

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

Lance Oil & Gas INC
Powder Valley Unit Delta

ENVIRONMENTAL ASSESSMENT –WY-070-EA08-143

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil & Gas INC’s Powder Valley Unit (PVU) Delta Coal Bed Natural Gas (CBNG) POD comprised of the following 44 Applications for Permit to Drill (APDs):

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	POWDER VALLEY U DELTA FED	13-7	NWSW	7	49N	77W	WYW152613
2	POWDER VALLEY U DELTA FED	14-7*	SWSW	7	49N	77W	WYW152613
3	POWDER VALLEY U DELTA FED	34-7	SWSE	7	49N	77W	WYW152613
4	POWDER VALLEY U DELTA PVU	22-19	SENE	19	50N	77W	WYW134924
5	POWDER VALLEY U DELTA PVU	41-19	NENE	19	50N	77W	WYW134924
6	POWDER VALLEY U DELTA PVU	42-19	SENE	19	50N	77W	WYW134924
7	POWDER VALLEY U DELTA PVU	43-19	NESE	19	50N	77W	WYW134924
8	POWDER VALLEY U DELTA PVU	34-33	SWSE	33	50N	77W	WYW149151
9	POWDER VALLEY U DELTA PVU	42-33	SENE	33	50N	77W	WYW149151
10	POWDER VALLEY U DELTA PVU	44-22	SESE	22	50N	78W	WYW143880
11	POWDER VALLEY U DELTA PVU	12-23	SWNW	23	50N	78W	WYW143880
12	POWDER VALLEY U DELTA PVU	23-23	NESW	23	50N	78W	WYW143880
13	POWDER VALLEY U DELTA FADDIS-K	32-23	SWNE	23	50N	78W	WYW140724
14	POWDER VALLEY U DELTA RUBY	34-23	SWSE	23	50N	78W	WYW140724
15	POWDER VALLEY U DELTA RUBY	43-23	NESE	23	50N	78W	WYW140724
16	POWDER VALLEY U DELTA FED	12-24	SWNW	24	50N	78W	WYW140724
17	POWDER VALLEY U DELTA PVU	31-24	NWNE	24	50N	78W	WYW141418
18	POWDER VALLEY U DELTA PVU	32-24	SWNE	24	50N	78W	WYW141418
19	POWDER VALLEY U DELTA PVU	41-24	NENE	24	50N	78W	WYW141418
20	POWDER VALLEY U DELTA PVU	13-25	NWSW	25	50N	78W	WYW146922
21	POWDER VALLEY U DELTA PVU	11-26	NWNW	26	50N	78W	WYW146921
22	POWDER VALLEY U DELTA PVU	24-26	SESW	26	50N	78W	WYW146923
23	POWDER VALLEY U DELTA PVU	32-26	SWNE	26	50N	78W	WYW146921
24	POWDER VALLEY U DELTA PVU	34-26	SWSE	26	50N	78W	WYW146922
25	POWDER VALLEY U DELTA PVU	41-26	NENE	26	50N	78W	WYW146921
26	POWDER VALLEY U DELTA PVU	44-26	SESE	26	50N	78W	WYW146922
27	POWDER VALLEY U DELTA FED	31-27	NWNE	27	50N	78W	WYW152616
28	POWDER VALLEY U DELTA FED	32-27	SWNE	27	50N	78W	WYW152616
29	POWDER VALLEY U DELTA PVU	12-34	SWNW	34	50N	78W	WYW146923
30	POWDER VALLEY U DELTA PVU	14-34	SWSW	34	50N	78W	WYW142843
31	POWDER VALLEY U DELTA PVU	21-34	NENW	34	50N	78W	WYW146923
32	POWDER VALLEY U DELTA PVU	23-34	NESW	34	50N	78W	WYW142843
33	POWDER VALLEY U DELTA PVU	34-34	SWSE	34	50N	78W	WYW142843
34	POWDER VALLEY U DELTA PVU	41-34	NENE	34	50N	78W	WYW146923

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
35	POWDER VALLEY U DELTA PVU	42-34	SENE	34	50N	78W	WYW146923
36	POWDER VALLEY U DELTA PVU	43-34	NESE	34	50N	78W	WYW142843
37	POWDER VALLEY U DELTA PVU	12-35	SWNW	35	50N	78W	WYW146925
38	POWDER VALLEY U DELTA PVU	14-35D	NESW	35	50N	78W	WYW146925
39	POWDER VALLEY U DELTA PVU	21-35	NENW	35	50N	78W	WYW146925
40	POWDER VALLEY U DELTA PVU	23-35	NESW	35	50N	78W	WYW146925
41	POWDER VALLEY U DELTA PVU	32-35	SWNE	35	50N	78W	WYW146925
42	POWDER VALLEY U DELTA PVU	34-35	SWSE	35	50N	78W	WYW146925
43	POWDER VALLEY U DELTA PVU	41-35	NENE	35	50N	78W	WYW146925
44	POWDER VALLEY U DELTA PVU	43-35	NESE	35	50N	78W	WYW146925

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
Lance Oil & Gas INC
Powder Valley Unit Delta
PLAN OF DEVELOPMENT
WY-070-EA08-143**

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to produce coal bed natural gas (CBNG) on 13 federal oil and gas mineral leases issued to the applicant by the BLM.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Lance Oil & Gas INC’s PVU Delta Plan of Development (POD) for 51 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 51 wells proposed within this POD, on 80 acre spacing pattern with 1 well per location. One location will have twin wells with one being a directional drilled well. Each of the 51 wells will produce from 2 coal seams (Big George and Werner). Well head production facilities will be housed in a 42 inch cubical well head enclosure.

Wells are located as follows:

	Well Name	Well #	Qtr	Sec	Twp	Rng	Lease #
1	POWDER VALLEY DELTA FED	14-7*	SWSW	7	49N	77W	WYW152613
2	POWDER VALLEY U DELTA FED	23-7	NESW	7	49N	77W	WYW152613
3	POWDER VALLEY U DELTA FED	34-7	SWSE	7	49N	77W	WYW152613
4	POWDER VALLEY U DELTA PVU	12-19	SWNW	19	50N	77W	WYW134924
5	POWDER VALLEY U DELTA PVU	21-19	NENW	19	50N	77W	WYW134924
6	POWDER VALLEY U DELTA PVU	32-19	SWNE	19	50N	77W	WYW134924
7	POWDER VALLEY U DELTA PVU	41-19	NENE	19	50N	77W	WYW134924
8	POWDER VALLEY U DELTA PVU	43-19	NESE	19	50N	77W	WYW134924
9	POWDER VALLEY U DELTA PVU	13-33	NWSW	33	50N	77W	WYW149151
10	POWDER VALLEY U DELTA PVU	42-33	SENE	33	50N	77W	WYW149151
11	POWDER VALLEY U DELTA PVU	12-23	SWNW	23	50N	78W	WYW143880
12	POWDER VALLEY U DELTA PVU	14-23	SWSW	23	50N	78W	WYW143880
13	POWDER VALLEY U DELTA PVU	21-23	NENW	23	50N	78W	WYW143880
14	POWDER VALLEY U DELTA PVU	23-23	NESW	23	50N	78W	WYW143880
15	POWDER VALLEY U DELTA FADDIS-K	32-23	SWNE	23	50N	78W	WYW140724
16	POWDER VALLEY U DELTA RUBY	34-23	SWSE	23	50N	78W	WYW140724
17	POWDER VALLEY U DELTA FED	41-23	NENE	23	50N	78W	WYW140724
18	POWDER VALLEY U DELTA RUBY	43-23	NESE	23	50N	78W	WYW140724
19	POWDER VALLEY U DELTA FED	12-24	SWNW	24	50N	78W	WYW140724
20	POWDER VALLEY U DELTA FED	21-24	NENW	24	50N	78W	WYW140724
21	POWDER VALLEY U DELTA PVU	31-24	NWNE	24	50N	78W	WYW140724
22	POWDER VALLEY U DELTA PVU	32-24	SWNE	24	50N	78W	WYW141418
23	POWDER VALLEY U DELTA PVU	41-24	NENE	24	50N	78W	WYW141418
24	POWDER VALLEY U DELTA PVU	13-25	NWSW	25	50N	78W	WYW146922
25	POWDER VALLEY U DELTA PVU	12-26	SWNW	26	50N	78W	WYW146921
26	POWDER VALLEY U DELTA PVU	21-26	NENW	26	50N	78W	WYW146921
27	POWDER VALLEY U DELTA PVU	23-26	NESW	26	50N	78W	WYW146923
28	POWDER VALLEY U DELTA PVU	24-26	SESW	26	50N	78W	WYW146923
29	POWDER VALLEY U DELTA PVU	32-26	SWNE	26	50N	78W	WYW146921
30	POWDER VALLEY U DELTA PVU	34-26	SWSE	26	50N	78W	WYW146922
31	POWDER VALLEY U DELTA PVU	41-26	NENE	26	50N	78W	WYW146921
32	POWDER VALLEY U DELTA PVU	43-26	NESE	26	50N	78W	WYW146922
33	POWDER VALLEY U DELTA FED	32-27	SWNE	27	50N	78W	WYW152616
34	POWDER VALLEY U DELTA FED	41-27	NENE	27	50N	78W	WYW152616
35	POWDER VALLEY U DELTA PVU	12-34	SWNW	34	50N	78W	WYW146923
36	POWDER VALLEY U DELTA PVU	14-34	SWSW	34	50N	78W	WYW142843
37	POWDER VALLEY U DELTA PVU	21-34	NENW	34	50N	78W	WYW146923

	Well Name	Well #	Qtr	Sec	Twp	Rng	Lease #
38	POWDER VALLEY U DELTA PVU	23-34	NESW	34	50N	78W	WYW142843
39	POWDER VALLEY U DELTA PVU	32-34	SWNE	34	50N	78W	WYW146923
40	POWDER VALLEY U DELTA PVU	33-34	NWSE	34	50N	78W	WYW142843
41	POWDER VALLEY U DELTA PVU	34-34	SWSE	34	50N	78W	WYW142843
42	POWDER VALLEY U DELTA PVU	41-34	NENE	34	50N	78W	WYW146923
43	POWDER VALLEY U DELTA PVU	12-35	SWNW	35	50N	78W	WYW146925
44	POWDER VALLEY U DELTA PVU	14-35	SWSW	35	50N	78W	WYW146925
45	POWDER VALLEY U DELTA PVU	21-35	NENW	35	50N	78W	WYW146925
46	POWDER VALLEY U DELTA PVU	23-35	NESW	35	50N	78W	WYW146925
47	POWDER VALLEY U DELTA PVU	32-35	SWNE	35	50N	78W	WYW146925
48	POWDER VALLEY U DELTA PVU	34-35	SWSE	35	50N	78W	WYW146925
49	POWDER VALLEY U DELTA PVU	41-35	NENE	35	50N	78W	WYW146925
50	POWDER VALLEY U DELTA PVU	43-35	NESE	35	50N	78W	WYW146925

Water Management Proposal: The following impoundments are proposed as secondary impoundments for potential use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sect	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	24-24-5078	SESW	24	50	78	13.2	4.6	WYW140724
2	43-33-5077	NESE	33	50	77	6.2	2.2	WYW149151

County: Johnson

Applicant: Lance Oil & Gas INC

Surface Owners: Bureau of Land Management, Robert J. Ruby, Tear Drop Cattle Co., Powder River Ranch Co., Carl R. Arndt, Faddis-Kennedy Cattle Co., John Christian, State of Wyoming

Project Description:

The proposed action involves the following:

- Drilling of 51 total federal CBM wells in Big George, and Werner coal zones to depths of approximately 2032 feet. The 55 locations will be single well locations all locations will be capable of producing from multiple coal seams.
- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.
- Well metering shall be accomplished by telemetry. Metering would entail 2-3 visits per month during the summer and 4 visits per month during the winter months.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: The primary water management strategy involves using existing water treatment facilities: Powder Valley Unit and Merrill Meadows EMITS facilities and Rohm and Haas fixed bed ion exchange facility at Dry Creek. Please review WYPDES permits for existing facilities in the WMPs for the aforementioned PODs. The secondary water management proposal includes 2 proposed discharge points and 2 proposed secondary stock water reservoirs within the Upper Powder River watershed. Proposed future water management strategy includes transporting produced water to Midwest, Wyoming for injection into the Madison aquifer.
- An unimproved and improved road network will be used to connect the three independent geographic areas of the POD.
- An above ground power line network to 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. Depending on the contractors' construction schedule, power line construction and completion may be completed before the CNNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 16 power drops.
- A storage tank of 500 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 24 months. Fuel deliveries are anticipated to be 3 times per week. Noise level is expected to be 100.5 decibels at 1 meter distance.
- A buried gas, water and power line network.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as

Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to 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 PVU Delta POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well #	Aliquot	Sec	T	R	Onsite Notes
14-7*	SWSW	7	49N	77W	well move , proposed location to close to drainages, fill issue, new location engineered pad, eyebrow off of existing O/G(oil/gas) rd, A/U(access/utilities) will need more room due to existing O/G infrastructure
23-7	NESW	7	49N	77W	well move , slopes >25%, HE soils (highly erosive), new 1/41/4,A/U would need site specific reclamation plan due to knife ridge, new location engineered pad, A/U will be engineered but using old 2TK (track) rd cut
41-23	NENE	23	50N	78W	DROPPED : GE(golden eagle) nest, Archeology issues, infrastructure to support this well is too close to GE nest, this well will be incorporated into a POD to be submitted at a later date
12-24	SWNW	24	50N	78W	no issues w/ location engineered pad, A/U rerouted due proposed route being longer in highly erodible soils, new route better soils, higher success for reclamation, shorter, will require one section of engineering to get off bench across drainage
21-24	NENW	24	50N	78W	DROPPED : GE nest, Archeology issues, will be incorporated into a POD to submitted at a later date, will be moved farther W to get 1/4 mile from GE nest
41-27	NENE	27	50N	78W	well moved ~200 W, due to proximity to drainage and access off existing rd, new engineered drawing, pad will be incorporated into rd needs turn around room
12-19	SWNW	19	50N	77W	well moved , moved in conjunction w/ dropping 21-19 location, new engineered pad drawing,
21-19	NENW	19	50N	77W	DROPPED : SGH (sage grouse habitat), A/U required engineering to get up on plateau >25% slopes, HE soils
32-19	SWNE	19	50N	77W	well moved , new 1/41/4, new engineered pad will be incorporated into road, operator move: proposed A/U required engineering, minimize disturbance, side slopes >25%, highly erosive soils
43-19	NESE	19	50N	77W	well moved , proposed location on slopes >25%,highly erosive soils, new location, will be slot 30x120', eyebrow off of A/U
31-20	NWNE	20	50N	77W	FEE Well removed from POD
13-33	NWSW	33	50N	77W	well moved BE (bald eagle) nesting habitat, moved new 1/41/4, new location need new engineered pad, A/U template
12-23	SWNW	23	50N	78W	no issues w/ location, engineered pad, A/U rerouted to run S, minimize disturbance no LWC required, shorter
14-23	SWSW	23	50N	78W	well moved , W into Sec 22, wildlife issue burrowing owl, ferruginous hawk, to close to well location, new GE nest found, new location slot 30'x120' incorporated into rd,

Well #	Aliquot	Sec	T	R	Onsite Notes
21-23	NENW	23	50N	78W	DROPPED: archeology issue, landowner issues, A/U disturbance, Operator state potential loss of drainage will be covered by POD to submitted at later date
23-23	NESW	23	50N	78W	well moved GE nest (new) ~200' E, last well on run need turn around room, new engineered pad drawing, A/U template
41-24	NENE	24	50N	78W	new engineered pad drawing due to topography and last well on run, need turn around room, A/U template
13-25	NWSW	25	50N	78W	A/U rerouted, come from S, template, minimize impact & SGH issue, engineered pad, drive through incorporated into rd
12-26	SWNW	26	50N	78W	well moved , N, new 1/41/4, back on FEE, operator access issues safety, SGH, A/U template
21-26	NENW	26	50N	78W	DROPPED: Raptor issue, no alternative to get of 1/4 mile or line of site
23-26	NESW	26	50N	78W	DROPPED: SGH
32-26	SWNE	26	50N	78W	engineered A/U to the E rerouted to the W ~100' to use and old existing rd cut
34-26	SWSE	26	50N	78W	well moved , ~200' S, A/U rerouted due to required engineering on side slope in highly erosive soils & SGH, new A/U template on contour line, engineered pad new drawing
43-26	NESE	26	50N	78W	well moved S, SGH, 460' off State sec corner, A/U coming in from E, verify at pre-construct, template, engineered pad new drawing, 30 day COA, on edge of sand blow out,
12-34	SWNW	34	50N	78W	as of 8/8/08 well moved due to adjoining operator protest of location, moved ~100'.
14-34	SWSW	34	50N	78W	well moved ~200' W 440' N due to A/U on slopes >25%, highly erosive soils, where proposed access meets pad would require excessive dirt work for turnaround room for rigs (last well on this run), new engineered drawing required
23-34	NESW	34	50N	78W	As of 8/8/08 new access coming in from N, template, better soils
32-34	SWNE	34	50N	78W	well moved , topography, no turn around room, too much dirt work required w/ proposed location, new location will be incorporated into engineered rd. new engineered drawing
33-34	NWSE	34	50N	78W	well moved NW, topography, safety, no room for turnaround, needed as A/U beyond goes up steep ~16% beyond, fill of SE corner of proposed location in drainages, new engineered drawing, pad will be incorporated into rd
34-34	SWSE	34	50N	78W	well moved ~35' N, topography, safety, no room for turnaround, better soils for new location, new engineered pad, A/U rerouted to get off ridgeline, off slopes >25%, highly erosive soils, new route follows contour, may be engineered
41-34	NENE	34	50N	78W	new engineered pad drawing due to existing infrastructure, not in place at time of well staking, location will be eyebrow w/ 2 pts of entry
12-35	SWNW	35	50N	78W	well moved , topography, no turn around room, engineered pad new drawing, last well on the run
14-35	SWSW	35	50N	78W	as of 8/8/08 Lance has chosen to directionally drill this well from the 23-35 location.
21-35	NENW	35	50N	78W	A/U to be rerouted to find alternate route due to steep slopes >25%, narrow knife ridge, highly erosive soils,

Well #	Aliquot	Sec	T	R	Onsite Notes
23-35	NESW	35	50N	78W	engineered pad incorporated into engineered A/U, NOTE: A/U to the S that access wells to the W will be rerouted to run due W from this location to minimize engineering in HE soils,
32-35	SWNE	35	50N	78W	well moved ~100' W, minimize disturbance in highly erosive soils, new well location will incorporate engineered rd, new drawing NOTE: A/U will be engineered from 34-35 to 32-35
34-35	SWSE	35	50N	78W	well moved ~ 75 NW, topography, last well on run no turn around room, keep fill out of drainages, safety ingress/egress, A/U engineered back to 32-35 location
41-35	NENE	35	50N	78W	A/U rerouted, no engineering required, proposed did, HE soils, incorporates rerouted access for 13-25, 43-26, engineered pad
43-35	NESE	35	50N	78W	well moved (new engineered drawing) P/Dog A/U will run E to existing gate
34-23	SWSE	23	50N	78W	well moved, engineered pad, proposed location was at toe of slope in channel, new location up on a bench, A/U template
43-23	NESE	23	50N	78W	well moved , fee surface, landowner wants it moved to S side or existing pasture fence, A/U rerouted to tie into A/U servicing 32-23 location, Template shorter, no engineering required, proposed route was longer and has section of engineering

Total wells as a result of onsite changes are 44 with one location having twin wells; one vertical bore and directional bore.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

2.3.2.2. Surface Water

1. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
2. 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.
3. 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.

2.3.2.3. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before

initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.

2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. 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.

2.3.2.4. Threatened, Endangered, or Sensitive Species

2.3.2.4.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.
2. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.4.2. 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.

2.3.3. Site specific mitigation measures

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

General

1. Please contact Eric Holborn – Natural Resource Specialist, @ (307) 684-1044, Bureau of Land Management, Buffalo, if there are any questions concerning surface use COAs.

Surface Use

Lease	Well #	Aliquot	Sec	T	R	Site Specific COAs
WYW152613	34-7	SWSE	7	49N	77W	Signs will be placed at either end of utility corridor that states "no oil and gas traffic beyond this point"
WYW146923	24-26	SESW	26	50N	78W	The construction of the access/utility corridor connecting the 24-26 location to 21-35 location: all work will not exceed 35 feet in width.
WYW146923	12-34	SWNW	34	50N	78W	Mowing for the well location will not exceed 35 feet radius from the well stake.

2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the PVU Delta POD is Carlsbad Canyon, (Munsell Soil Color 2.5Y 6/2).

3. Constructed pad and slot locations will be built to design specifications, component of the PVU Delta Plan of Development, submitted by Grizzly Engineering.
4. The following well locations in the project area have been identified to have limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities. If drilling takes place between October 31 to March 1 any liquids in the pits will be vacuumed out to expedite drying of pits to meet the 30 day stabilization requirement.

Lease	Well #	Aliquot	Sec	T	R
WYW152613	14-7	SWSW	7	49N	77W
WYW152613	23-7	NESW	7	49N	77W
WYW152613	34-7	SWSE	7	49N	77W
WYW152616	41-27	NENE	27	50N	78W
WYW142843	14-34	SWSW	34	50N	78W
WYW142843	23-34	NESW	34	50N	78W
WYW146923	32-34	SWNE	34	50N	78W
WYW142843	33-34	NWSE	34	50N	78W
WYW146925	12-35	SWNW	35	50N	78W
WYW146925	32-35	SWNE	35	50N	78W
WYW146925	34-35	SWSE	35	50N	78W

5. 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.
6. 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 different specific mix desired by the surface owner, use the following:

Shallow Loamy Ecological Site Seed Mix		
Species	% in Mix	Lbs PLS*
Thickspike Wheatgrass <i>(Elymus lanceolatus ssp. lanceolatus)</i>	50	6.0
Bluebunch wheatgrass <i>(Pseudoroegneria spicata ssp. Spicata)</i>	35	4.2
Prairie coneflower <i>(Ratibida columnifera)</i>	5	0.6
White or purple prairie clover <i>(Dalea candidum, purpureum)</i>	5	0.6
Rocky Mountain beeplant <i>(Cleome serrulata)</i>	5	0.6
Totals	100%	12 lbs/acre

- Provide 4” of aggregate where grades exceed 8% for stability and erosion prevention.
- The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

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

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

Wildlife

Bald Eagles

- The following conditions will alleviate impacts to bald eagles:
 - No project related actions shall occur within one mile of bald eagle habitat (Powder River) annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1 through August 15 (CM8) prior to a nesting survey. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
50/77	19	Wells: 41-19-5077, 42-19-5077, and 43-19-5077 All proposed access and/or pipeline corridors within the E1/2 of this section. The proposed power drop in the SE of this section and any powerline associated with it.
50/77	20	The proposed access and/or pipeline within the NWNW of this section.
50/77	33	Wells: 34-33-5077 and 42-33-5077 Impoundment: P43-33 and its associated monitoring wells if this becomes a primary impoundment. All proposed access and/or pipeline corridors within this entire section. The proposed power drop in the SE of this section and any powerline associated with it.
49/77	6	The proposed pipeline corridor in the SW of this section.
49/77	7	Well: 34-7-4977 All proposed access and/or pipeline corridors within the E1/2 of this section. The proposed powerline and power drop in the SE of this section.

- a. If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
- b. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle nest sites (February 1 - August 15).

Burrowing Owls

1. The following conditions will alleviate impacts to burrowing owls:

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

Township/Range	Section	Wells and Infrastructure
50/78	22	The proposed access/pipeline corridor in the SESE of this section.
50/78	23	Wells: 23-23-5078 and 34-28-5078 All proposed access and/or pipeline corridors within the SW, SWSE, and SESE of this section. The proposed power drop in the SW of this section and any powerline associated with it.
50/78	24	Impoundment: P24-24 if this becomes a primary impoundment. The proposed access and/or pipeline corridors in the SESE and SESW of this section.
50/78	25	All proposed access and/or pipeline corridors in the NW of this section.

Township/Range	Section	Wells and Infrastructure
50/78	26	Well: 11-26-5078 All proposed access and/or pipeline corridors within the NENW and NENE of this section.
50/78	35	Well: 43-35-5078 All proposed access and/or pipeline corridors within the SENE and NESE of this section.
49/78	12	The proposed pipeline corridor in the NENE of this section.
49/77	6	The proposed pipeline corridor in the SWSW of this section.
49/77	7	The proposed pipeline corridor in the NWNW of this section.
50/77	33	Well: 34-33-5077 The proposed access/pipeline corridor in the NESW, NESE, and SWSE of this section.

Raptors

1. The following conditions will alleviate impacts to raptors:
 - a. No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
50/78	22	Well: 44-22-5078 All proposed access and/or pipeline corridors within the NWSE, NESE, and SESE of this section.
50/78	23	Wells: 12-23-5078, 23-23-5078, 34-23-5078, and 43-23-5078 All proposed access and/or pipeline corridors within this entire section. The proposed power drop in the SW of this section and any power lines associated with it.
50/78	24	Wells: 12-34-5078, 31-24-5078, and 41-24-5078 Impoundment: P24-24 and its associated monitoring wells if this becomes a primary impoundment. All proposed access and/or pipeline corridors within the NENE, NWNW, SWNE, NESW, SESW, SWSE, and SESE of this section.
50/78	25	All proposed access and/or pipeline corridors in the NWNW, NENW, and NENE of this section.
50/78	26	Wells: 11-26-5078 and 41-26-5078 All proposed access and/or pipeline corridors within the NW and NENE of this section.
50/78	33	All proposed access and/or pipeline corridors within the SE of this section.
50/78	34	Wells: 34-34-5078 and 43-34-5078 All proposed access and/or pipeline corridors within the SE of this section.
50/77	33	Well: 42-33-5078 Impoundment: P43-33 and its associated monitoring wells if this becomes a primary impoundment. All proposed access and/or pipeline corridors within this entire section.

Township/Range	Section	Wells and Infrastructure
49/78	12	All proposed access and/or pipeline corridors within the E1/2 of this section.
4977	7	Wells: 13-7-4977 and 14-7-4977 All proposed access and/or pipeline corridors within the SWSW and NWSW of this section.

- 1) Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.
- 2) Nest occupancy and productivity checks shall be completed for nests within a ½ mile of any surface disturbing activities (e.g., well drilling, pipeline installation, or road improvements) across the entire POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy and productivity checks shall continue for the first five years on all nests that are within a ½ mile of locations where any surface-disturbing activities took place. Productivity checks shall be completed only on those nests that were verified to be occupied during the initial occupancy check for the current year. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to the following nest(s): See Table 3.1 of this EA.
 - b. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
 - c. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

Sage Grouse

1. The following conditions will alleviate impacts to sage-grouse:
 - a. Perch inhibitors will be installed on the one mile of new overhead powerlines (Section 12, T49N, R78W and Section 7, T49N, R77W).
 - b. No surface disturbing activities are permitted within 2 miles of sage grouse lek(s) between March 1 and June 15, prior to completion of a greater sage grouse lek survey. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
50/78	22	Well: 44-22-5078 All proposed access and/or pipeline corridors within the SE of this section. The proposed power drop in the center of this section and any powerline associated with it.
50/78	23	Wells: 12-23-5078 and 23-23-5078 All proposed access and/or pipeline corridors within the NW and SW of this section. The proposed power drop in the SW of this section and any powerline associated with it.
50/78	26	Well: 11-26-5078 All proposed access and/or pipeline corridors within the NWNW of this section.

Township/Range	Section	Wells and Infrastructure
50/78	27	Wells: 31-27-5078 and 32-27-5078 All proposed access and/or pipeline corridors within this entire section. The proposed power drops in the SE and SW of this section and any powerline associated with them.
50/78	28	All proposed access and/or pipeline corridors within this entire section.
50/78	33	All proposed access and/or pipeline corridors within this entire section. The proposed power drop in the NE of this section and any powerline associated with it.
50/78	34	Wells: 12-24-5078, 21-34-5078, 23-24-5078, 24-34-5078, 41-34-5078, 42-34-5078, and 43-34-5078 All proposed access and/or pipeline corridors within this entire section. The proposed power drop in the NE of this section and any powerline associated with it.
50/78	35	Wells: 12-35-5078 and 23-35-5078 All proposed access and/or pipeline corridors within the SWNW of this section.
50/77	33	Wells: 34-33-5077 and 42-33-5077 Impoundment: P43-33 and its associated monitoring wells if this becomes a primary impoundment. All proposed access and/or pipeline corridors within this entire section. The proposed power drop in the SE of this section and any powerline associated with it.

- 1) If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
- c. Well metering, maintenance and other site visits within 2.0 miles of documented sage grouse lek sites should be minimized as much as possible during the breeding season (March 1– June 15).

Sharp-tailed Grouse

1. The following conditions will minimize impacts to sharp-tailed grouse:
 - a. A survey is required for sharp-tailed grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist.
 - b. If an active lek is identified during the survey, the 0.64 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. The required sharp-tailed grouse survey will be conducted by a biologist following WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
 - c. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 0.5 mile buffer until the following breeding season (April 1).
 - d. Creation of raptor hunting perches will be avoided within 0.64 miles of documented sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on grouse.

Water Management

1. The operator shall submit a Sundry notice to the BLM for approval prior to the initiation of construction of the secondary impoundments included in this plan.
2. The operator will comply with all the existing conditions of approval associated with the EMITs facilities in the Powder Valley Unit and Merrill Meadows.

Cultural

Oil and gas related activities (pedestrian and mechanical) shall be restricted to approved well pads and infrastructure, particularly in the vicinity of 32-24-5078.

2.4. Summary of Alternatives

Infrastructure currently existing within the POD area (Alternative A) consists of the following companies that have lease holdings encompassed by the PVU Delta POD;

- Lance Oil and Gas Company: Powder Valley Unit POD, approved, 3/02/04, WY-070-EA04-072
- Lance Oil and Gas Company: Williams Draw Unit POD, approved, 4/10/05, WY-070-EA05-134
- Yates Petroleum Corporation: Skyward POD, approved, 9/07/05, WY-070-EA05-187
- Devon Energy: Golden Eagle POD, approved, approved, 12/04/07, WY-070-EA07-111

For specifics on wells and infrastructure please see the above referenced documents.

The infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposal (Alternative C) are presented in Table 2.5.

Table 2.5 Summary of the Alternatives

Facility	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Total CBNG Wells	51	44
Total Locations	51	43
Nonconstructed Pads	23	0
Slotted Pads		9
Constructed Pads	28	34
Conventional Wells	0	0
Gather/Metering Facilities	0	0
Compressors	0	0
Monitor Wells	0	0
Impoundments		
On-channel	2	2
Off-channel		
Water Discharge Points	2	2
Treatment Facilities	0	0

Facility	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Improved Roads		
No Corridor	0	0.34
With Corridor	22	14.8
2-Track Roads		
No Corridor	0	0
With Corridor	0	2.1
Buried Utilities		
No Corridor	0	3.5
Overhead Powerlines	9.2	1
Communication Sites	0	0
Staging/Storage Areas	0	1
Other Disturbance		
Acres of Disturbance	245.2	143

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on April 17, 2007. Field inspections of the proposed PVU Delta CBNG project were conducted on October 16-19, 2007, March 11, 2008, June 17, 26, 2008 by:

NAME	TITLE	AGENCY
Joy Kennedy	Regulatory Agent	Lance Oil & Gas Company
Colt Rodeman	Senior Foreman	Lance Oil & Gas Company
Tammy Hitt	Regulatory Analyst	Lance Oil & Gas Company
Ethan Jahnke	Federal Permit Coordinator	Lance Oil & Gas Company
Brent	Civil Engineer	Grizzly Engineering
Eric Holborn	Natural Resource Specialist	BLM
Arnie Irwin	Soil Scientist	BLM
Hilarie Peck	Civil Engineer	BLM
Ted Hammersma	Civil Engineer Technician	BLM
Guymen Easdale	Wildlife Biologist	BLM
Mike McKinley	Hydrologist	BLM
Wendy Sutton	Archeologist	BLM

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

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

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

3.1. Topographic Characteristics of Project Area

The Powder River Delta Unit Plan of Development area is located in eastern Johnson County, Wyoming, immediately north of Interstate- 90's Indian Creek exit. The development area is located within the Dry Creek watershed and Flying E Creek which are both tributaries to the Upper Powder River. The area is semi-badland country with many erosional features (buttes, badlands, break valleys, and canyons) and sparse vegetation. The elevation changes and presence of woody species provide a windbreak effect while also capturing additional moisture; vegetation from semi-desert to woodland, are supported.

This is an area of extensive existing CBNG development, as well as existing conventional oil and gas production. Most of the roads which will be used for access to the proposed wells were constructed or improved to accommodate minerals production and/or existing cattle operations.

3.2. Vegetation & Soils

General vegetation communities within the project area consist of sagebrush/grassland. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the project area. Grass species consist of needle and thread, western wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and buffalo grass. Broom snakeweed, rubber rabbitbrush, and prickly pear are found interspersed throughout the area. Juniper trees were observed along incised draws, cottonwood trees and willows were observed in draw bottoms and along the Powder River flood plain. Differences in dominant species within the project area vary with soil type, aspect, and topography.

Cheatgrass (downy brome) has invaded the project area.

Soils within the project area were identified from the *North Johnson County Survey Area, Wyoming (WY719)*. A soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area and on-site field work conducted by BLM. Topsoil depths to be salvaged for reclamation range from 2 to 4 inches on ridges to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. Areas with limited reclamation capability and/or highly erosive soils were identified by

BLM specialists and the operator during the pre-approval onsite inspection.

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

Map Unit Symbol	Ecological Site
639	LOAMY (10-14NP)
684	SHALLOW CLAYEY (10-14NP)
707	LOAMY (10-14NP)
708	LOAMY (10-14NP)
709	LOAMY (10-14NP)
718	SANDY (10-14NP)

The most dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are: *Shallow Clayey and Loamy 10-14" precipitation zone Northern Plains*.

The *shallow clayey sites* occur on slopes and ridge tops on landforms which include hill sides, ridges and escarpments in the 10-14" precipitation zone. The soils of this site are shallow (less than 20" to bedrock) well drained soils that formed in alluvium or residuum derived from unspecified shale. These soils have moderate to slow permeability and may occur on all slopes. The bedrock is clay shale which is virtually impenetrable to plant roots.

The *loamy sites* occur on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The soils and landforms of this area present distinct challenges for reclamation. Soils differ with topographic location, slope and elevation. The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes.

3.2.1. Wetlands/Riparian

Riparian areas were not found along unnamed tributaries and portions of Flying E and Dry Creek. Riparian environment exists along the banks of the Powder River, primarily due to natural flow.

3.2.2. Invasive Species

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

- salt cedar
- Russian knapweed
- leafy spurge

Cheatgrass (downy brome) has also invaded the project area.

The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. 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

Land cover within the project area consists of sagebrush and native grasses. This vegetation includes a combination of sparse (0-5%), light (5-10%), moderately dense (10-15%) and dense (15-25%) big sagebrush stands with a variety of understory grasses and forbs. Wyoming big sagebrush (*Artemisia tridentata*) is the dominant shrub interspersed with short native grasses including blue grama (*Bouteloua gracilis*). Large patches of cheatgrass (*Bromus tectorum*) occur throughout the project area (Maechtle 2007). Dense stands of mature cottonwood (*Populus* spp) trees occur along the Powder River in Sections 16, 17, 20, 21 and 33, Township 50 North, Range 77 West. Within the draws, throughout the project area cottonwood trees occur as lone individuals or in small groups (2-5 trees).

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 Big Horn Environmental Consultants (BHEC) (Maechtle 2007, 2008). BHEC performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in 2006, 2007, and 2008. Surveys were conducted for Ute ladies'-tresses orchid in August 2007. PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM biologist conducted field visits on October 16-19, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species that have been identified in the project area or that have been noted as being of special importance are described below.

3.2.3. Big Game

Big game species expected to be within the project area include pronghorn, mule deer, and white-tailed deer. The WGFD has determined that the project area contains Yearlong range for pronghorn antelope, Yearlong and Winter-Yearlong range for mule deer, and Yearlong range for white-tailed deer. Populations of pronghorn antelope, mule deer, and white-tailed 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.

3.2.4. Aquatics

The project area is drained ephemerally by Flying E Creek and Dry Creek. These ephemeral drainages drain into the Powder River to the east. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

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

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

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

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

3.2.5. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.2.6. Raptors

Raptors species expected to occur in suitable habitats within the Powder River Basin include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper's hawk,

northern goshawk, long-eared owl, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities.

Forty-six raptor nests are located within or adjacent to the project area. Twenty-three were active during the 2008 breeding season.

Table 3.1. Documented raptor nests within the PVU Delta project area in 2006, 2007 and 2008.

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION IN 2008	STATUS / YEAR
508	Red-tailed hawk	402035E 4907464N	NWNE Sec. 15 T50N, R78W	Cottonwood, dead	Good	Inactive / 08 Active / 07
523	Great-horned owl	405766E 4901389N	SESE Sec. 36 T50N, R78W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06 Active / 05 Active / 04 Active / 00
1274	Unknown	400469E 4900923N	NWNE Sec 4 T49N, R78W	Cottonwood, live	Fair	Inactive / 08 Inactive / 07 Active / 06 Inactive / 03
1288	Unknown	405141E 4897139N	SWNE Sec. 13 T49N, R78W	Ponderosa pine, live	Fair	Inactive / 08 Active / 07 Inactive / 06
2022	Ferruginous hawk	403017E 4904803N	NWSW Sec 23 T50N, R78W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06 Inactive / 04 Inactive / 03
2030	Red-tailed hawk	409196E 4901961N	SWNW Sec 33 T50N, R77W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06 Active / 05 Active / 04 Active / 03
2128	Golden eagle	407477E 4903557N	SWNW Sec 29 T50N, R77W	Cottonwood, live	Good	Active / 08 Inactive / 07 Active / 06 Active / 05 Active / 04 Inactive / 03
2136	Great-horned owl	408874E 4905379N	SENE Sec 20 T50N, R77W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06 Active / 04

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION IN 2008	STATUS / YEAR
2137	Red-tailed hawk	409024E 4905231N	SWSW Sec 21 T50N, R77W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06 Active / 04
2647	Red-tailed hawk	399346E 4903150N	NESE Sec 29 T50N, R78W	Cottonwood, live	Good	Inactive / 08 Active / 07 Active / 06 Active / 05 Inactive / 04
2722	Unknown	405493E 4897123N	SENE Sec 13 T49N, R78W	Ponderosa pine, live	Fair	Inactive / 08 Inactive / 07 Inactive / 06 Inactive / 04 Inactive / 03
2723	Unknown	405629E 4898675N	SENE Sec. 12 T49N, R78W	Cottonwood, live	Unknown	Inactive / 08 Inactive / 07 Inactive / 05 Inactive / 04
2724	Unknown	405632E 4898676N	SENE Sec 12 T49N, R78W	Cottonwood, live	Fair	Inactive / 08 Inactive / 07 Inactive / 04
2725	Red-tailed hawk	405766E 4901389N	SESE Sec 36 T50N, R78W	Cottonwood, live	Good	Active / 07 Active / 06
2727	Golden eagle / Black-billed magpie (BBMP)	406567E 4899014N	NENW Sec. 7 T49N, R77W	Ponderosa pine, live	Unknown	Inactive (BBMP) / 08 Inactive / 07 Inactive / 05 Inactive / 04
2728	Red-tailed hawk	408103E 4897032N	SENW Sec 17 T49N, R77W	Cottonwood, live	Good	Inactive / 08 Active / 07 Active / 06 Inactive / 05 Active / 04
3331	Red-tailed hawk	408836E 4900566N	NENE Sec 5 T49N, R77W	Cottonwood, live	Good	Active / 08 Active / 07 Inactive / 06 Inactive / 05
3563	Great-horned owl	399480E 4902884N	SESE Sec 29 T50N, R78W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06
3667	Prairie falcon	407742E 4905780N	NWNW Sec 20 T50N, R77W	Cliff	Good	Active / 08 Active / 07 Active / 06 Active / 05

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION IN 2008	STATUS / YEAR
3758	Long-eared owl	405184E 4897167N	SWNE Sec. 13 T49N, R78W	Juniper, live	Good	Active (BBMP) / 08 Inactive / 07 Active / 06
4380	Golden eagle	404188E 4900339N	SENE Sec. 2 T49N, R78W	Ponderosa pine, live	Excellent	Active / 08 Inactive / 07 Inactive / 06
4438	Red-tailed hawk	401236E 4905241N	SWNW Sec. 22 T50N, R78W	Creek bank	Poor	Inactive / 08 Active / 07 Active / 06
4959	Red-tailed hawk	401518E 4905067N	NESW Sec. 22 T50N, R78W	Man-made structure	Gone	Inactive / 08 Active / 07
4960	Great-horned owl / Red-tailed hawk	399726E 4902896N	SWSW Sec. 28 T50N, R78W	Cottonwood, live	Good	Active (GRHO) / 08 Active (RETA) / 07
5009	Unknown	409472E 4901907N	SENE Sec 33 T50N, R77W	Cottonwood, live	Fair	Inactive / 08 Inactive / 07
5010	American kestrel	403298E 4904574N	SESW Sec 23 T50N, R78W	Creek bank	Good	Active / 08 Inactive / 07
5011	Great-horned owl	402811E 4904968N	NWSW Sec 23 T50N, R78W	Creek bank	Unknown	Active / 08 Active / 07
5012	Barn owl	402811E 4904968N	NWSW Sec 23 T50N, R78W	Creek bank	Good	Inactive / 08 Active / 07
5013	Unknown	405876E 4903944N	NENE Sec 25 T50N, R78W	Creek bank	Good	Active / 08 Inactive / 07
5014	Golden eagle	405104E 4905885N	NENW Sec 24 T50N, R78W	Juniper, live	Good	Inactive / 08 Inactive / 07 Inactive / 06
5015	Long-eared owl	401791E 4907505N	SESW Sec10 T50N, R78W	Juniper, live	Good	Inactive / 08 Inactive / 07 Active / 06
5016	Red-tailed hawk	408509E 4906716N	SWNE Sec 17 T50N, R77W	Cottonwood, live	Good	Active / 08 Active / 07 Active / 06
5017	American kestrel	402809E 4904982N	NWSW Sec 23 T50N, R78W	Creek bank	Good	Active / 08 Active / 07 Active / 06
5018	Long-eared owl	405880E 4901158N	SWSW Sec 31 T50N, R77W	Juniper, live	Poor	Inactive / 08 Inactive / 07 Active / 06
5019	American kestrel	402575E 4901168N	SESE Sec 34 T50N, R78W	Creek bank	Fair	Inactive / 08 Inactive / 07 Active / 06

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION IN 2008	STATUS / YEAR
5020	Long-eared owl	402708E 4900955N	NWNW Sec 2 T49N, R78W	Juniper, live	Good	Inactive / 08 Inactive / 07 Active / 06
5021	Long-eared owl	402912E 4900994N	NWNW Sec 2 T49N, R78W	Juniper, live	Good	Active / 08 Inactive / 07 Active / 06
5827	American kestrel	404904E 4904135N	NENW Sec. 25 T50N, R78W	Creek bank	Good	Active / 08
5828	Unknown	410824E 4903344N	NWSW 27 T50N, R77W	Cottonwood, live	Good	Inactive / 08
5829	American kestrel	400210E 4901176N	SESW Sec. 33 T50N, R78W	Cliff	Good	Active / 08
5830	Red-tailed hawk	405739E 4896939N	SENE Sec. 13 T49N, R78W	Ponderosa pine, live	Good	Active / 08
5831	Red-tailed hawk	408816E 4900492N	SENE Sec. 5 T49N, R77W	Cottonwood, live	Poor	Inactive / 08
5832	Golden eagle	403028E 4904829N	NWSW Sec. 23 T50N, R78W	Cottonwood, live	Unknown	Active / 08
5833	Red-tailed hawk	410968E 4901487N	NESW Sec. 34 T50N, R77W	Ponderosa pine, live	Good	Active / 08
5834	Unknown	407433E 4905646N	NWNW Sec. 20 T50N, R77W	Cottonwood, live	Good	Inactive / 08

3.2.7. Threatened and Endangered and Sensitive Species

3.2.7.1. Threatened and Endangered Species

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

3.2.7.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

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

Ten active prairie dog colonies, totaling 137.8 acres in size, were identified by BHEC (2007) and the

BLM database within and adjacent to the Powder Valley Unit Delta project area. Prairie dog colonies within and adjacent to the project area are listed below:

Table 3.2 Prairie Dog Colonies within and adjacent to the PVU Delta project area (2008).

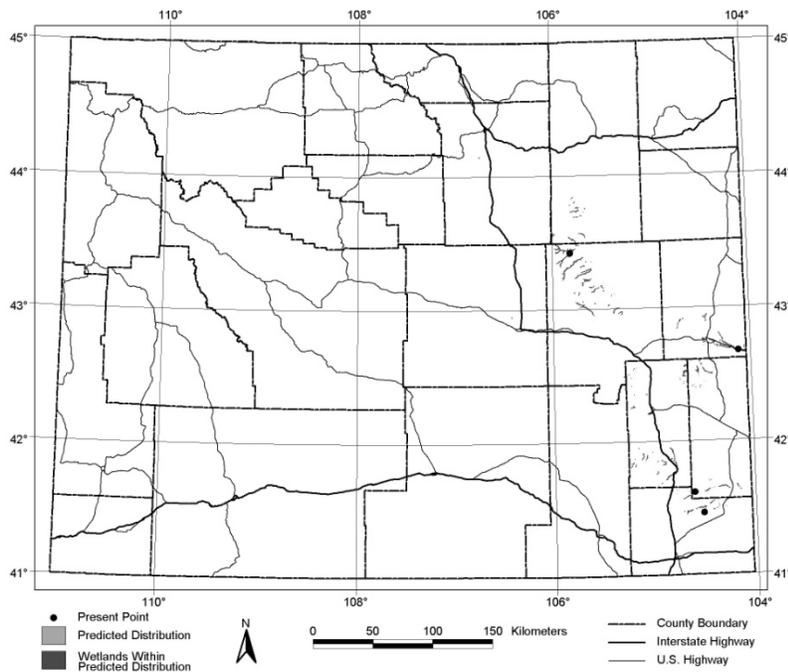
LEGAL LOCATION	SIZE (ACRES)
<i>Within the project area.</i>	
NW Sec. 7, T49N, R77W	22.3
SWSW Sec 23, T50N, R78W	10.8
SW Sec 23, T50N, R78W	5.8
SW Sec 23/NW Sec26, T50N, R78W	4.7
SW Sec. 33, T50N, R77W	4.6
NW Sec. 25, T50N, R77W	12.1
NE Sec. 25, T50N, R77W	10.5
<i>Within 1.5 km (0.9 mile) of colonies</i>	
SWSW Sec. 12, T49N, R78W	6.2
NE Sec. 9, T50N, R77W	15.9
NW Sec 29/NE Sec 30, T50N, R77W	44.9
Total	137.8

The project area is located approximately nine miles from the Arvada complex, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the PVU Delta project area.

3.2.7.1.2. Ute Ladies'-Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties.

Figure 1. Predicted Distribution of Ute ladies'-tresses in Wyoming



Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. In Wyoming, *Spiranthes diluvialis* blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

The Powder River flows through the project area and surveys for orchids were conducted at discharge points in Sections 28, 29, and 32, T50N, R77W. No populations of Ute ladies'-tresses orchid are known within the area and no orchids were observed. Suitable orchid habitat is present within the PVU Delta project area, though no plants were observed.

3.2.7.2. 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. Prairie dog colonies and sagebrush ecosystems are the most common among habitat types within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. These are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.2.7.2.1. Prairie dog colony obligates

Prairie dog colonies create habitat for many species of wildlife (King 1955, Reading et al. 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and

Reading et al. 1989) suggest that species richness increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of prey species (Clark 1982, Agnew 1986, Agnew 1988).

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

3.2.7.2.2. Sagebrush obligates

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

3.2.7.2.3. Bald eagle

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

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

Bald eagle nesting and roosting habitat exists along the Powder River, which bisects the project area. Dense stands of mature cottonwood (*Populus spp*) trees occur all along the Powder River. The project area has a reliable year-round prey base in the form of prairie dogs, and lagomorphs. On December 4, 18, 26, 27, and 29, 2006, adult bald eagles were observed on a large nest structure in NWNE Section 8, T49N, R77W. In subsequent survey reports (January 5, 10, 12, and 16, 2007), no additional bald eagle activity was ever recorded at this nest site. This inactivity coincides with an exception request granted for construction of the Merrill Meadow treatment facility located within one mile of this potential nest

location. Observations have been recorded along this segment of the Powder River since 2003. Within the Powder River corridor that occurs within 1 mile of the project area, 69 adult and 14 juvenile bald eagles were recorded between December 2003 and January 2007. BHEC recorded additional observations in December 2007 and January 2008: 1 adult on December 3; 13 adults on December 5; 8 adults and 4 juveniles on December 12; 3 adults on December 17; 12 adults and 1 juvenile on December 19; 1 adult on January 8; 2 adults and 10 juveniles on January 9; 10 adults and 4 juveniles on January 10; and 1 adult on January 14. These observations are strongly clustered, but exist throughout the corridor. The entire segment of the Powder River within and surrounding the project area is considered an area of consistent use.

3.2.7.2.4. Black-tailed prairie dog

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

Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented, and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems, such as landowner poisoning and disease that affect long term population viability (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 Digital ortho quads indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2004).

Seven active prairie dog colonies, totaling 70.8 acres in size, were identified by BHEC (2007) and the BLM database within the PVU Delta project area (See prairie dog colonies within the project area in Table 3.2).

3.2.7.2.5. Burrowing owl

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

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

Burrowing owl nesting habitat consists of open areas with mammal burrows. Individual burrowing owls have moderate to high site fidelity to breeding areas and even to particular nest burrows (Klute et al.

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

The BLM BFO database indicates burrowing owl nests at the following locations within the project area or within 0.25 mile of the project area in 2006, 2007, and/or 2008: (see Table below)

Table 3.3 Burrowing owl nests within and surrounding the PVU Delta project area.

BLM ID#	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS / YEAR
82	401119E 4904462N	SESE Sec. 22 T50N, R78W	Active burrow	Unknown	Active / 08
85	403185E 4904496N	SESW Sec 23 T50N, R78W	Active burrow	Good	Inactive / 08 Active / 07
86	403400E 4904282N	SESW Sec 23 T50N, R77W	Active burrow	Good	Inactive / 08 Active / 07
87	406870E 4903898N	NWNE Sec. 30 T50N, R77W	Abandoned burrow	Unknown	Inactive / 08 Inactive / 07 Active / 06

3.2.7.2.6. Grouse

3.2.7.2.6.1. Greater sage-grouse

The greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was “not warranted” following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. In 2007, the U.S. District Court remanded that decision, stating that the USFWS’ decision-making process was flawed and ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). Suitable sage-grouse habitat is present throughout the project area. Large patches of suitable sage-grouse nesting habitat occur within the northern half of Section 19, T50N, R77W and throughout Sections 25 and 26, T50N, R78W. Approximately 50 percent of the project area meets seasonal habitat requirements and are large enough to meet the landscape scale requirements of the bird (BLM 2008). Sage-grouse habitat models indicate that 94 percent of the project area contains high quality sage-grouse nesting habitat and high quality sage-grouse wintering habitat (Walker et al. 2007). At the onsite, BLM biologists found sage-grouse sign throughout the project area. BLM records identified seven sage-grouse leks within 4 miles of the project area. The 4-mile distance was recommended by the State wildlife agencies' ad hoc committee for consideration of oil and gas development effects to nesting habitat (WGFD 2008). These seven lek sites are identified below (Table 6).

Table 3.4. Sage-grouse leks surrounding the PVU Delta project area.

LEK NAME	LEGAL LOCATION	STATUS YEAR / PEAK MALES	DISTANCE FROM PROJECT AREA (MILES)
Tear Drop I	NESE Sec. 33 T50N, R78W	'06/13, '07/8, '08/2-BHEC	0.0
Bear Draw	SWSE Sec. 16 T50N, R78W	'04/0, '05/24, '06/1, '07/0, '08/0-BHEC	0.5
Maycock	NWNE Sec. 3 T49N, R77W	'82/0, '88/9, '92/6, '98/0, '01/0, '02/0, '03/0, '04/0, '05/0, '06/0, '07/0, '08/0-BHEC	0.8
Tear Drop II	SENE Sec. 32 T50N, R78W	'06/14, '07/15, '08/13-BHEC	0.8
Coal Gulch	SENE Sec. 5 T50N, R79W	'04/32, '05/34, '06/124, '07/95	2.5
BLM	SE Sec. 36 T50N, R79W	'85/38, '86/37, '95/0, '00/0, '02/0, '03/0, '04/0, '05/9, '06/20, '07/0	2.8
BLM Alt. Location	NWSE Sec. 36 T50N, R79W	'07/15	2.6
Flying E Creek	SENE Sec. 11 T49N, R79W	'04/37, '05/33, '06/56, '07/57	3.8

3.2.7.2.6.2. Sharp-tailed grouse

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

The PVU Delta project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter. No sign of sharp-tailed grouse was found within the project area (Maechtle 2007).

3.2.7.2.7. Mountain plover

The mountain plover was proposed for listing in 1999 (USFWS). In 2003, the USFWS withdrew a proposal to list the Mountain Plover as a Threatened species, stating that the population was larger than had been thought and was no longer declining. Mountain plovers, which are a BLM sensitive species, are typically associated with high, dry, short grass prairies (BLM 2003). Mountain plover nesting habitat is often associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Suitable mountain plover habitat is not present within the project area. The varied terrain and lack of flat areas within the project area does not provide habitat for mountain plover (Maechtle 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*	155	22	Unk	1

*Wyoming Department of Health Records September 12, 2007.

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

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

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

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along

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

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

3.5 Water Resources

The project area is within Flying E Creek and an unnamed tributary to the Upper Powder River drainage system. The minor tributary channel exhibits little to no floodplain development. The average watershed slope for Flying E Creek is 870 ft/mi and approximately 467 ft/mi in the unnamed tributary.

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 27 registered stock or domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 120 to 1,077 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 Flying E Creek drainage and unnamed tributary, which are tributaries to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 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 (PRB FEIS page 3-49). There were no springs determined to be within the POD boundary from literature review or as a result of the onsite.

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 PVU Delta project, following the Secretary of the Interior’s Guidelines and Standards. A Class III inventory specifically for the project was conducted by North Platte Archaeological Services (BLM project no. 70070127). The inventory covered approximately 3507 acres; this inventory recorded 8 sites and 8 isolates. Tribal Consultation was conducted by the BLM to help identify sites of potential interest within the inventory. Tribal representatives requested that all oil and gas related activities within the POD be restricted to approved infrastructure, particularly in the vicinity of 32-24-5078; in the spirit of Executive Order 13007, this request must be considered. Four additional Class III inventories cover portions of the project (BLM # 70030088, 70050023, 70050085, and 70050128); two additional sites discussed in previous inventories lie within the APE (area of potential effect). The following cultural resources are located in or near the APE.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48JO2494	Site (previously recorded)	Not Eligible
48JO2574	Site (previously recorded)	Not Eligible
48JO3806	Site	Not Eligible
48JO3807	Site	Not Eligible
48JO3809	Site	Not Eligible
48JO3810	Site	Eligible
48JO3811	Site	Not Eligible
48JO3812	Site	Not Eligible
48JO3813	Site	Not Eligible
48IR1	Isolated Resource	Not Eligible
48IR2	Isolated Resource	Not Eligible
48IR3	Isolated Resource	Not Eligible
48IR4	Isolated Resource	Not Eligible
48IR5	Isolated Resource	Not Eligible
48IR6	Isolated Resource	Not Eligible
48IR7	Isolated Resource	Not Eligible
48IR8	Isolated Resource	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 44 wells, 43 proposed well locations (one twin well location), all 43 locations will require constructed (cut & fill) well pads. Estimated disturbance associated with these 43 locations would involve approximately 1.0 acre/location for 43 total acres. Approximately 15.1 miles of improved roads would be constructed to provide access to various well locations. Approximately 2.1 miles existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 3.5 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with

utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Constructed Pad	43	.5/acre .5/acre	21.5 21.5	Long Term Short Term
Gather/Metering Facilities	0	Site Specific		Long Term
Screw Compressors	0	Site Specific		Long Term
Monitor Wells	0	0.1/acre		Long Term
Impoundments On-channel Off-channel Water Discharge Points	0	Site Specific Site Specific 30'x30'	0.0	Long Term
Channel Disturbance Headcut Mitigation* Channel Modification		Site Specific Site Specific	0.0 0.0	
Improved Roads No Corridor With Corridor	14.8 .34	50' 50'	33.7 1.6	Long Term
2-Track Roads With Corridor	2.1	35'	8.9	Long Term
Pipelines No Corridor	3.5	35'	15	Short Term
Overhead Powerlines	1.0	30' Width	3.6	Long Term
Additional Disturbance	Staging area	Site Specific	2.9	

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

Riparian areas within the Powder River Delta Unit project area were not found along unnamed tributaries and portions of Flying E and Dry Creek. Along the banks of the Powder River riparian environment exists primarily due to natural flow.

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

4.1.2. Invasive Species

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

1. Administer herbicides.
2. Incorporate weed prevention and control measures into environmental restoration and infrastructure maintenance activities (for specifics see Integrated Pest Management Plan (IPMP) in the POD.
3. Initiate a weed education policy to assist contractors and field employees in the identification of noxious weeds and to create an awareness of the impacts of noxious weeds and invasive plants.

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.

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

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 18.5% of the total predicted in the PRB FEIS for 2007.
- 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 Flying E Creek and prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the PVU Delta proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, yearlong range for pronghorn antelope, Yearlong and Winter-Yearlong range for mule deer and Yearlong range white-tailed 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 indicates a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests mule deer avoid mineral activities, and after three years of drilling activity the deer have not become accustomed to the disturbance (Madson 2005).

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

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

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

4.2.1.1. Big Game Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be re-injected, and/or treated and piped to the Powder River and/or Dead Horse Creek, or contained within proposed on-channel reservoirs located within tributaries to the Powder River and Flying E Creek (WWC Engineering 2008). If a reservoir were to discharge, it is likely that the produced water will reach a fish-bearing stream, and that downstream species will be affected.

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

Altering water temperatures, flow timing and magnitude, turbidity and chemical composition of the Powder River could harm native fish species that inhabit the Powder River. Alterations could also allow for non native species to become established. Any water development that alters discharge patterns, reduces turbidity, changes water quality, modifies sediment transport, or blocks migratory routes for fish is likely to result in changes in the fish community. Additionally, altering of tributaries may have adverse effects to aquatic species. Tributaries provide spawning and nursery habitat for riverine fishes and support unique fish assemblages. Seasonal movements of riverine fishes into tributaries may be essential to the continued maintenance of several species found in the Powder River (Hubert 1993).

Change in Water Quality

Fish and amphibian species have evolved and adapted to existing conditions. Changes in water quality may have detrimental impacts on the native aquatic fauna. Major information gaps for these species include feeding habits, reproduction, specific habitat preference (pools, riffles, runs, backwaters, side channels, or a combination), and seasonal habitat use, therefore, it is difficult to fully understand how changes in water quality may affect native aquatic fauna.

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

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting, Inc. reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their report on the Powder River (2004). This report indicated that CBNG discharges could affect native species in the drainage. See Section 3.5.2 of this EA for water quality information associated with this project.

Change in Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a dynamic hydrography with high

sediment loads. Changes in this flow regime (i.e., perennial flows) may seriously impact native fauna by altering their use of historical habitats for spawning, rearing, and reproduction. Alterations that impact channel morphology is an issue, and may have impacts to the aquatic biota due to changes in sediment loads, loss of habitat, and possible disruption of migration movements due to barriers created by culverts and/or head cuts.

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

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

4.2.2.1. Aquatics Cumulative effects

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

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

Reclamation activities that occur in the spring may be detrimental to migratory bird survival. Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequences of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges

(Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity and nests may be destroyed by equipment.

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

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation.

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

4.2.3.1. Migratory Birds Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

The presence of overhead power lines may impact foraging raptors. Raptors forage opportunistically throughout the Powder River Basin. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span

collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

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

The 14-23 well was moved approximately 600 feet west to remove it from the 0.25 buffer of nest 2022. The 41-23 and 21-24 wells were removed from the project plan due to the proximity of their access route to nest 5014.

Table 4.2. Proposed infrastructure within close proximity (0.5 mile) to documented raptor nests within the Powder Valley Unit Delta project area (Timing limitations will apply to this infrastructure).

BLM ID#	INFRASTRUCTURE	DISTANCE
5014	Wells: 21-24-5078, 12-24-5078, 41-24-5078 Power Drop	0.21(SSE), 0.44(SW), 0.46(SE) 0.42(SW)
5011	Wells: 12-23-5078, 44-22-5078, 23-23-5078 Power Drop	0.21(N), 0.34(SW), 0.37(ESE) 0.23(SE)
5012	Wells: 12-23-5078, 44-22-5078, 23-23-5078 Power Drop	0.21(N), 0.34(SW), 0.37(ESE) 0.23(SE)
5017	Wells: 12-23-5078, 44-22-5078, 23-23-5078 Power Drop	0.21(N), 0.34(SW), 0.37(ESE) 0.23(SE)
2022	Wells: 23-23-5078, 12-23-5078, 44-22-5078, 34-23-5078, 11-26-5078 Power Drop	0.23(E), 0.32(N), 0.36(SW), 0.39(SE), 0.48(S) 0.07(E)
5010	Wells: 34-23-5078, 23-23-5078, 11-26-5078, 43-23-5078 Power Drop	0.17(SE), 0.17(NNE), 0.38(SW), 0.47(ENE) 0.17(NW)
5827	Well: 41-26-5078 Impoundment: P24-24 Power Drop	0.49(W) 0.16(N) 0.23(W)
5013	Power Drop	0.17(SW)
5021	Wells: 14-35-5078D, 23-35-5078, 34-35-5078	0.45(NE), 0.47(NE), 0.47(ENE)
5019	Wells: 43-34-5078, 34-34-5078	0.37(NNW), 0.37(WNW)
1274	Well: 14-24-5078 Power Drop	0.47(E) 0.44(E)
2724	Wells: 14-7-4977, 13-7-4977 Power Drop Overhead powerline	0.42(SSE), 0.43(SE) 0.43(SE) 0.33 (S)
5833	Impoundment: P43-33	0.33(E)
5009	Well: 42-33-5077 Power Drop	0.49(E) 0.45(SE)

Individual raptor pairs (see Table 4 for species) will likely abandon nests 2022 and 5010 as the proposed development surrounds them. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Raptors Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

4.2.5.1. Threatened and Endangered Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NS	NLAA	Suitable habitat present, but plants highly unlikely.

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

- 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 Direct and Indirect Effects

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

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

The Ute ladies’-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants. Invasive weeds transplanted by vehicle and foot traffic in habitat could outcompete this fragile species. Restricting work from areas of Ute ladies’-tresses orchid habitat reduces these impacts.

Produced water is to be re-injected, and/or treated and piped to the Powder River and/or Dead Horse Creek, or contained within proposed on-channel reservoirs located within tributaries to the Powder River and Flying E Creek (WWC Engineering 2008).

The reservoirs are located within ephemeral drainages of Flying E Creek and the Powder River. No springs has been identified within the project area. These areas do not provide orchid habitat.

Suitable habitat is present within the PVU Delta project area along the Powder River. Numerous surveys over multiple years have been conducted along the Powder River with negative results for the plant. Therefore it is highly unlikely the orchid occurs within the project area.

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within the project area. Implementation of the proposed coal bed natural gas project should have “no effect” on the Ute ladies’- tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

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

4.2.5.2.1. Prairie dog colony obligates

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

4.2.5.2.2. Sagebrush obligates

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

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

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

Presence

K Known, documented observation within project area.

S Habitat suitable and species suspected, to occur within the project area.

NS Habitat suitable but species is not suspected to occur within the project area.

NP Habitat not present and species unlikely to occur within the project area.

Project Effects

NI No Impact.

MIH May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.

WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

BI Beneficial Impact

4.2.5.2.3. Bald eagle Direct and Indirect Effects

To reduce the risk of disruption to the winter roosting activities of bald eagles, the BLM BFO requires a 0.5 mile no surface occupancy radius and a one mile radius timing limitation of all winter roosts (either communal or consistent use). A large bald eagle roost site was identified within the project area. Consistent use has been documented from 2003 to the present within the S1/2 Section 28, E1/2 Section 32, W1/2 Section 33, T50N, R77W; and Section 5 and the N1/2 Section 8, T49N, R77W. A No Surface Occupancy (NSO) has been placed within 0.5 mile of the roost area. The 13-33 well was removed from the project plan due to its proximity to this roosting area. The following infrastructure is proposed within one mile of occupied bald eagle roosting habitat (Powder River): Wells: 34-33, 42-33, 34-7, 22-19, 41-19, 42-19, and 43-19; Impoundment: P43-33; and 0.2 mile of overhead powerlines.

To reduce the risk of decreased productivity or nest failure, BLM BFO requires a 0.5 mile no surface occupancy radius and a one mile radius timing limitation of all activity during the breeding season around active bald eagle nests. The following infrastructure is proposed within one mile of a occupied bald eagle nesting habitat (Powder River): Wells: 34-33, 42-33, 34-7, 22-19, 41-19, 42-19, and 43-19; Impoundment: P43-33; and 0.2 mile of overhead powerlines.

The following impacts from the Merrill Meadow EMITS facility should also be noted:

On December 19, 2006, Anadarko Petroleum Corporation - Lance Oil & Gas (APC-LOG) requested an exception to the bald eagle roost timing limitation stipulation Condition of Approval to the Powder Valley Unit Gamma POD in order to construct the Merrill Meadow treatment facility in NWNW Section 9, T49N, R77W. The BLM BFO granted an exception request under conditions of surveying the surrounding area and providing those survey results along with work schedules on the treatment facility to the BFO on a weekly basis (Ref: December 29, 2006 letter to Colleen Faber in PVU Gamma project file). On December 4, 18, 26, 27, and 29, 2006, adult bald eagles were observed on a large nest structure in NWNE Section 8, T49N, R77W, approximately 0.5 mile from the Merrill Meadow treatment facility site. Work began on the treatment facility on December 29, 2006. In subsequent survey reports (January 5, 10, 12, and 16, 2007), no additional bald eagle activity was ever recorded at this nest site. Although the facility was located outside of the 0.5 mile NSO for this nest, the activity permitted by exception request, during the timing limitation stipulation, disrupted bald eagles. It is the opinion of the BLM BFO biologist that the construction of this potential bald eagle nest was abandoned due to the activity associated with the construction of the Merrill Meadow treatment facility. In order to prevent this from occurring again, exception requests of this nature should not be granted in the future.

There are 11.1 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. APC-LOG is proposing an additional one mile of overhead three-phase distribution lines. There are currently 16.1 miles of improved roads within the project area, with no additional improved roads proposed.

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

electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water may be stored in two proposed on-channel impoundments which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the impoundments on eagles is unknown. The impoundments 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.

4.2.5.2.4. Black-tailed prairie dog Direct and Indirect Effects

Access/pipeline routes are proposed adjacent to the prairie dog town in SW Section 23, T50N, R78W. One access/pipeline route bisects the prairie dog town in NW Section 25, T50N, R78W. Well 43-35 was relocated approximately 400 feet north to remove it from the prairie dog town. This well is now located adjacent to the prairie dog town in SE Section 35, T50N, R78W.

Well houses and power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog road mortalities. During construction of these facilities, there is the possibility that prairie dogs within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and will cause an increase in prairie dog mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover.

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

4.2.5.2.5. Burrowing owl Direct and Indirect Effects

The 21-26 well was removed from the project plan due to no alternative location that would not impact the burrowing owl nest (BLM ID#) 86 could be found. The 14-23 well was relocated approximately 600 feet west to a location greater than 0.25 mile from burrowing owl nest (BLM ID#) 85. Impacts to burrowing owl habitat are described in section 4.2.5.2.4 of this EA.

The dramatic reduction of prairie habitat in the United States has been linked to reduction of burrowing owl populations (Klute et al. 2003). Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. Overhead power lines provide perch sites for larger raptors that could potentially result in increased burrowing owl predation. CBNG infrastructure such as roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

The USDAFS Thunder Basin National Grasslands in Campbell County, WY, whom cooperated with the BLM in the creation of the 2003 PRB EIS, recommends a 0.25 mile timing restriction buffer zone for burrowing nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to “use the least restrictive stipulations that effectively accomplish the resource objectives or uses.” Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to four and one half months (See Chapter 3 for breeding, nesting, and migration chronology) from six and one half months and from 0.5 mile to 0.25 mile.

4.2.5.2.6. Grouse

4.2.5.2.6.1. Greater sage-grouse Direct and Indirect Effects

There are seven sage-grouse leks located within four miles of the PVU Delta project area. The proposed action will adversely impact breeding, nesting, brood rearing, late summer, and winter habitat. Proposed project elements that are anticipated to negatively impact grouse are approximately: 44 CBNG wells on 43 locations, 17.2 miles of new roads, 5.1 miles of new pipelines, 1 mile of new overhead power, 2 new reservoirs, and increased vehicle traffic on established roads. Using 0.6 miles as a distance for impacts (Holloran et al. 2007, Aldridge and Boyce 2007), effective sage-grouse habitat loss will be 9,735 acres from 43 well locations, 10,449 acres from roads, 4,524 acres from pipelines, 1,272 acres from overhead power, and 1,200 acres from 2 reservoirs. These numbers are not additive since in many cases overlap exists across infrastructure buffers. A total of approximately 13,470 acres can be considered impacted by the PVU Delta project.

Of the 43 proposed wells locations, five were moved to reduce direct loss and fragmentation of sage-grouse habitat during the onsite visits. Well 12-26 was originally staked in an area of dense sagebrush and was relocated approximately 500 feet north. Well 34-26 was originally staked in an area of dense sagebrush and was relocated approximately 500 feet south. Well 43-26 was originally staked in an area of dense sagebrush and was relocated approximately 1090 feet south to a ridge-top closer to existing infrastructure. Well 21-19 was originally staked in an area of dense sagebrush and was relocated approximately 1100 feet south southeast, closer to existing infrastructure. Well 23-26 was originally staked in an area of dense sagebrush and was removed from the project plan. No other modifications were made to the project proposal to further mitigate impacts to sage-grouse. The operator, as part of their project plan, has committed to applying larvacide to all of the project impoundments, to bury nearly all of their new powerlines, and to install perch inhibitors to the proposed overhead line (one mile of overhead power is proposed within Section 12, T49N, R78W and Section 7, T49N, R77W).

Based on the best available science, which is summarized below, the proposed action will most likely contribute to abandonment of the seven leks within and surrounding the project area and to the potential extirpation of the local sage-grouse population.

4.2.5.2.6.2. Greater sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and associated infrastructure the project area also contains existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the Bear Draw, BLM, Coal Gulch, Flying E Creek, Maycock, Tear Drop I, and Tear

Drop II sage-grouse leks. As of July 28, 2008, there are approximately 678 existing wells and associated infrastructure within four miles of the seven leks - an area of 175 square miles. The existing well density is approximately 3.8 wells/section. Due to this level of development there is potential that the population(s) breeding at these leks may become extirpated without the federal development.

There are 213 proposed wells (44 are the wells from this project) within four miles of the seven leks. With the addition of 169 proposed wells that are not associated with this proposed action, the well density within four miles of the seven leks increases to 4.8 wells/section. With approval of alternative C (43 proposed well locations) the well density increases to 5 wells/section.

CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (WGFD 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

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

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

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004). Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce 2007). Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral

facilities overlap creating contiguous avoidance areas (WGFD 2004). As interpreted by a coordinated effort with state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately 1 well pad per square mile with the associated infrastructure, results in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (Holloran 2005, Walker et al. 2007)

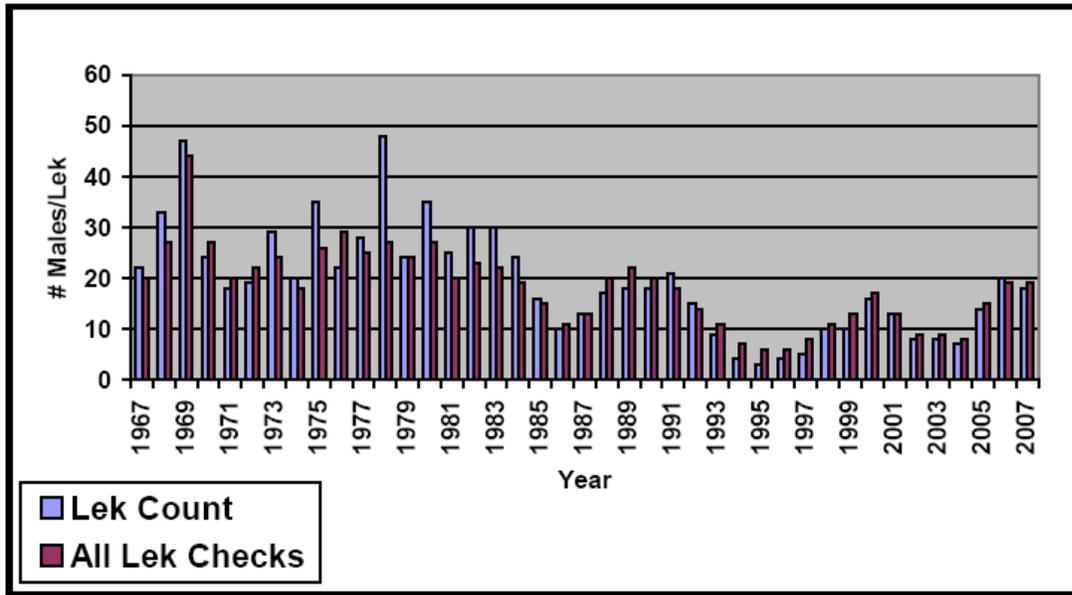
Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active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

Vegetation communities within the Powder River Basin are naturally fragmented, as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size has decreased by more than 63% in the past forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 2004). West Nile virus represents a significant new stressor, which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. comm.).

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

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



The BFO Resource Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho’s Snake River plain.

Additional studies, across more of the sage-grouse’s range, indicate that many populations nest much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage-grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found only 36% of their grouse nesting within 3 km of the capture lek. Moynahan’s study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. 2007). Habitat conditions and sage-grouse biology within the Buffalo Field Office are more similar to Moynahan’s north-central Montana study area than the Upper Green River area.

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

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

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

4.2.5.2.7. Sharp-tailed grouse Direct and Indirect Effects

Effects similar to sage-grouse.

4.2.5.2.8. Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is not present within the project area. The project should not impact mountain plovers.

4.2.5.3. Sensitive Species Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and

landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies. A Water Management Plan (WMP) that involves the following infrastructure and strategy: The primary water management strategy involves using existing water treatment facilities: Powder Valley Unit and Merrill Meadows EMITS facilities and Rohm and Haas fixed bed ion exchange facility at Dry Creek. Please review WYPDES permits for existing facilities in the WMPs for the aforementioned PODs. The secondary water management proposal includes 2 proposed discharge points and 2 proposed secondary stock water reservoirs within the Upper Powder River watershed. Proposed future water management strategy includes transporting produced water to Midwest, Wyoming for injection into the Madison aquifer.

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

The maximum water production is predicted to be 20.0 gpm per well or 880.0 gpm (1.96 cfs or 1419.2 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). As such, the volume of water resulting from the production of these wells is 0.8% 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 Upper Powder River drainage area (PRB FEIS pg 4-5). However, for this action, it may be assumed that none of the produced water will infiltrate due to the 2 proposed impoundments being secondary (not approved to be constructed).

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 120 to 1,077 feet compared to 1,200-2,150 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 - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years." (PRB FEIS page 4-38).

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

adversely impacted by well drilling and completion operations.

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

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

The BLM has installed shallow groundwater monitoring wells at five impoundment locations in the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. Water quality data has been sampled from these wells on a regular basis. Preliminary data from three sites show increasing TDS level as water infiltrates while two sites are not.

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. The BLM requires that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

Approximately 1650 new impoundment sites have been investigated with over 1850 borings as of December, 2007. Of those impoundments, 240 met the criteria to provide compliance monitoring data if constructed and used for CBNG water containment. Only 108 monitored impoundments are currently in use. As of the 4th quarter 2007, only 9 monitored impoundments exceed groundwater class of use limits (Fischer, 2008). The BLM requires that operators comply with the DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the

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

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

Predicted Values	TDS, mg/l	SAR	EC, μmhos/cm
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Arvada Gauging station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
Predicted Produced Water Quality Big George Coal Zone	2,550	36.5	3,990

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of treated produced water from this project from the WDEQ at the Powder Valley Unit EMITS facility (WY0047317 Major Modification) and the Merrill Meadow EMITS facility (WY0052248). WYPDES Permit WY0051934 will be provided when approved.

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 2550.0 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the Big George 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 20.0 gallons per minute (gpm) is projected is to be produced from these 44 wells, for a total of 880.0 gpm for the POD. See Table 4.5.

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

There are 2 proposed discharge points and 2 proposed secondary stock water reservoirs 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.

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 operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of treated produced water from this project from the WDEQ at the Powder Valley Unit EMITS facility (WY0047317 Major Modification) and the Merrill Meadow EMITS facility (WY0052248). WYPDES Permit WY0051934 will be provided when approved.

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 (1/2 mile) of the proposed CBNG wells.

In-channel downstream impacts are addressed in the WMP (page 25) for the Powder Valley Unit Delta POD prepared by Western Water Consultants for Lance Oil & Gas Company, Inc.

4.4.2.1. Surface Water Cumulative Effects

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

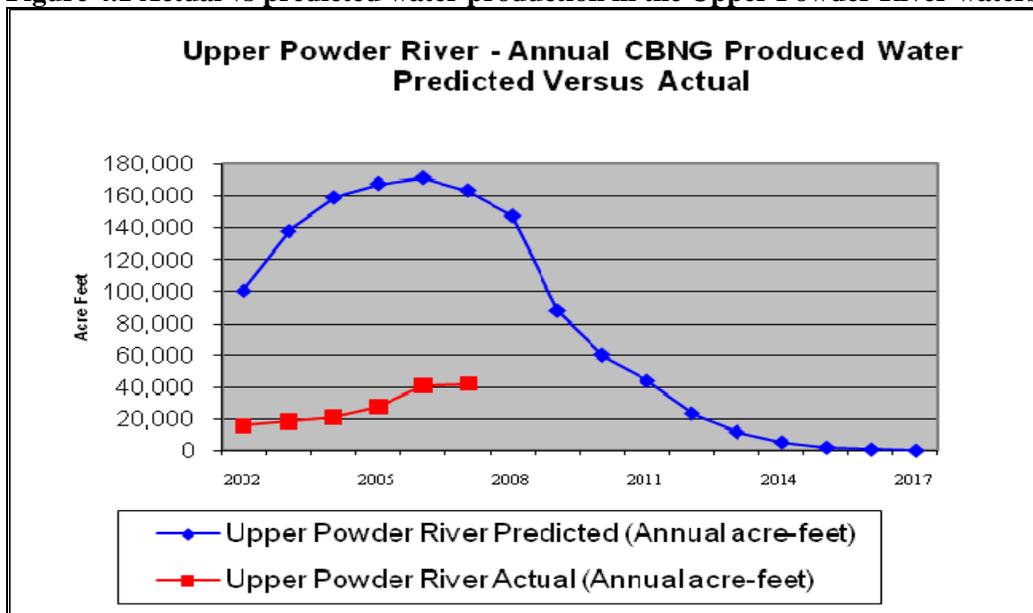
As of December 2007 all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 18.5% 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 2007 Data Update 3-08-08

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521				

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
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		166,096			

Figure 4.1 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. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 18.5% of the total predicted in the PRB FEIS for 2007.
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 Upper Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

BLM review, conducted by Wendy Sutton, has determined that two (2) sites and two (2) isolated resources will be impacted by the current project. The impacted sites (48JO2494 & 48JO2574) and isolates (IR1 & IR8) have been recommended as not eligible to the National Register of Historic Places. As such, these resources are not considered historic properties; therefore, the impact to this resource result in *no historic properties affected*. Following the Wyoming State Protocol, Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 8/5/2008 that the proposed project would result in *no historic properties affected/no effect* (DBU_WY_2008_1782).

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brad Rogers	Wildlife Biologist	US Fish & Wildlife Service	no
Conrad Fisher	Tribal Historic Preservation Officer	Northern Cheyenne	yes
Jo Ann White	Tribal Historic Preservation Officer	Northern Arapaho	yes
Curley Youpee	Tribal Historic Preservation Officer	Ft. Peck Assiniboine/Sioux	no

6. OTHER PERMITS REQUIRED

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

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