	76	14-14, 41-22, 23-23, P23-1, BC007&Pit
4603	422549	4876013	SWNW	23	47	76	41-22, 43-22, 14-23, 23-23, BC 004&005, P23-1
4757	422586	4874866	NWNW	26	47	76	14-23, 12-26, 21-26, 23-26, 32-26, 41-27, BC 005&006
4758	422612	4874813	NWNW	26	47	76	14-23, 12-26, 21-26, 23-26, 32-26, 41-27, BC 005&006
640	422629	4874696	SENW	26	47	76	12-26, 21-26, 23-26, 32-26, 41-27, BC 006
4604	421401	4874211	NESW	27	47	76	14-27, 23-27, 32-27, 34-27, 21-34
3119	420541	4873396	NENE	33	47	76	14-27, 21-34
3112	423096	4873042	SWNE	35	47	76	34-26, 12-35, 21-35, 23-35, 32-35, 41-35, 43-35, PC 004&005
3118	423186	4872911	SWNE	35	47	76	21-35, 23-35, 32-35, 34-35, 41-35, 43-35, PC 004&005
3135	422381	4872521	NWSW	35	47	76	43-34, 12-35, 14-35, 23-35, 41-3, P35-1, 35-1, PC 003&004
4294	423127	4873154	NWNE	35	47	76	34-26, 12-35, 21-35, 23-35, 32-35, 41-35, PC 004

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. At the onsite six wells were moved either out of line of sight or to an acceptable distance (usually over ¼ mile) from raptor nests. Maintenance activities that consist of more than a pumper in a pickup checking the wells at wells 12-26, 32-35, and 14-14 could disrupt breeding activities if nests # 640, 2112, or 3121 are active. A condition of approval restricting maintenance at these well, if the nests are active, will minimize the risk of disrupting breeding activities.

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects to Threatened and Endangered Species are provided in Table 4.3. and further discussed following the table.

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Two small prairie dog towns present.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	No known populations, surveys completed

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

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

4.2.5.1.1. Black-footed ferret

The proposed development will have **no effect** on the black-footed ferret. Only one prairie dog town, totaling 3 acres was identified within the project. Three acres is insufficient to support ferrets.

4.2.5.1.2. Ute's Ladies'-Tresses Orchid

The proposed action will discharge water into drainages, however those drainages do not contain suitable orchid habitat (BHEC 2007). The POD was surveyed for suitable habitat and surveys for the plant were performed in any potentially suitable habitat that could be impacted by the proposed action or its produced water WEST 2006, BHEC 2007). Produced water may create suitable habitat for the species, however there is no seed source in the action area. There will be **no effect** to Ute ladies'-tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

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

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

4.2.5.2.1. Bald eagle

There are 2.2 miles of proposed overhead distribution lines within the project area. All proposed power will be constructed in compliance with the 2006 Avian Power Line Interaction Committee's (APLIC) suggested practices and with the Service's standards (USFWS 2007). There is existing power in the project area serving ranch operations and conventional oil wells. These older lines may not be in compliance with current APLIC standard. Where BBC proposes to tie into these existing lines, the existing pole that is used shall be upgraded to meet 2006 APLIC standards.

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

Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. Typically two-tracks and improved project roads pose minimal collision risk In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The proposed project will increase traffic on Sate Highways 387 and 50, which may result in bald eagle / vehicle strikes in the winter when migratory eagles are in the area.

Produced water will be stored in 12 reservoir(s) which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect or CBNG reservoirs on eagles are unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.2.2. Black-tailed prairie dog

No infrastructure will be located within the 3 acre black tailed prairie dog town. No impact to black tailed prairie dogs are anticipated

4.2.5.2.3. Greater sage-grouse

Approximately 380 acres of greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, power lines, reservoirs and other infrastructure. 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). At the onsite, the operator and BLM moved ten well locations to minimize impacts to nesting and brood-rearing habitat. In addition, the 34-1, 23-1 wells will not be approved in order to protect the Gilkie Ranch lek. Both these wells were within a ¼ mile of this lek and access to 34-1 was through the lek. Visitation and maintenance at the 14-1 will be limited during the breeding season due to

its proximity (< 0.5 mile) to the Gilkie Ranch Lek. In order to protect nesting habitat within the POD, disturbance widths including mowing will be limited to 30 feet on access and 35 feet radius around the well for; 12-1, 14-1, 23-2, 23-15, 23-23, 43-23, 34-26, 32-27, 43-27, 41-27, 41-34, 41-35, 12-35, 23-35, 43-35, 34-35.

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

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

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

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

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

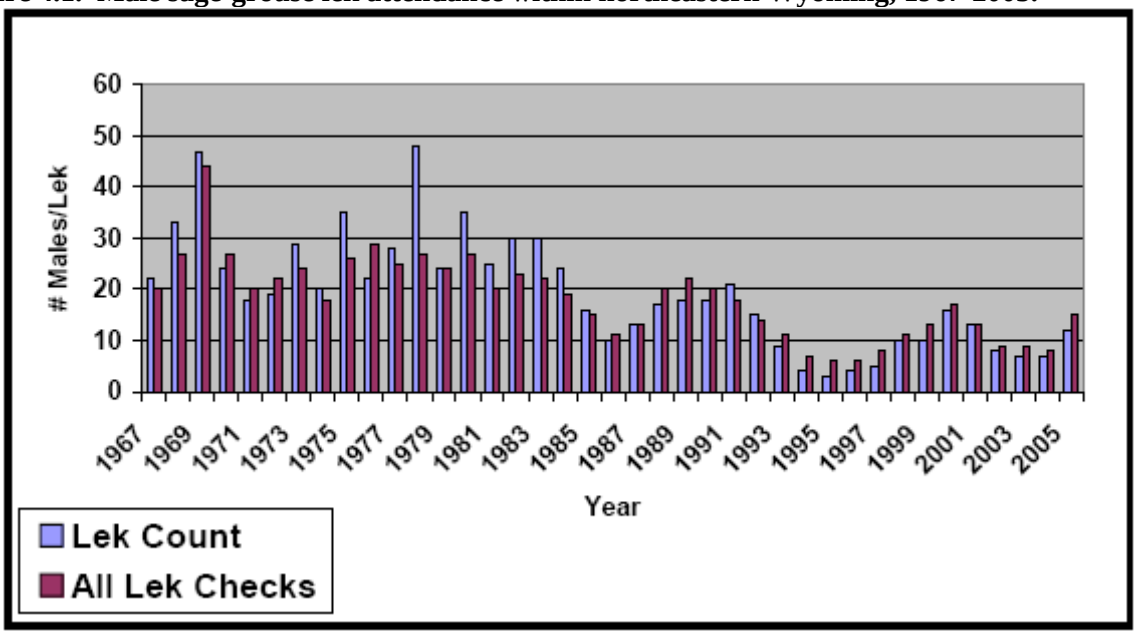
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

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

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

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

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



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

population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

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

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

The operator worked with the BLM to avoid breeding and nesting habitats wherever possible. If impacts were unavoidable then they were minimized.

4.2.5.2.4. Mountain plover

Suitable mountain plover habitat within the project area is limited to one three acre prairie dog town . The project should not affect mountain plovers since none were found during protocol surveys and the small prairie dog town will not be impacted.

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

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

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

The WMP used 53 wells in the hydrology analysis for the POD, and the values in this section are based on that analysis, whereas 51 wells were finally approved. The maximum water production is predicted to be 15.0 gpm per well or 795.0 gpm (1.8 cfs or 1,285 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 0.7% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 318 gpm will infiltrate at or near the discharge points and impoundments (513 acre feet per year), however this value is probably high because approximately half of the CBNG water for this POD will be directly discharged to area drainages where water will be lost to evapotranspiration. Discharge 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 0 to 870 feet compared to 1,200 feet to 1,500 feet to the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

the coal. The model projects that this initial recovery period would occur over 25 years." (PRB FEIS page 4-38).

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

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows typical 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 (typical) At discharge point	 5,000	 na	 7,500
Predicted Produced Water Quality Big George Coal Zone	 1,190	 13	 1,860

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 1,190.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 15.0 gallons per minute (gpm) is projected is to be produced from these 51 wells, for a total of 795.0 gpm for the POD. See Table 4.5 .

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

There are 13 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, 14 impoundments (216 acre feet) would potentially be constructed within the project area. These impoundments will disturb approximately 324 acres including the dam structures. Of these water impoundments, 13 would be on-channel reservoirs disturbing 251.5 acres, and 1 would be off-channel ponds disturbing 72.8 acres. The off-channel impoundments would result in evaporation and infiltration of CBNG water. Criteria identified in "Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming" (WDEQ, 2002) was used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Since water produced from these wells will be stored in reservoirs and periodically released to channels or it is directly discharged to channels which may result in may result in the addition of 1.8 cfs outside of the POD area (not subtracting infiltration, evaporation and evapotranspiration losses). The

contributed flow rate could be lower if direct discharge water is fully captured flows in the series of depressions downstream of the POD boundary. The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed change in ephemeral draws through 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 51 wells is anticipated to be a total of 795.0 gpm or 1.8 cfs to impoundments (most will be periodically drained) and direct discharge. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and potential total discharge of water to area drainages, the produced water re-surfacing in Beaver Creek and Pumpkin Creek from this action (1.8 cfs) may add a maximum 1.44 cfs to the flows, or 2.0% of the predicted total CBNG produced water contribution. 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 5). The Pumpkin Creek POD is located in headwater areas of tributaries to Beaver and Pumpkin Creeks. Based on the area of the tributaries to Beaver Creek watershed above the POD (3,561 acres) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 45 wells which could produce a maximum flow rate of 225 gpm (0.5 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 0.5 cfs, is much less than the volume of runoff estimated from the 2-year storm event for tributaries to Beaver Creek of 354 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 obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

Typical permit effluent limits are below (multiple WYPDES permits are pending for this POD):

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
Radium 226	1 pCi/l max
Dissolved iron	299.7 µg/l max
Dissolved manganese	629 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

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

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

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

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

In-channel downstream impacts are addressed in the WMP for the Pumpkin Creek II POD prepared by SWCA Environmental Consultants for BBC.

4.4.2.1. Surface Water Cumulative Effects

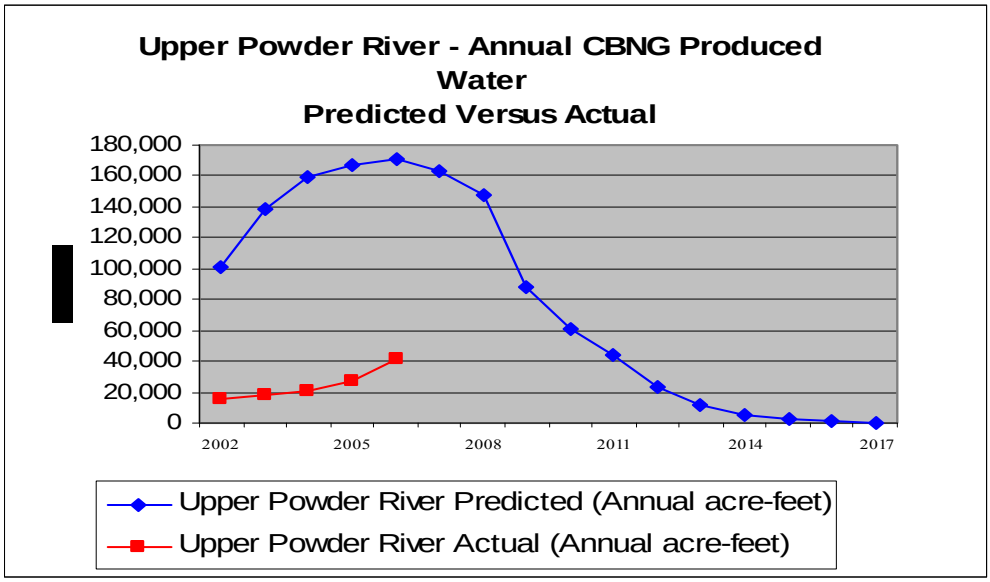
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2006, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 736,519 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1 following. This volume is 16.8 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040				
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**		**123,984**			

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



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced

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

The PRB FEIS states, "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 within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

No National Register eligible historic properties are in areas of effect, and two non-eligible sites will have minor impacts. Since the undertaking will not affect any eligible historic properties, cultural clearance is recommended for this undertaking.

No eligible historic properties are located in Areas of Effect within the Bill Barrett: Pumpkin Creek II POD, and no eligible historic properties will be affected by proposed developments. However, if previously unreported cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the ***Standard COA*** (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brad Rogers	Fish and Wildlife Biologist	US Fish and Wildlife Service	Yes

6. OTHER PERMITS REQUIRED

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

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