

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

XTO Energy Inc.
HD CBM Federal 2

ENVIRONMENTAL ASSESSMENT –WY-070-07-011

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize XTO’s HD CBM Federal 2 Coal Bed Natural Gas (CBNG) POD comprised of the following 47 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	HD CBM 2 HARTZOG	12-5BG*	SWNW	5	44N	75W	WYW56952
2	HD CBM 2 HARTZOG	21-5BG	NENW	5	44N	75W	WYW51705
3	HD CBM 2 HARTZOG	34-5BG	SWSE	5	44N	75W	WYW50394
4	HD CBM 2 HARTZOG	41-5BG	NENE	5	44N	75W	WYW50394
5	HD CBM 2 HARTZOG	43-5BG	NESE	5	44N	75W	WYW50394
6	HD CBM 2 HARTZOG	32-5BG	SWNE	5	44N	75W	WYW50394
7	HD CBM 2 HARTZOG	21-6BG	NENW	6	44N	75W	WYW51705
8	HD CBM 2 HARTZOG	32-6BG	SWNE	6	44N	75W	WYW56952
9	HD CBM 2 HARTZOG	41-6BG	NENE	6	44N	75W	WYW51705
10	HD CBM 2 HARTZOG	32-19BG	SWNE	19	45N	75W	WYW36691
11	HD CBM 2 HARTZOG	14-19BG	SWSW	19	45N	75W	WYW36691
12	HD CBM 2 HARTZOG	23-19BG	NESW	19	45N	75W	WYW36691
13	HD CBM 2 HARTZOG	34-19BG	SWSE	19	45N	75W	WYW36691
14	HD CBM 2 HARTZOG	41-19BG	NENE	19	45N	75W	WYW36197
15	HD CBM 2 HARTZOG	43-19BG	NESE	19	45N	75W	WYW36691
16	HD CBM 2 HARTZOG	21-20BG	NENW	20	45N	75W	WYW42610
17	HD CBM 2 HARTZOG	14-28BG	SWSW	28	45N	75W	WYW42610
18	HD CBM 2 HARTZOG	21-28BG	NENW	28	45N	75W	WYW0314786
19	HD CBM 2 HARTZOG	34-28BG	SWSE	28	45N	75W	WYW42610
20	HD CBM 2 HARTZOG	43-28BG	NESE	28	45N	75W	WYW42610
21	HD CBM 2 HARTZOG	14-29BG	SWSW	29	45N	75W	WYW42094
22	HD CBM 2 HARTZOG	12-30BG	SWNW	30	45N	75W	WYW36691
23	HD CBM 2 HARTZOG	14-30BG	SWSW	30	45N	75W	WYW36691
24	HD CBM 2 HARTZOG	21-30BG	NENW	30	45N	75W	WYW36691
25	HD CBM 2 HARTZOG	23-30BG	NESW	30	45N	75W	WYW36691
26	HD CBM 2 HARTZOG	32-30BG	SWNE	30	45N	75W	WYW36691
27	HD CBM 2 HARTZOG	34-30BG	SWSE	30	45N	75W	WYW36691
28	HD CBM 2 HARTZOG	41-30BG	NENE	30	45N	75W	WYW36691
29	HD CBM 2 HARTZOG	12-31BG	SWNW	31	45N	75W	WYW36691
30	HD CBM 2 HARTZOG	21-31BG	NENW	31	45N	75W	WYW36691
31	HD CBM 2 HARTZOG	23-31BG	NESW	31	45N	75W	WYW36691
32	HD CBM 2 HARTZOG	32-31BG	SWNE	31	45N	75W	WYW36691
33	HD CBM 2 HARTZOG	34-31BG	SWSE	31	45N	75W	WYW42609
34	HD CBM 2 HARTZOG	41-31BG	NENE	31	45N	75W	WYW36691
35	HD CBM 2 HARTZOG	43-31BG	NESE	31	45N	75W	WYW42609
36	HD CBM 2 HARTZOG	14-32BG	SWSW	32	45N	75W	WYW42609
37	HD CBM 2 HARTZOG	34-32BG	SWSE	32	45N	75W	WYW42609

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
38	HD CBM 2 HARTZOG	14-33BG	SWSW	33	45N	75W	WYW42609
39	HD CBM 2 HARTZOG	32-24BG	SWNE	24	45N	76W	WYW46867
40	HD CBM 2 HARTZOG	34-24BG	SWSE	24	45N	76W	WYW46867
41	HD CBM 2 HARTZOG	43-24BG	NESE	24	45N	76W	WYW46867
42	HD CBM 2 HARTZOG	12-25BG	SWNW	25	45N	76W	WYW42622
43	HD CBM 2 HARTZOG	23-25BG	NESW	25	45N	76W	WYW42622
44	HD CBM 2 HARTZOG	32-25BG	SWNE	25	45N	76W	WYW46867
45	HD CBM 2 HARTZOG	34-25BG	SWSE	25	45N	76W	WYW46867
46	HD CBM 2 HARTZOG	41-25BG	NENE	25	45N	76W	WYW46867
47	HD CBM 2 HARTZOG	43-25BG	NESE	25	45N	76W	WYW46867

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Bonns	SWNE	24	45	76	WYW46867
2	East Summer	SWNE	32	45	75	WYW43685

The following wells will not be approved at this time

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	HD CBM 2 HARTZOG	12-6BG	SWNW	6	44N	75W	WYW51705
2	HD CBM 2 HARTZOG	14-31BG	SWSW	31	45N	75W	WYW36691

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

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

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
 - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.

6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.
9. Wells 12-6BG and 14-31BG and associated infrastructure will not be approved at this time. The Bureau is in the process of conducting Native American and SHPO consultation for impacts of development to the setting of the Pumpkin Buttes traditional cultural property. The Bureau will not initiate consultation for the HD CBM #2 wells until the completion of a memorandum of agreement between the BLM, SHPO and several tribes for the nearby Dry Willow POD. After the consultation process is complete and prior to approval, the proposed well locations and infrastructure may be modified or mitigated as a result of the consultation.

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
XTO
HD CBM Federal 2
PLAN OF DEVELOPMENT
WY-070-07-011**

INTRODUCTION

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

1. PURPOSE AND NEED

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Description of the Proposed Action

Proposed Action Title/Type: XTO Energy’s HD CBM Federal 2 Plan of Development (POD) for 52 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 52 wells proposed within this POD, as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	HD CBM 2 HARTZOG	12-5BG*	SWNW	5	44N	75W	WYW56952
2	HD CBM 2 HARTZOG	21-5BG	NENW	5	44N	75W	WYW51705
3	HD CBM 2 HARTZOG	34-5BG	SWSE	5	44N	75W	WYW50394
4	HD CBM 2 HARTZOG	41-5BG	NENE	5	44N	75W	WYW50394
5	HD CBM 2 HARTZOG	43-5BG	NESE	5	44N	75W	WYW50394
6	HD CBM 2 HARTZOG	32-5BG	SWNE	5	44N	75W	WYW50394
7	HD CBM 2 HARTZOG	12-6BG	SWNW	6	44N	75W	WYW51705
8	HD CBM 2 HARTZOG	14-6BG	SWSW	6	44N	75W	WYW145164
9	HD CBM 2 HARTZOG	21-6BG	NENW	6	44N	75W	WYW51705
10	HD CBM 2 HARTZOG	32-6BG	SWNE	6	44N	75W	WYW56952
11	HD CBM 2 HARTZOG	41-6BG	NENE	6	44N	75W	WYW51705
12	HD CBM 2 HARTZOG	32-19BG	SWNE	19	45N	75W	WYW36691
13	HD CBM 2 HARTZOG	14-19BG	SWSW	19	45N	75W	WYW36691
14	HD CBM 2 HARTZOG	23-19BG	NESW	19	45N	75W	WYW36691
15	HD CBM 2 HARTZOG	34-19BG	SWSE	19	45N	75W	WYW36691
16	HD CBM 2 HARTZOG	41-19BG	NENE	19	45N	75W	WYW36197
17	HD CBM 2 HARTZOG	43-19BG	NESE	19	45N	75W	WYW36691
18	HD CBM 2 HARTZOG	21-20BG	NENW	20	45N	75W	WYW42610
19	HD CBM 2 HARTZOG	14-28BG	SWSW	28	45N	75W	WYW42610
20	HD CBM 2 HARTZOG	21-28BG	NENW	28	45N	75W	WYW0314786
21	HD CBM 2 HARTZOG	34-28BG	SWSE	28	45N	75W	WYW42610
22	HD CBM 2 HARTZOG	43-28BG	NESE	28	45N	75W	WYW42610
23	HD CBM 2 HARTZOG	14-29BG	SWSW	29	45N	75W	WYW42094
24	HD CBM 2 HARTZOG	12-30BG	SWNW	30	45N	75W	WYW36691
25	HD CBM 2 HARTZOG	14-30BG	SWSW	30	45N	75W	WYW36691
26	HD CBM 2 HARTZOG	21-30BG	NENW	30	45N	75W	WYW36691
27	HD CBM 2 HARTZOG	23-30BG	NESW	30	45N	75W	WYW36691
28	HD CBM 2 HARTZOG	32-30BG	SWNE	30	45N	75W	WYW36691
29	HD CBM 2 HARTZOG	34-30BG	SWSE	30	45N	75W	WYW36691
30	HD CBM 2 HARTZOG	41-30BG	NENE	30	45N	75W	WYW36691
31	HD CBM 2 HARTZOG	12-31BG	SWNW	31	45N	75W	WYW36691
32	HD CBM 2 HARTZOG	14-31BG	SWSW	31	45N	75W	WYW36691
33	HD CBM 2 HARTZOG	21-31BG	NENW	31	45N	75W	WYW36691
34	HD CBM 2 HARTZOG	23-31BG	NESW	31	45N	75W	WYW36691
35	HD CBM 2 HARTZOG	32-31BG	SWNE	31	45N	75W	WYW36691
36	HD CBM 2 HARTZOG	34-31BG	SWSE	31	45N	75W	WYW42609
37	HD CBM 2 HARTZOG	41-31BG	NENE	31	45N	75W	WYW36691
38	HD CBM 2 HARTZOG	43-31BG	NESE	31	45N	75W	WYW42609
39	HD CBM 2 HARTZOG	14-32BG	SWSW	32	45N	75W	WYW42609
40	HD CBM 2 HARTZOG	34-32BG	SWSE	32	45N	75W	WYW42609
41	HD CBM 2 HARTZOG	41-32BG	NENE	32	45N	75W	WYW42094
42	HD CBM 2 HARTZOG	14-33BG	SWSW	33	45N	75W	WYW42609
43	HD CBM 2 HARTZOG	32-24BG	SWNE	24	45N	76W	WYW46867
44	HD CBM 2 HARTZOG	34-24BG	SWSE	24	45N	76W	WYW46867
45	HD CBM 2 HARTZOG	43-24BG	NESE	24	45N	76W	WYW46867
46	HD CBM 2 HARTZOG	12-25BG	SWNW	25	45N	76W	WYW42622
47	HD CBM 2 HARTZOG	21-25BG	NENW	25	45N	76W	WYW42622

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
48	HD CBM 2 HARTZOG	23-25BG	NESW	25	45N	76W	WYW42622
49	HD CBM 2 HARTZOG	32-25BG	SWNE	25	45N	76W	WYW46867
50	HD CBM 2 HARTZOG	34-25BG	SWSE	25	45N	76W	WYW46867
51	HD CBM 2 HARTZOG	41-25BG	NENE	25	45N	76W	WYW46867
52	HD CBM 2 HARTZOG	43-25BG	NESE	25	45N	76W	WYW46867

County: Campbell

Applicant: XTO Energy Inc. (The operator)

Surface Owners: John Christensen, Bob Christensen

The proposed action involves the development of the project, which includes the following:

- Drilling of 52 total federal CBM wells in Big George, and coal zones to depths of approximately 1031 to 1770 feet.
- An unimproved and improved road network.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 1 discharge point within the Upper Belle Fourche River watershed and 2 emergency discharge points and 2 stock water reservoirs within the Upper Powder River watershed. The water produced in association with Federal minerals from this project will be added to an existing water system which services the Hartzog Draw area and is transported to the existing outfall at the Belle Fourche River. The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) Permit (WY0052370) to discharge to the waters of the State from the Wyoming Department of Environmental Quality (WDEQ). In the event of an emergency, there may be temporary discharge to the two impoundments included in this project area.
- A buried gas, water and power line network, and compression facilities.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

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

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

At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or minimize environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate or minimize environmental effects of the operator’s proposal. The specific changes identified for the HD CBM Federal 2 POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Lease #	Well #	Aliquot	Sec	T/R	Notes
WYW56952	12-5	SWNW	5	44/75	Relocated well to existing conventional well pad. Operator will provide new APD and Well Plat.
WYW51705	21-5	NENW	5	44/75	Relocated well to existing conventional well pad to the SW. Operator will provide new APD and Well Plat.
WYW50394	32-5	SWSE	5	44/75	No changes.
WYW50394	34-5	SWNE	5	44/75	Relocated well to existing well pad. Operator will provide new APD and Well Plat. Relocated pipeline corridor (to south) to avoid sage habitat.
WYW50394	41-5	NENE	5	44/75	Relocated well to existing conventional well pad to the SE. Operator will provide new APD and Well Plat. Valve station 62 will be eliminated or moved. Pipeline corridor will not cross between the 34-32 and the 41-5.
WYW50394	43-5	NESE	5	44/75	Relocated well to existing conventional well pad to the south. Operator will provide new APD and Well Plat. Relocated pipeline to the edge of the disturbed area.
WYW51705	12-6	SWNW	6	44/75	Drilling pit will be lined due to proximity to drainage.
WYW145164	14-6	SWSW	6	44/75	No changes.

Lease #	Well #	Aliquot	Sec	T/R	Notes
WYW51705	21-6	NENW	6	44/75	Relocated well ~81 yards S to existing conventional well pad. Operator will provide new APD and Well Plat.
WYW56952	32-6	SWNE	6	44/75	No changes.
WYW51705	41-6	NENE	6	44/75	Relocated well ~180 feet west to edge of existing conventional well pad. Operator will provide new APD and Well Plat.
WYW36691	14-19	SWSW	19	45/75	No changes at well site.
WYW36691	23-19	NESW	19	45/75	Relocated well ~ 67 yards north to the edge of existing conventional well disturbance. Operator will submit new APD and Well Plat.
WYW36691	32-19	SWNE	19	45/75	Relocated well ~ 65 yards south to the edge of existing conventional well disturbance. Operator will submit new APD and Well Plat.
WYW36691	34-19	SWSE	19	45/75	Relocated well 69 yards to the SW to existing pad. Operator will submit new APD and Well Plat. The overhead power here is not on the map.
WYW36197	41-19	NENE	19	45/75	No changes to well site. Reroute access corridor from SE to N to reduce the amount of surface disturbance.
WYW36691	43-19	NESE	19	45/75	No changes to well site. Relocate power drop back to the existing line. No additional overhead spans to the well.
WYW42610	21-20	NENW	20	45/75	No changes.
WYW42610	14-28	SWSW	28	45/75	No changes to well site. Rerouted pipeline corridor out of the sage to follow the existing pl ROW to the east then north to the valve set.
WYW0314786	21-28	NENW	28	45/75	No changes to well site. Rerouted pipeline corridor out of the sage to follow access route. Drilling Pit will be lined.
WYW42610	34-28	SWSE	28	45/75	No changes.
WYW42610	43-28	NESE	28	45/75	No changes to well site. Power drop will be located here. Proposed overhead power to the SE will be eliminated.
WYW42094	14-29	SWSW	29	45/75	Relocated well to the edge of the existing conventional well pad. Operator will submit new APD and Well Plat.
WYW36691	12-30	SWNW	30	45/75	Relocated well to edge of existing conventional well disturbance. Operator will submit new APD and Well Plat.
WYW36691	14-30	SWSW	30	45/75	No changes at well site.
WYW36691	21-30	NENW	30	45/75	Relocated well 64 yards to the SW to existing pad. Operator will submit new APD and Well Plat.
WYW36691	23-30	NESW	30	45/75	No changes at well site.

Lease #	Well #	Aliquot	Sec	T/R	Notes
WYW36691	32-30	SWNE	30	45/75	Relocated the well to the edge of the compressor station located to the SE. Operator will submit new APD and Well Plat.
WYW36691	34-30	SWSE	30	45/75	No changes at well site. Pipeline corridor relocated to follow the existing two track.
WYW36691	41-30	NENE	30	45/75	Relocated well 40 yards south to the edge of existing conventional well pad. Operator will submit new APD and Well Plat.
WYW36691	12-31	SWNW	31	45/75	No changes.
WYW36691	14-31	SWSW	31	45/75	No changes.
WYW36691	21-31	NENW	31	45/75	Rerouted pipeline corridor to the SE to VS 70.
WYW36691	23-31	NESW	31	45/75	No changes.
WYW36691	32-31	SWNE	31	45/75	Pipeline corridor from VS 68 will be rerouted to follow the existing two track.
WYW42609	34-31	SWSE	31	45/75	Relocated well ~ 100 yards SW. Operator will provide new APD and Well Plat.
WYW36691	41-31	NENE	31	45/75	Relocated well ~35 yards S to existing conventional well pad. Operator will provide new APD and Well Plat.
WYW42609	43-31	NESE	31	45/75	No changes.
WYW42609	14-32	SWSW	32	45/75	Relocated well ~ 146 yards SW. Operator will provide new APD and Well Plat.
WYW42609	34-32	SWSE	32	45/75	Relocated well to existing conventional well pad to the SW. Operator will provide new APD and Well Plat. Pipelines would follow existing C&D roads.
WYW42094	41-32	NENE	32	45/75	No changes at well site. Pipeline corridor will be rerouted to follow access route.
WYW42609	14-33	SWSW	33	45/75	Relocated well to existing conventional well pad to the NW. Operator will provide new APD and Well Plat. Rerouted pipeline to follow existing crowned and ditched road to the SE then across to the 41-5 well.
WYW46867	32-24	SWNE	24	45/76	Rerouted access from south across dam crest to the NW from existing conventional well. Will corridor with pipelines. Drilling pit will be lined.
WYW46867	34-24	SWSE	24	45/76	Pipeline will be rerouted to corridor with the existing C&D to the south.
WYW46867	43-24	NESE	24	45/76	No changes at well site.
WYW42622	12-25	SWNW	25	45/76	Relocate the well 130 yards to the south to avoid sagebrush habitat. Pipeline should be rerouted to follow existing C&D to the north (if possible). Operator will submit new APD and Well Plat.
WYW42622	21-25	NENW	25	45/76	Well staked 150 feet from active raptor nest. Well must be relocated >1/4 mile from the nest. Operator will submit new APD and Well Plat.

Lease #	Well #	Aliquot	Sec	T/R	Notes
WYW42622	23-25	NESW	25	45/76	No changes at well site. Access to the location is steep and must be evaluated by a Professional Civil Engineer.
WYW46867	32-25	SWNE	25	45/76	No changes at well site.
WYW46867	34-25	SWSE	25	45/76	No changes at well site. No Overhead Power will be permitted to the west of this location due to proximity of sage grouse lek.
WYW46867	41-25	NENE	25	45/76	No changes at well site.
WYW46867	43-25	NESE	25	45/76	No changes at well site.
			19, 24, 25, 28 and 31	45/75 and 76	The wells in these sections should be relocated to the existing well pads to reduce the amount of new disturbance.

Additional changes:

08-25-06: The operator met with the landowners to review the changes made at the onsite. As a result, the operator proposed additional changes. The changes which were agreed upon by the Interdisciplinary Team are listed below:

1. Well 23-19 NESW Sec 19 T45N R75W was relocated toward the existing road, rather than on the existing conventional well pad.
2. Well 14-29 SWSW Sec 29 T45N R75W was relocated to an existing well pad at the onsite. The landowner would prefer that the well remain as originally staked but relocated the access route to an existing pipeline disturbance. The well location will remain as originally staked.
3. Well 32-30 SWNE Sec 30 T45N R75W was relocated to the edge of a proposed compressor station. The operator determined that this was not an acceptable move. The well was relocated to an existing well pad to the west.

10-12-06: Three wells were withdrawn.

1. Well 21-25 NENW Sec 25 T45N R76W was proposed to be relocated to an existing well at the 31-25 location. This move would have created spacing conflicts. The well was withdrawn.
2. Well 41-32 NENE Sec 32 T45N R75W was withdrawn. The well will be submitted by a different operator.
3. Well 14-6 SWSW Sec 6 T44N R75W was withdrawn. The well will be submitted by a different operator.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Surface Water

1. Channel Crossings:
 - a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry

the 25-year discharge event or other capacities as directed by the BLM.

- b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
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.

2.3.2.2. Soils

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

2.3.2.3. Vegetation

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

2.3.2.4. Wetland/Riparian

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

2.3.2.5. 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 construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
3. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
4. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.

5. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.
6. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Mountain Plover

1. A disturbance-free buffer zone of 0.25 mile will be established around all mountain plover nesting locations between March 15 and July 31.
2. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of known mountain plover nest sites.
3. Construction of ancillary facilities (for example, compressor stations, processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.
4. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
5. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.
6. When above ground markers are used on capped and abandoned wells, they will be identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

General

1. All changes made at the onsite will be followed. They have all been incorporated into the operator’s POD.
2. Please contact Kathy Brus, Natural Resource Specialist, @ (307) 684-1087, Bureau of Land Management, Buffalo, if there are any questions concerning these COAs.

Surface Use

1. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The colors selected for the HD CBM 2 POD is Carlsbad Canyon (Munsell Soil Color 2.5Y 6/2).
2. Provide 4” of aggregate where grades exceed 8% for stability and erosion prevention.
3. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

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

4. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
Reclamation Standards:
C. 3. The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.
5. 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. Attachment 1 is a map of the project area which identifies the ecological sites and designates the seed mix preference. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

Loamy Ecological Site Seed Mix		
Species	% in Mix	Lbs PLS*
Western Wheatgrass (Pascopyrum smithii)/or Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	30	3.6
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Green needlegrass (Nassella viridula)	25	3.0
Slender Wheatgrass (Elymus trachycaulus ssp. trachycaulus)	20	2.4
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata) /or American vetch (Vicia americana)	5	0.6
Totals	100%	12 lbs/acre

Sandy Ecological Site Seed Mix		
Species	% in Mix	Lbs PLS*
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	20	2.4
Prairie sandreed (Calamovilfa longifolia)	30	3.6
Indian ricegrass (Achnatherum hymenoides)	20	2.4
Needleandthread (Hesperostipa comata ssp. comata)	15	1.8
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Scarlet Globemallow (Sphaeralcea coccinea) / or Blue flax (Linum lewisii)	5	0.6
Totals	100%	12 lbs/acre

*PLS = pure live seed

*Northern Plains adapted species

*Double this rate if broadcast seeding

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

6. Wherever access routes or proposed disturbance crosses Sandy ecological sites and especially on

slopes, the operator will insure expedient reclamation and stabilization. One such area identified is the access road to the 14-28 location.

7. The drilling pits at the following locations will be lined due to close proximity to drainage:
 - Well 21-28 NENW Sec 28
 - Well 32-24 SWNE Sec 24

Wildlife

1. Observations of any threatened, endangered, proposed, or candidate species within the project area shall be reported to the BLM Buffalo Field Office (307-684-1100).
2. If any dead or injured sensitive species is located during construction or operation, the BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
3. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
4. No project related disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing stipulation will affect the following:

Township/Range	Section	Affected Wells and Infrastructure
T45N R75W	33	14-33 its infrastructure and utility line in the western half of Section 33.
T45N R75W	32	41-32, 34-32, and all proposed infrastructure in the eastern ½ of the section.
T45N R75W	30	41-30 and its associated infrastructure; all utility lines in the northeast quarter.
T45N R75W	29	All infrastructure in the northwest quarter of the section.
T45N R75W	28	14-28, 34-28, and their associated infrastructure; access road/pipeline to well 43-28.
T45N R75W	25	21-25, 12-25, 32-25 and all their associated infrastructure.
T44N R75 W	5	32-5, 43-5, 34-5, 41-5 and all their associated infrastructure.

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

BLM ID #	UTM N	UTM E	Legal
4014	4854771	431343	NESE Sec 27 T45N, R75W
4015	4856476	431771	NESE Sec 22 T45N, R75W
666	4851713	428236	SESE Sec 5 T45N, R75W
3137	4855790	424056	SWSW Sec. 24 T45N, R76W

5. 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.
6. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
7. No surface disturbing activities are permitted within 2 miles of a sage grouse lek between March 1 and June 15, prior to completion of a greater sage grouse lek survey. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing stipulation will affect the following:

Township/Range	Section	Affected Wells and Infrastructure
T45N R75W	19	32-19, 23-19,14-19 and all there associated infrastructure.
T45N R75W	29	14-29 and all infrastructure in the western half of section 29.
T45N R75W	30	All of section 30.
T45N R75W	31	All of section 31.
T45N R75W	32	14-32 and all infrastructure in the western 2/3 of section 32.
T44N R75W	6	All of section 6.
T45N R76W	24	All of section 24
T45N R76W	25	All of section 25

- a. 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.
 - b. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
8. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours.
9. Power lines will be buried whenever possible in the project area to protect bald eagles and other important wildlife. When it is not possible to bury them, overhead power lines will be constructed to the most recent standards identified by the Avian Power Line Interaction Committee and the additional measures outlined in the PRB FEIS to minimize raptor electrocution potential.

For new distribution lines and facilities:

- A. Raptor-safe structures (e.g., with increased conductor-conductor spacing) are to be used that provide adequate spacing for bald eagles (i.e. minimum 60" for bald eagles).
- B. Equipment installations (overhead service transformers, capacitors, reclosers, etc.) are to be made bald eagle safe (e.g., by insulating the bushing conductor terminations and by using covered jumper conductors).
- D. Jumper conductor installations (e.g. corner, tap structures, etc.) are to be made bald eagle safe by using covered jumpers or providing adequate separation.
- E. Employ covers for arrestors and cutouts, when necessary.
- F. Lines should avoid high avian use areas such as wetlands, prairie dog towns, and grouse leks.

10. Existing facilities which are associated with the CBNG wells will be upgraded within 6 weeks of the initiation of project construction, to comply with the most recent APLIC criteria. Areas for modification of existing facilities have been identified (see attachment map). For those modifications, areas for attention include:
- A. Existing structures, such as dead ends, tap or junction poles, transformers, reclosers and capacitor banks or other structures with less than 60" between conductors or a conductor and ground will need to be retrofitted to provide adequate spacing for bald eagles (i.e. minimum 60" for bald eagles).
 - B. Cover exposed jumpers
 - C. Gap any pole top ground wires
 - D. Isolate grounded guy wires (install insulating link)
 - E. On transformers, install insulated bushing covers, covered jumpers, and cutout covers and arrestor covers, if necessary
 - F. If bald eagle mortalities occur on existing lines and structures, bald eagle protection measures are to be applied (e.g. modify for raptor-safe construction, install safe perches or perching deterrents, nesting platforms or nest deterrent devices, etc.).

Water Management

1. The operator will sample the springs as listed below twice each year (spring and fall) for the duration of production to determine any changes in water quality or quantity. Analysis will follow the WYPDES Permit quality criteria suite. Copies of water quality and quantity data will be reported to the BLM BFO. If it is determined that either are changing as a result of CBNG production in the area, additional mitigation may be required.

Name	Qtr/Qtr	Sec	T(N)	Range
Spring	SWSW	5	44	75
Spring	SENW	5	44	75
Spring	NWNE	5	44	75
Spring	SWNE	6	44	75
Spring	NENE	6	44	75
Spring	SENE	32	45	75
Spring	SENW	32	45	75
Unnamed Spring	SENE	32	45	75
Y-Spring	SENW	28	45	75

2. To control erosion, no water will be allowed to overflow the tire stock water tanks.
3. The operator shall submit to the BLM a copy of the National Pollution Discharge Elimination System (NPDES) Permits for discharge into the Bonns and East Summer impoundments as they become available from the Wyoming Department of Environmental Quality (WDEQ). The operator has committed to comply with all the regulations and reporting requirements of the NPDES permits as issued by the WDEQ for this action.

2.4. Alternatives considered but not analyzed in detail

Most of the alternatives discussed for this project concerned water management. The operator and contractors considered the following alternatives in the water management plan (WMP), but did not include them in the water management strategy.

- Land application disposal – not cost effective, landowner concerns.
- Total containment – excessive surface disturbance, not cost effective.
- Treatment – not currently necessary based on water analysis and WYPDES permit requirements.
- Reinjection – not cost effective.

For more information regarding these alternatives, please see the HD#2 WMP page 3.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 03-13-06. Field inspections of the proposed HD CBM Federal 2 CBM project were conducted as follows:

- 06-13-06 by John Christensen – Landowner; Christy Haswell, Paul Huson, Ken Fox and Mike Cole – Pearl Development; Al Erwin, John Kluz and Dave – XTO; Guymen Easdale, and Kathy Brus – BLM
- 06-14-06 by Bob Christensen – Landowner; Christy Haswell, Paul Huson, Ken Fox and Mike Cole – Pearl Development; Al Erwin, John Kluz and Dave – XTO; Guymen Easdale, and Kathy Brus – BLM
- 06-15-06 by Christy Haswell, Paul Huson, Ken Fox and Mike Cole – Pearl Development; Al Erwin, John Kluz and Dave – XTO; Guymen Easdale, and Kathy Brus – 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			Guymen Easdale
Floodplains		X		Kathy Brus
Wilderness Values			X	Kathy Brus
ACECs			X	Kathy Brus
Water Resources	X			Kathy Brus
Air Quality		X		Kathy Brus
Cultural or Historical Values		X		G.L. “Buck” Damone III
Prime or Unique Farmlands			X	Kathy Brus
Wild & Scenic Rivers			X	Kathy Brus
Wetland/Riparian		X		Kathy Brus
Native American Religious Concerns		X		G.L. “Buck” Damone III
Hazardous Wastes or Solids		X		Kathy Brus
Invasive, Nonnative Species	X			Kathy Brus
Environmental Justice		X		Kathy Brus

3.1. Topographic Characteristics of Project Area

The HD#2 Federal POD area lies south of Gillette in an area comprised of primarily gently rolling hills typical of the short grass prairie located in the southeastern portion of the Powder River Basin. The landscape is shaped by the generally low gradient intermediate to primarily ephemeral drainages. This project falls within Major Land Resource Area 58B in the 10 to 14 inch precipitation zone as defined by the Natural Resource Conservation Service.

To the south and west of the project area lie the Pumpkin Buttes. These major features are flat mesas formed by the weathering of resistant cap rock (White River formation). Pumpkin Buttes are visible from all locations in the proposed project and from most areas within the Powder River Basin. The Buttes rise over 700 feet above the surrounding prairie and dominate the landscape. Generations of travelers and

settlers have used the Buttes as a focal point for navigation. The highest point in the area is west of the HD CBM #2 POD boundary at 6052 feet above sea level at the top of the North Butte. The lowest point in the area is located to the north of the POD along a tributary to Pumpkin Creek at 4800 feet above sea level. The topography is rolling to relatively flat (3-10% slope) with numerous draws (rather wide with gently rising slopes) throughout the project area.

Recent historical uses of the lands in this area are ranching, stock grazing, dryland farming, conventional oil and gas production, uranium mining and most recently CBNG development. Conventional oil field development and the origination of the Hartzog Draw unit was commenced in 1980 by Exxon. There is existing road and pipeline infrastructure which was developed by the mineral companies as well as ranch operations. The entire POD area (9105 acres) is privately held surface which overlays an intermingled patchwork of mineral ownership in the following percentages: 86% federal, 8% private, and 6% state.

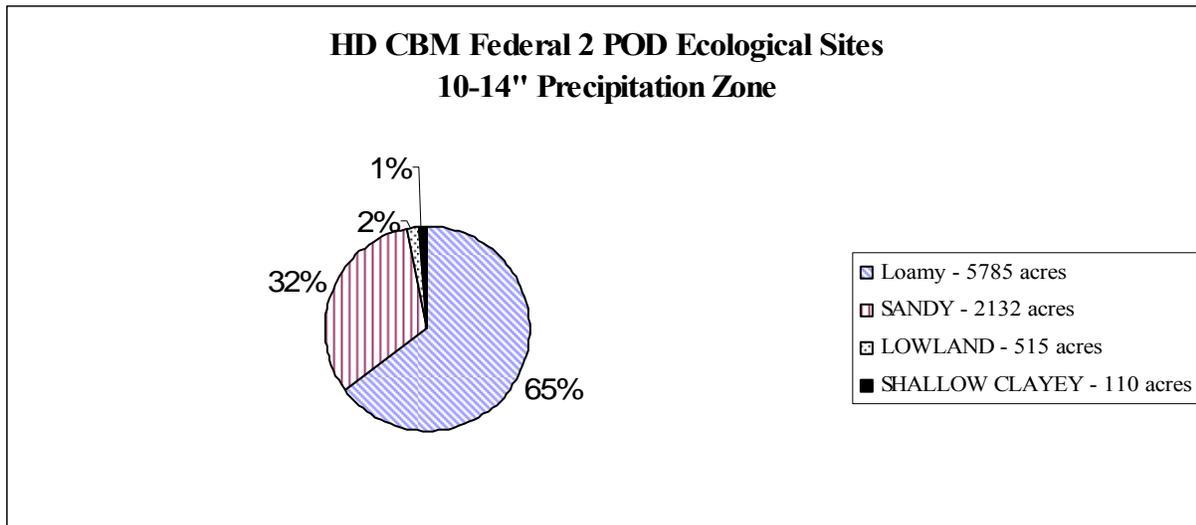
The project area is primarily grass land consisting mostly of native grasses. Sage brush cover is primarily sparse (0-5 %) with small pockets (0.5 to 10 acres) of moderate to dense (10-20 %) growth occurring throughout the project area. The project area lacks any stands of mature trees, and only a few scattered lone cottonwoods are present.

3.2. Vegetation & Soils

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification and management recommendations. To determine the appropriate Ecological Sites for this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information.

The Ecological Sites and plant communities identified in this POD and its infrastructure are predominately loamy (mixed sagebrush/ cheat grass) and sandy (Threadleaf sedge/fringed sagewort/Plains prickly pear cactus). Figure 3.1 summarizes the soil types within the POD boundary. As discussed previously, the area is predominantly gently sloped with moderate steepness associated with incised ephemeral drainage. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area.

Figure 3.1 Percentage of Soil Types within the HD CBM Federal 2 POD boundary



Loamy Sites

Well sites and associated infrastructure:

Well Number	Qtr/Qtr	Sec	T/R	Soil Site	Map symbol and Soil Name
34-5	SWNE	5	44/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
21-6	NENW	6	44/75	Loamy	109 Bidman loam, 0 to 6% slopes
32-6	SWNE	6	44/75	Loamy	233 Ustic Torriorthents, gullied
41-6	NENE	6	44/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
14-19	SWSW	19	45/75	Loamy	145 Forkwood-Cambria loams, 0 to 6% slopes
23-19	NESW	19	45/75	Loamy	148 Forkwood-Ulm loams, 0 to 6% slopes
32-19	SWNE	19	45/75	Loamy	148 Forkwood-Ulm loams, 0 to 6% slopes
41-19	NENE	19	45/75	Loamy	116 Cambria-Kishona-Zigweid loams, 0 to 6% slopes
43-19	NESE	19	45/75	Loamy	116 Cambria-Kishona-Zigweid loams, 0 to 6% slopes
21-28	NENW	28	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
34-28	SWSE	28	45/75	Loamy	215 Theedle-Kishona loams, 6 to 20% slopes
14-29	SWSW	29	45/75	Loamy	214 Theedle-Kishona loams, 0 to 6% slopes
12-30	SWNW	30	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
14-30	SWSW	30	45/75	Loamy	145 Forkwood-Cambria loams, 0 to 6% slopes
21-30	NENW	30	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
23-30	NESW	30	45/75	Loamy	144 Forkwood loam, 0 to 6% slopes
32-30	SWNE	30	45/75	Loamy	145 Forkwood-Cambria loams, 0 to 6% slopes
34-30	SWSE	30	45/75	Loamy	145 Forkwood-Cambria loams, 0 to 6% slopes
41-30	NENE	30	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
12-31	SWNW	31	45/75	Loamy	121 Cushman-Cambria loams, 0 to 6% slopes
21-31	NENW	31	45/75	Loamy	214 Theedle-Kishona loams, 0 to 6% slopes
23-31	NESW	31	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
32-31	SWNE	31	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
34-31	SWSE	31	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
41-31	NENE	31	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
14-32	SWSW	32	45/75	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
32-24	SWNE	24	45/76	Loamy	215 Theedle-Kishona loams, 6 to 20% slopes
34-24	SWSE	24	45/76	Loamy	116 Cambria-Kishona-Zigweid loams, 0 to 6% slopes
43-24	NESE	24	45/76	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
12-25	SWNW	25	45/76	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
32-25	SWNE	25	45/76	Loamy	116 Cambria-Kishona-Zigweid loams, 0 to 6% slopes
34-25	SWSE	25	45/76	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
43-25	NESE	25	45/76	Loamy	146 Forkwood-Cushman loams, 0 to 6% slopes
32-5	SWSE	5	44/75	Loamy/Sandy	217 Theedle-Shingle loams, 3 to 30% slopes
43-31	NESE	31	45/75	Loamy/Sandy	146 Forkwood-Cushman loams, 0 to 6% slopes

Well Number	Qtr/Qtr	Sec	T/R	Soil Site	Map symbol and Soil Name
21-20	NENW	20	45/75	Lowland	153 Haverdad-Kishona association, 0 to 6% slopes
34-19	SWSE	19	45/75	Lowland Loamy	153 Haverdad-Kishona association, 0 to 6% slopes

Loamy ecological sites occur on gently undulating rolling land which includes landform such as hill sides and ridges in this project area. The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this area would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community. It was in a natural dynamic equilibrium with the historic biotic, abiotic, climatic factors on its ecological site at the time of settlement. Rhizomatous wheatgrasses and annuals will eventually dominate the site. The current plant community is Mixed Sagebrush/Grass, which was created when the vegetation was subjected to fire or brush management and not followed by prescribed grazing. Compared to the HCPC, cheatgrass has invaded with western wheatgrass and thickspike wheatgrass maintaining at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low.

The soils of this site are deep to moderately deep (greater than 20" to bedrock), well drained and moderately permeable. The main soil limitations include low organic matter content and soil droughtiness.

Wyoming big sagebrush is a significant component of this Mixed Sagebrush/CheatGrass plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Due to the history of conventional oil well development and interim reclamation in the area, there is also an abundance of introduced species found throughout the area. An increase in bare ground reduces water infiltration and increases soil erosion. The watershed is usually functioning. The biotic integrity is reduced by the lack of diversity in the plant community.

Dominant grasses identified include: crested wheatgrass, cheatgrass and Japanese brome, blue grama, needleandthread grass, prairie junegrass, western wheatgrass, green needlegrass, bluebunch wheatgrass, threadleaf sedge, and Sandburg's bluegrass. Forbs identified include: scarlet globemallow, milkvetches, field pennycress, and fringed sagewort. Other vegetative species identified at onsite: Wyoming big sagebrush, prickly pear cactus and winterfat.

Sandy Sites:

Well sites and associated infrastructure:

Well #	Qtr/Qtr	Sec	T/R	Soil Site	Map symbol and Soil Name
21-5	NENW	5	44/75	Sandy	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes
41-5	NENE	5	44/75	Sandy	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes
43-5	NESE	5	44/75	Sandy	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes
12-6	SWNW	6	44/75	Sandy	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes

Well #	Qtr/Qtr	Sec	T/R	Soil Site	Map symbol and Soil Name
14-6	SWSW	6	44/75	Sandy	171 Keeline-Tullock-Niobrara, dry complex, 3 to 30% slopes
14-28	SWSW	28	45/75	Sandy	221 Turnercrest-Keeline-Taluce fine sandy loams, 6 to 30% slopes
14-31	SWSW	31	45/75	Sandy	171 Keeline-Tullock-Niobrara, dry complex, 3 to 30% slopes
34-32	SWSE	32	45/75	Sandy	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes
41-32	NENE	32	45/75	Sandy	221 Turnercrest-Keeline-Taluce fine sandy loams, 6 to 30% slopes
14-33	SWSW	33	45/75	Sandy	171 Keeline-Tullock-Niobrara, dry complex, 3 to 30% slopes
21-25	NENW	25	45/76	Sandy	171 Keeline-Tullock-Niobrara, dry complex, 3 to 30% slopes
23-25	NESW	25	45/76	Sandy	171 Keeline-Tullock-Niobrara, dry complex, 3 to 30% slopes
43-28	NESE	28	45/75	Sandy/Loamy	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes
41-25	NENE	25	45/76	Sandy/Loamy	221 Turnercrest-Keeline-Taluce fine sandy loams, 6 to 30% slopes
12-5	SWNW	5	44/75	Sandy/Lowland	158 Hiland-Bowbac fine sandy loams, 6 to 15% slopes

Sandy ecological sites occur on nearly level to 50 percent slopes on landforms which include hillsides, plateaus, and ridges in this project area.

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have moderate, moderately rapid, or rapid permeability. The surface soil will vary from 3 to 6 inches deep and have one of the following textures: fine sandy loam, sandy loam, or loamy very fine sand. Coarser topsoils may be included if underlain by finer textured subsoil. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

The main soil limitations include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high wind erosion potential. The low annual precipitation should be considered when planning a seeding.

The HDPC for these soils is a Needleandthread/Prairie sandreed Plant Community. The current plant community, Threadleaf sedge/ Fringed sagewort/ Plains pricklypear, is the result of frequent and severe grazing. A sod of threadleaf sedge and needleandthread dominates. Pricklypear cactus can become dense enough so that livestock cannot graze forage growing within the cactus clumps. When the historic climax community is replaced by sod forming communities, grass production is reduced.

The soil is generally protected in this state. The biotic integrity may be reduced due to low vegetative production. The sod formed by these grasses is resistant to water infiltration. While this sod protects the site, off-site areas are affected by excessive runoff that may cause gully erosion. This sod is resistant to change and may require practices such as long-term prescribed grazing to return to a mid grass community.

Dominant grasses identified include: crested wheatgrass, cheatgrass and Japanese brome, needleandthread

grass, prairie junegrass, western wheatgrass, little bluestem, bluebunch wheatgrass, and foxtail barley. Forbs identified include: fourwinged saltbush, lupine, and fringed sagewort. Other vegetative species identified at onsite: Wyoming big sagebrush, prickly pear cactus, yucca, buckwheat, curlycup gumweed and winterfat.

For more detailed soil information, see the NRCS Soil Survey WY605.

3.2.1. Wetlands/Riparian

The project area lies at the headwaters of the South Prong Pumpkin Creek. The drainages are all ephemeral within the POD boundary. However, there were several locations along the mainstem which exhibited riparian and wetland characteristics due to decreased channel slope, resulting in periodic water detention.

3.2.2. Invasive Species

State-listed noxious weeds and invasive/exotic plant infestations were discovered by a search of inventory maps and/or databases. This area is known for infestations of Black Henbane, a poisonous plant which contains alkaloids. Both the foliage and seeds are toxic. It primarily infests disturbed areas. (Larson and Johnson Plants of the Black Hills and Bear Lodge Mountains, page 358). It has become prevalent in conventional oil fields in Campbell County. No areas of infestation were discovered during subsequent field investigations by the proposed project proponent or at the preapproval onsite. Cheatgrass has invaded the area.

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Western Ecosystem Technology Consultants (WEST). WEST performed three aerial surveys for bald eagle winter roosts on December 13, 2004, January 17, February 8, December 19, 2005, January 5, February 20, 2006. Ground surveys for mountain plover nesting activity was conducted on May 3-5, May 14-18, and June 6-8, 2005 and May 12, 25 and June 8, 2006. Aerial surveys for new sage grouse leks were conducted on April 23-26, May 4-6, 14-17, 2004; April 15, 24 and May 5, 2005 and April 17, 25 and May 1, 2006. In addition to surveys for new leks, three ground counts were conducted on April 13, May 4 and 5, 2006. Raptor nest surveys were conducted on June 1, 2, 7, and 12, 2006.

A BLM Biologist conducted a field visit to the proposed oil well locations on June 13, 14, and 15, 2006. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the HD CBM #2 project area include mule deer and pronghorn antelope. The project area is part of the Pumpkin Buttes mule deer herd unit. The 2004 estimated herd population was 14,800 with a population objective of 11,000 (WGFD 2004).

Pronghorn antelope belong to the Pumpkin Butte herd unit. Mule deer populations have been increasing

since 1998 with a 2004 population estimate of 27,109 animals, and a herd objective of 18,000 (WGFD 2004).

The WGFD has designated the entire project area as winter-yearlong range for pronghorn antelope. This covers the entire project area.

The WGFD has designated a small area on the north end as winter-yearlong range of the project area as year long range for mule deer (See Attachment 2). The vast majority of the project area is yearlong range with the exception of the eastern edge of the POD which is not defined. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

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

3.3.2. Aquatics

The project area is drained by numerous ephemeral tributaries of the Powder River and the Belle Fourche River. Fish that have been identified in the Powder River and the Belle Fourche River watersheds are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151). Species observed by WEST include Brewer's sparrow, McCown's longspur, and sage thrasher (2005).

3.3.4. Raptors

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, osprey, bald eagle, rough-legged hawk, Merlin and burrowing owls. 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 (PRB FEIS 3-145-148).

Fourteen raptor nest sites were identified by Western EcoSystems Technology Inc. and the BLM Buffalo Field Office database within 1 mile of the project area, four of which were active in 2006 (Table4.).

Table 3.2. Documented raptor nests within the HD CBM #2 POD project area in 2006.

BLM ID #	Species	Substrate	Activity	Nest condition	UTM N	UTM E	Legal Location	Distance from Facilities/Roads
3371	FEHA	GHS	inactive	not discussed in report	4859415	426578	SESE Sec. 7 T45N, R75W	Nest is 0.08 miles from an existing improved road. No proposed development within 0.5 miles.
3369	FEHA	rock outcrop	inactive	fair	4853031	428930	NWSW Sec. 33 T45N, R75W	Nest is 0.05 miles from an existing improved road; 0.18 miles from an existing oil well. 0.27 miles from proposed well 14-33; 0.19 miles from a proposed pipeline.
4014	SWHA	unknown tree	active	good	4854771	431343	NESE Sec 27 T45N, R75W	Next to the edge of an existing improved road (main access road).
4015	SWHA	unknown tree	active	good	4856476	431771	NESE Sec 22 T45N, R75W	Nest is one mile outside of project boundary.
3706	unknown	ponderosa pine	inactive	good	4852392	422775	NENW Sec 27 T44N, R76W	Nest is 0.12 miles from an existing improved road; no proposed development within 0.5 miles.
3711	unknown	ponderosa pine	inactive	no information	4852423	422941	NENW Sec 2 T44N, R76W	Nest is 0.12 miles from an existing improved road; no proposed development within 0.5 miles.
4018	unknown	CTL	inactive	good	4852571	422855	SESW Sec 35 T45N, R76W	Nest is 0.12 miles from an existing improved road; no proposed development within 0.5 miles.
4019	unknown	CTL	inactive		4855766	426973	NWNW Sec29 T45N, R75W	Nest 0.20 miles from well 41-30, nest is a drainage and out of sight of well. Nest is 0.03 miles from an existing oil well and road.
666	FEHA	GHS	active	good	4851713	428236	SESE Sec 5 T45N, R75W	Nest is 0.25 miles from proposed well 34-05; 0.13 miles from proposed well 43-05 (well 43-05 was moved onto an existing oil pad).
3137	RTHA	CTL	active	good	4855790	424056	SWSW Sec. 24 T45N, R76W	Nest is 0.26 miles from proposed well 34-24; 0.18 miles from existing

BLM ID #	Species	Substrate	Activity	Nest condition	UTM N	UTM E	Legal Location	Distance from Facilities/Roads
								improved road.
647	unknown	not located	not located	not located	4855569	424118	NWNW Sec 25 T45N, R76W	Nest is 0.41 miles from proposed well32-25; 0.35 miles from well 12-25; 0.35 miles from an existing oil well.
668	unknown	not located	not located	not located	4853023	428392	SESE Sec 32 T45N, R75W	Nest is 0.08 miles from an existing oil well; 0.04 miles from a proposed pipeline.
671	unknown	not located	not located	not located	4854349	429022	SWSW Sec 28 T45N, R75W	Nest not found any where in the area.
3123		not located	not located	not located	4853242	428331	NESE Sec. 32 T45N, R75W	Nest is 0.08 miles from an existing oil well; 0.04 miles from a proposed pipeline.

RTHA = red-tailed hawk
 UNKN= unknown
 CLFF = cliff
 JUNP = juniper

FEHA = ferruginous hawk
 AMKE = American kestrel
 CTL = cotton wood tree live
 PPD = ponderosa pine dead

GOEA = golden eagle
 GRHO = great-horned owl
 CTD = cottonwood tree dead
 GHS = ground/hillside

BUOW = burrowing owl
 PD = prairie dog colony

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

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

No black-tailed prairie dog colonies were found within the projects boundaries. Black-footed ferret habitat is not present within the HD CBM #2 project area.

3.3.5.1.2. Bald eagle

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

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

The HD CBM #2 project area has few mature trees associated with it (WEST 2005). No prairie dog colonies are present within three miles of the proposed project. A portion of the proposed project area is used for an active sheep operation, located on the Christensen Ranch. No potential nests or suitable communal winter roosting habitat were identified by WEST during the BLM biologist's site visits, within the immediate project area or extending one mile from proposed activities. No bald eagles were observed in the project area in 2006.

3.3.5.1.3. Ute's Ladies Tresses Orchid

It is extremely rare, and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events.

Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

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. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. The orchid is documented in four Wyoming locations, Converse County along a tributary of Antelope Creek, an irrigated field in Niobrara County, along Bear Creek in Goshen County, and Horse Creek in Laramie County. Three new populations were identified in 2005 (Heidel pers. comm.).

The project area is drained by numerous ephemeral drainages that drain north to the Powder River or east to the Belle Fourche River. Suitable orchid habitat is not present within the HD CBM #2 project area.

3.3.5.2. Sensitive Species

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

3.3.5.2.1. Black-tailed prairie dog

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

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

3.3.5.2.2. Greater sage-grouse

The project area is primarily grassland with pockets of sagebrush ranging in size from 0.1 to 10 acres and sagebrush cover within the pockets ranges from sparse (0-5%), low (5-10%), moderate (10-15%) and dense (15-25%). West of the project area, there are larger stands of sagebrush (15 plus acres) that are 15-25% cover. With numerous draws located within the project area, the project area has the potential to be good brood rearing habitat for sage grouse. With extensive development occurring around the area, sage grouse are being forced into alternative habitats for nesting.

According to the Wyoming Game and Fish Department database (2006) and surveys conducted by Western EcoSystems Technology (2006), one sage grouse lek occurs within the project area and six are outside of the project area and are within 4.5 miles.

Table 3.3. Sage-grouse lek(s) surrounding the HD CBM #2 POD project area.

Lek Name	UTM N	UTM E	Legal Location	Comments
Christensen IV	4853705	418106	SENE Sec 19 T45N R76W	2006 no birds; 2002-2005 no birds
Christensen Ranch 5	4853705	418106	NENW Sec 32 T45N R76W	2003-2005 no birds
Gilbertz I	4849500	432800	SESW Sec11 T44N R75W	2006 no information; 2004-2005 Inactive
Christensen Ranch 6	4853900	424800	NWNE Sec.36 T45 R76W	2006 inactive; 2002-2006 inactive.
Gilbertz III	4846511	429234	SESW Sec 21, T44N,R75W	2006 no information; 2002-2005 inactive.
Christensen Potential New Lek	4856935	423046	SWNE Sec 23 T45N R76W	2006 –at least 2 male sage grouse observed during an aerial survey. New Lek for 2006

3.3.5.2.3. Mountain plover

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

Suitable mountain plover habitat is found throughout the project area according to the 2006 habitat survey, and the BLM (Buffalo Field Office) habitat suitability model and based on observations by a BLM biologist. Ground surveys for mountain plover nesting activity was conducted on May 3-5, May 14-18, and June 6-8, 2005 and May 12, 25 and June 8, 2006 by Western Ecosystems Technology. No plovers were observed during the surveys or during the onsite.

3.4. West Nile Virus

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

Since its discovery in 1999 in New York, WNV has been firmly established in the United States and has continued to spread west. Birds are the natural vector host and serve not only to amplify the virus, but spread it rapidly throughout the country since they are the only known animal to infect mosquitoes. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting the virus to humans, horses, and wildlife. The *Culex* genus appears to be the most important mosquito group that vector, WNV.

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

includes Campbell, Sheridan and Johnson counties.

Table 3.4 Historical West Nile Virus Information

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

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

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

Mosquitoes can potentially breed in any standing water that lasts more than 4 days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNV mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNV, such as some *Culex* species, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

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

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

3.5. Water Resources

The project area is within the Upper Belle Fourche River and Upper Powder River drainage systems.

3.5.1. Groundwater

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for Total Dissolved Solids (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).

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 48 registered stock and domestic water wells within the radius of influence of the project area with depths ranging from 1 to 1170 feet (average depth of 460 feet).

In June, 2004, the WDEQ issued the following guidelines for the Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments. If an impoundment is to be constructed or an existing impoundment improved to contain waters produced in association with CBNG, the presence and quality of the existing shallow groundwater must be determined. For all impoundments the operator may provide documentation that the proposed unlined CBM impoundments pose no threat to groundwater. The documentation shall consist of data which demonstrates that:

- Facility construction will not allow a discharge to groundwater by direct or indirect discharge, percolation or filtration (e.g., lining the impoundment); or
- Water infiltrating from the CBM impoundment and through the unsaturated zone will not cause a violation of groundwater standards; (e.g., column leachate or batch leachate study of unsaturated zone); or
- Existing soils or geology will not allow a discharge to groundwater (e.g., impermeable substrate, or depth to groundwater is > 150 feet (200 feet if impoundment is ≥ 50 acre feet)). See Section 2 for required documentation for >depth to groundwater= option.
- All groundwater within 150 feet of the surface (200 feet if impoundment is ≥ 50 acre feet) is Class IV(B) quality (i.e. > 10,000 mg/l TDS).

Documentation must be submitted and approved by the WQD Groundwater prior to discharge to the impoundment (Guidelines at page 1).

For this project, the operator provided water analysis results from samples obtained through shallow groundwater investigation at 3 locations near the project area. The results are listed in the following table.

Well Name	Location	Depth, feet	pH	Electrical Conductivity, EC μ hos/cm	TDS, mg/l	Sodium Adsorption Ration, SAR
MW-A	SWNW Sec 12 T44N R75W	150	8.3	900	570	4.5
The Jay	NWSW Sec 2 T44N R75W	85	8.0	954	760	1.0
VanVorhes GMW	NENE Sec 9 T44N R75W	109	8.3	1140	870	8.8

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 Pumpkin Creek drainage which is tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels 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 watersheds potentially impacted by this project, the water quality results are listed below. (PRB FEIS page 3-49).

Predicted Values	SAR	EC, $\mu\text{mhos/cm}$
Upper Powder River Watershed near Arvada, WY Gauging station (06317000)		
Historic Data Average at Maximum Flow	4.76	1,797
Historic Data Average at Minimum Flow	7.83	3,400
Upper Belle Fourche River Watershed near Moorcroft, WY Gauging station (06426500)		
Historic Data Average at Maximum Flow	3.81	1,532
Historic Data Average at Minimum Flow	6.77	2,755

The operator has identified 9 natural springs within this POD boundary at the locations listed below. The estimated flow of the springs and water quality is also included.

Name	Qtr/Qtr	Sec	T(N)	Range	Flowrate, gpm	pH	TDS, mg/l	EC, $\mu\text{mhos/cm}$
Spring	SWSW	5	44	75	ND			
Spring	SENW	5	44	75	ND			
Spring	NWNE	5	44	75	ND			
Spring	SWNE	6	44	75	ND			
Spring	NENE	6	44	75	ND			
Spring	SENE	32	45	75	Not measurable	8.0	5,120	4,700
Spring	SENW	32	45	75	ND			
Unnamed Spring	SENE	32	45	75	ND			
Y-Spring	SENW	28	45	75	Not measurable	8.3	1,790	2,060

There are numerous existing stock water impoundments located throughout the project area, however only two will be impacted by this project. Most of these impoundments were dry at the time of the

onsites, with the exception of the East Summer and the Bonns impoundments which held remnant storm water runoff. 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 HD CBM Federal 2 project prior to on-the-ground project work (BFO project no. 070060148). SWCA Environmental Consultants conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. G.L. "Buck" Damone III, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The Pumpkin Buttes traditional cultural property (TCP) is two miles from the proposed project. In addition, the following cultural resources are located in or near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48CA167	Lithic Scatter	Not Eligible
48CA835	Lithic Scatter	Not Eligible
48CA927	Lithic Scatter	Not Eligible
48CA929	Lithic Scatter	Not Eligible
48CA931	Lithic Scatter	Not Eligible
48CA932	Lithic Scatter	Not Eligible
48CA933	Historic Trash/Lithic Scatter	Not Eligible
48CA934	Lithic Scatter	Not Eligible
48CA936	Historic Trash/Lithic Scatter	Not Eligible
48CA938	Lithic Scatter	Not Eligible
48CA942	Historic Trash/Lithic Scatter	Not Eligible
48CA2005	Historic Trash	Not Eligible
48CA2006	Historic Trash/Lithic Scatter	Not Eligible
48CA2007	Historic Trash/Lithic Scatter	Not Eligible
48CA2008	Historic Trash/Lithic Scatter	Not Eligible
48CA2157	Historic Trash	Not Eligible
48CA5537	Lithic Scatter	Not Eligible
48CA5538	Lithic Scatter	Unevaluated
48CA5539	Lithic Scatter	Not Eligible
48CA5540	Lithic Scatter	Not Eligible
48CA5544	Historic Trash/Lithic Scatter	Unevaluated
48CA5545	Lithic Scatter	Not Eligible
48CA5546	Historic Trash/Lithic Scatter	Not Eligible
48CA5560	Lithic Scatter	Not Eligible
48CA5563	Lithic Scatter	Not Eligible
48CA5567	Historic Trash	Not Eligible
48CA5568	Lithic Scatter	Not Eligible
48CA5569	Lithic Scatter	Not Eligible
48CA5570	Lithic Scatter	Not Eligible
48CA5571	Lithic Scatter	Not Eligible
48CA5572	Lithic Scatter	Not Eligible
48CA5947	Historic Trash/Lithic Scatter	Not Eligible
48CA5948	Lithic Scatter	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Under this alternative 47 federal wells would be drilled (see description of alternatives). As discussed, the topography, ecological sites and soils in this area are diverse. Much of the area has been already been developed for fee CBNG and conventional oil and gas production, providing a road system. There are many areas which can be reclaimed by traditional methods, minimizing the overall impact of the project. However, some areas will be challenging for reclamation due to soil properties or site characteristics. The operator planned their project to avoid those areas where possible, however the proposed action may affect some areas of soils with a limited potential for successful reclamation. The operator will be required to monitor all of the associated construction and infrastructure for interim reclamation success and apply additional mitigation if required.

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

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

Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.

This is an area of extensive conventional oil and gas development. At the onsite, the BLM Interdisciplinary Team (IDT) encouraged the operator to locate the wells and infrastructure for the proposed development to existing disturbance. A total of 22 wells were relocated to existing conventional well pads to reduce additional disturbance area. Of the 52 proposed well locations, 3 wells were withdrawn by the operator and 2 wells will not be approved at the present time. Of the remaining 47 wells, 25 will be constructed on existing or reclaimed conventional well pads and all can be drilled without a well pad being constructed. This disturbance would only involve minor digging-out of rig wheel wells (for leveling drill rigs on minor slopes), reserve pit construction (estimated approximate size of 25 x 40 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 25 wells would involve approximately 0.1 acre/well for 2.5 total acres. The other 22 wells which were not located on existing well pads would disturb approximately 0.32 acres per well for a total of 7.0 acres. The total estimated disturbance for all 47 wells would be 9.5 acres. This impact would be minimized with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 0.06 miles of improved roads would be constructed to provide access to various well locations. Approximately 8.41 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.64 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, 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 only 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult.” (PRB FEIS page 4-144). Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	47	0.1/acre	9.5	Long Term
Constructed Pad		or Site Specific		
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Compressor	1	Site Specific	3.51	Long Term
Impoundments	2		10.2	Long Term
On-channel	2	Site Specific	10.2	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	2	Site Specific	0.2	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads	0.06			Long Term
No Corridor	0.06	40' Width or Site	0.3	
With Corridor	0	Specific		
2-Track Roads	8.4			Long Term
No Corridor	3.6	30' Width	13.1	
With Corridor	4.8	40' Width	23.3	
Pipelines	22.1			Short Term
No Corridor	1.7	30' Width	6.2	
With Corridor	20.4	40' Width	99.1	
Buried Power Cable				Short Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
No Corridor	0.44	20' Width	1.07	
Overhead Powerlines	0.0	15' Width		Long Term
Additional Disturbance		Site Specific	0	
Total Disturbance				
Short Term			166.4	
Long Term			59.9	

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”.

RECLAMATION BONDING

One of the greatest potential impacts anticipated following the close of CBNG production will be the presence of all the water impoundments which were constructed specifically for the management of produced water. Most of these impoundments are located high in the drainages and therefore would not contain storm event water for any length of time. It is predicted that these impoundments would become weed pits rather than serve a useful purpose for stock or wildlife watering. In order to ensure expedient reclamation of these impoundments, as of September, 2005, the BLM in coordination with the WDEQ and WOGCC began bonding these structures for the cost of reclamation. These cost estimates are prepared by a licensed Professional Engineer experienced in reclamation. As these impoundments are no longer needed as a part of the water management strategy, the operator will submit a reclamation plan and satisfactorily reclaim each location prior to the release of the bond. This bonding insures that any adverse impacts which could result from these impoundments will be mitigated through final reclamation at no additional cost to the public.

4.1.1. Wetland/Riparian

There should be no effects to any of the wetland or riparian areas resulting from this project.

4.1.2. Invasive Species

The operator has submitted a plan for the control of noxious weeds and invasive species within the project area. This integrated plan includes education of company personnel in the identification and awareness of weeds, prevention of infestations and control of infestations. The company has committed to control weed growth in coordination with the landowner of record. For more information, see HD CBM 2 POD Sec 9 IPM.

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

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 anticipated to be minimal for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Belle Fourche River drainage, which is approximately 29.4% and in the Upper Powder River drainage, which is approximately 14.7% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the Upper Belle Fourche River and to mitigate any adverse impacts resulting from that discharge.

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

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native Disturbance of sage brush and grassland 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 than the physical habitat disturbance. Drilling and construction noise can be troublesome for song birds by interfering with the males’ ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

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

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

4.2.2.1. Cumulative effects

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

4.2.3. Raptors Direct and Indirect Effects

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

Table 4.2. Wells within close proximity to documented raptor nests within the HD CBM #2 project area (Timing limitations will apply to these wells).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS	WELL NUMBER	DISTANCE
4014	4854774N 431343E	SWHA	Active	Main Access road	<0.1
4015	4856476N 431771E	SWHA	Active	POD Boundary	1.0 mile
666	4851713N 428236E	FEHA	Active	34-05 43-05	0.25 mi 0.13 mi
3137	4855790N 424056E	RTHA	Active	34-24	0.26 mi & 0.18 mi from existing road

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

At the onsite, one well was proposed within 400 feet of an active raptor nest. Subsequently, the operator relocated the well to the east across a drainage to an existing well location. Unfortunately, this would have created a problem with the WOGCC spacing orders and conflicts with the surrounding lease holders. The well was removed from the project.

4.2.3.1. Cumulative effects

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

4.2.4. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.4.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	No prairie dog colonies present.
Threatened				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	S	LAA	Project includes overhead power and roads.
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

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

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

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

Effect Determinations

Listed Species

LAA Likely to adversely affect

NE No Effect.

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

4.2.4.1.1. Black-footed ferret

Because there are no black-tailed prairie dog colonies within the HD CBM #2 project area and it is isolated from any prairie dog complexes, implementation of the proposed development should have no effect on the black-footed ferret.

4.2.4.1.2. Bald eagle

The presence of overhead power lines and roads may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin, particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking, such as the Hartzog Draw Oil / HD CBM #2 project areas. Twenty-two raptors, including sixteen golden eagles, were electrocuted within Wyoming's Powder River Basin in 2003. Twelve electrocutions were on recently constructed lines which did not fully meet APLIC standards (Rogers). Seventeen raptors, including fifteen golden eagles were electrocuted in 2004. Three electrocutions were on newly constructed lines (Rogers). 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.

There are 166.7 miles of existing overhead electrical power lines within and around the Hartzog Draw Oil Field/HD CBM #1 and HD CBM#2 the project areas. XTO is proposing to construct another 3.9 miles of 3-phase overhead powerlines. The existing overhead lines are a combination of single and three phase lines. Observations made by the BLM biologist during the onsite visit indicate that many of these lines are not in compliance with the Avian Power Line Interaction Committee's suggested practices and with the Service's standards (USFWS 2002). Outlined in the consultation and environmental assessment for the Hartzog Draw Oil Field/HD CBM #1 project, XTO was required to modify the existing overhead powerlines and bring them up to the standards outlined by Avian Power Line Interaction Committee's suggested practices and with the Service's standards (USFWS 2002).

Approximately 161.9 miles (0.06 proposed and 161.84 existing) of improved constructed road will be used to access the well sites in the project areas. Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. Typically, two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses, the BLM BFO 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 were observed feeding on 16 of the reported road-side carcasses (<4%).

CBNG produced water may flow into two reservoirs if the water disposal pipe line is not operational, which may attract eagles if reliable prey is present. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

The proposed project is "likely to adversely affect" bald eagles due to the presence of existing roads and existing and proposed overhead electric lines that may not meet current standards for minimizing the potential for raptor electrocutions.

4.2.4.1.3. Ute's Ladies Tresses Orchid

Suitable habitat is not present within the HD CBM #2 project area. Reservoir seepage may create suitable habitat if ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. This proposed project should not affect the Ute ladies'- tresses orchid.

4.2.4.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (<i>Rana pipiens</i>)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will effect existing waterways. 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.
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	NP	NI	No prairie dog colonies present.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	K	MIIH	Grassland and shrubland habitats will be affected.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	S	MIIH	Grasslands will be affected.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	S	MIIH	Prairie will be affected.
Northern goshawk (<i>Accipiter gentilis</i>)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (<i>Falco peregrinus</i>)	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	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.
- WIFV** 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. (Trigger for a Significant Action as defined in NEPA)
- BI** Beneficial Impact

4.2.4.2.1. Black-tailed prairie dog

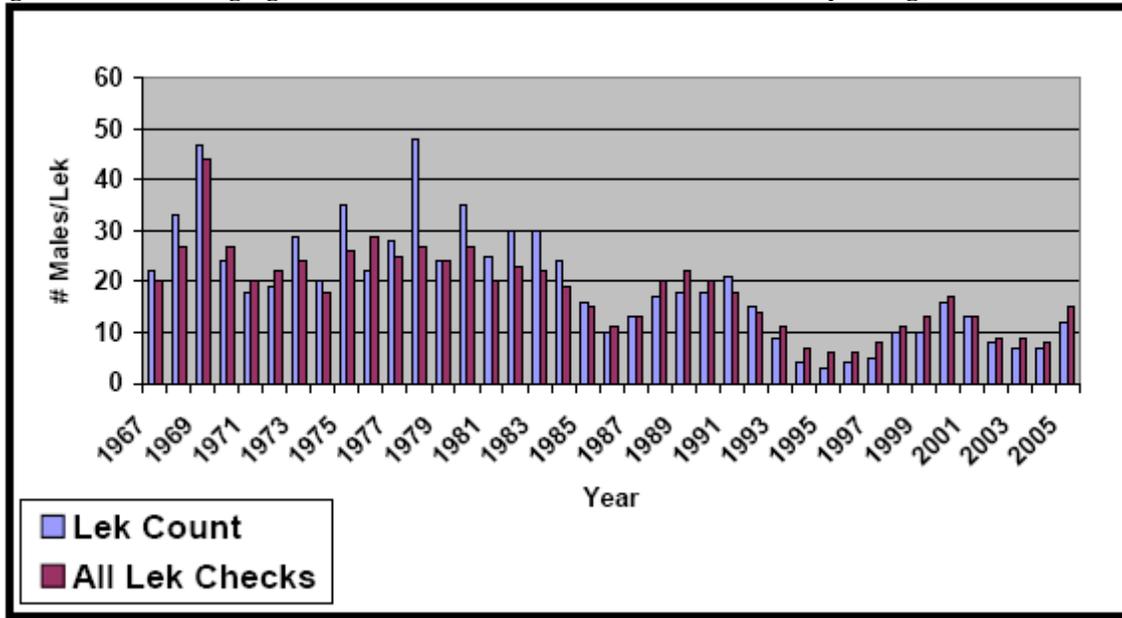
No black-tailed prairie dog colonies are present within the project areas.

4.2.4.2.2. Greater sage-grouse

Wells and other infrastructure located within sagebrush communities will result in direct habitat loss. Sage-grouse avoidance of these facilities produces even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). Well houses and power poles may provide habitats for mammal and avian predators increasing sage grouse predation. Overhead power lines may also present a collision risk for sage-grouse. Sage-grouse may avoid suitable habitat containing overhead power lines to reduce their exposure to predation. Roads also present a collision hazard. With the development of reservoirs within the sagebrush community there is an increase chance of sage grouse being exposed to the West Nile Virus. Mortality rates for sage grouse may increase.

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

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



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

It is BLM Wyoming policy to limit disruptive activities within a two mile radius of active lek sites during the nesting season. This radius may be expanded based on site-specific criteria (Bennet 2004). The Partners in Flight's Western Working Group recommend no net loss of sagebrush habitats (Paige and Ritter 1999). BLM Wyoming policy also states that rehabilitation activities will include sagebrush and appropriate forb species (Bennet 2004).

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

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

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

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

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

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Holloran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres; meanwhile Powder River Basin sagebrush coverage was estimated to be 35% with an average

patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding WAFWA revised their sage grouse management guidelines (Connelly et. al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where habitats are not distributed uniformly such as the Powder River Basin.

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

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

4.2.4.2.3. Mountain plover

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines adjacent to the project area provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

Some areas of suitable habitat for mountain plovers are present in the proposed project area in the form of gently rolling, native mixed-grass prairie (Good 2006). Surveys for mountain plover occupancy according to Service protocol were conducted in these areas during the 2006 (Good) nesting season. No mountain plovers were observed.

4.2.4.3. Cumulative effects

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

4.3. West Nile Virus

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

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

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

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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 Belle Fourche River watershed and the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should minimize project area and downstream potential impacts from proposed water management strategies.

The Water Management Strategy for the HD CBM Federal #2 POD is to add the produced water to a common gathering system which will transport the water to an existing discharge point located at the Upper Belle Fourche River in the NENW Sec 5 T44N R73W. There will be two emergency discharge points to the impoundments located within the POD boundary. These impoundments will not be allowed to discharge water on a continuous basis. For more information, see Section 4.4.2 – Surface Water.

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

The maximum water production is predicted to be 30.0 gpm per well or 1410 gpm (3.1 cfs or 2,274 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 Belle Fourche River drainage, the projected volume produced within the watershed area was 85,761 acre-feet in 2006 (maximum production). As such, the volume of water resulting from the production of these wells is 2.7% of the total volume projected for 2006. This volume of produced water is within the predicted parameters of the PRB FEIS. Water will only be discharged within the Upper Powder River watershed on an emergency basis and should not impact anything outside of the two impoundments.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 28% to groundwater aquifers and coal zones in the Upper Belle Fourche River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 394.8 gpm will infiltrate at or near the discharge point (636.7 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging

the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 1 to 1170 feet compared to 1031 to 1770 feet to the Big George coal zone. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence of the proposed wells.

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

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

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

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

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

upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gaging 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 for this project, shallow groundwater water quality and the concentrations 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
Upper Powder River Watershed near Arvada, WY Gauging station (06317000)			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
Upper Belle Fourche River Watershed near Moorcroft, WY Gauging station (06426500)			
Historic Data Average at Maximum Flow		3.81	1,532
Historic Data Average at Minimum Flow		6.77	2,755
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # WY0052370			
At discharge point	5,000	10	2,000
Predicted Produced Water Quality			
Big George Coal	790	9.2	1,250
Shallow Groundwater Quality			
MW-A SWNW Sec 12 T44N R75W	570	4.5	900
The Jay NWSE Sec 2 T44N R75W	760	1.0	954
Van Vorhes NENE Sec 9 T44N R75W	870	8.8	1,140
Spring SENE Sec 32 T45N R75W	5,120	8.0	4,700
Y-Spring SENW Sec 28 T45N R75W	1,790	8.3	2,060

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1,250 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. 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. For more information, please refer to the WMP included in this POD.

There are 3 discharge points proposed for this project. One is the existing discharge point to the Upper Belle Fourche River, the other two are proposed emergency discharges. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water in the event of an emergency which would preclude the discharge of this project water at the Upper Belle Fourche water discharge point, 2 impoundments (39.6 acre-feet) would be improved within the project area. These impoundments will disturb approximately 10.2 acres including the dam structures. These existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

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 Belle Fourche River of 61 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 47 wells is anticipated to be a total of 1410 gpm or 3.1 cfs or 5.1% of the predicted total CBNG produced water contribution. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

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

The operator has obtained a WYPDES permit (Permit # WY0052370) for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES page2-1):

pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	2000 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	820 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	3.1 µg/l max
Chlorides	46 mg/l

In order to determine the actual water quality of the producing formations in this POD and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a

reference well to each coal zone within the POD boundary. The reference well will be sampled at the wellhead for analysis within sixty days of initial production. A copy of the water analysis will be submitted to the BLM Authorized Officer.

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

The development of coal bed natural gas and the production and discharge of water in the area surrounding the existing natural spring may affect the flow rate or water quality of the spring. The operator has sampled the springs that were active in the fall of 2006 and provided baseline water quality data (See Table 4.5). The springs that had water present were determined to be seeps and therefore the flowrates were not defined at the time of sampling (Personal Communication C. Haswell -12-15-06). The operator will be required to monitor all the springs identified in the area of influence for the duration of the project in the spring and fall of each year.

In-channel downstream impacts are addressed in the WMP for the HD CBM #2 POD prepared by Pearl Development for XTO Energy. Additional downstream impacts are not anticipated with respect to this project. Water will only be discharged within the POD boundary on an emergency basis, and will be fully contained in the two permitted and bonded impoundments. No water should enter the Pumpkin Creek drainage. For more information, please refer to the POD WMP page 9.

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 Belle Fourche River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

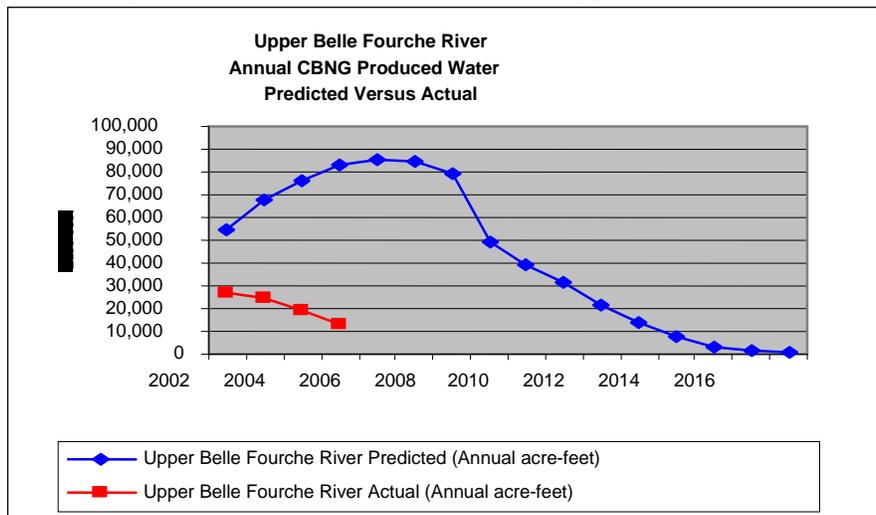
As of December 2005, all producing CBNG wells in the Upper Belle Fourche River watershed have discharged a cumulative volume of 82,792 acre-ft of water compared to the predicted 281,188 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 29.4% of the total predicted produced water analyzed in the PRB FEIS for the Upper Belle Fourche River watershed.

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

Year	Upper Belle Fourche Predicted (Annual acre-feet)	Upper Belle Fourche Predicted (Cumulative acre-feet from 2002)	Upper Belle Fourche Actual (Annual acre-feet)		Upper Belle Fourche Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	54,735	54,735	26,761	48.9	26,761	48.9
2003	67,481	122,216	24,309	36.0	51,070	41.8
2004	76,259	198,475	18,906	24.8	69,975	35.3
2005	82,713	281,188	12,817	15.5	82,792	29.4
2006	85,761	366,949				
2007	84,507	451,456				
2008	79,493	530,949				
2009	49,435	580,384				

2010	39,170	619,554			
2011	31,277	650,831			
2012	21,215	672,046			
2013	13,495	685,541			
2014	7,630	693,171			
2015	3,347	696,518			
2016	1,849	698,367			
2017	790	699,157			
Total	699,157		69,975		

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



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

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Belle Fourche River drainage, which is approximately 29.4% of the total predicted in the PRB FEIS.

2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

According to the Wyoming State Protocol Section VI (A)(1) the Bureau of Land Management notified the Wyoming State Historic Preservation Officer (SHPO) that it determined no historic properties exist within the APE.

Tribal consultation was not conducted for this project. In consultation for the nearby HDCBM 1 POD, tribes did not express any concerns to the BLM that would warrant including the Pumpkin Buttes in the APE. Similar to the HDCBM 1 POD, the subject project is primarily within a previously developed oil field. The existing oil field has already compromised the aspect of setting for the Pumpkin Buttes TCP in the area. The proposed 12-16 and 14-31 wells and associated infrastructure are outside the existing oil field, within two miles, and in clear view of the Buttes. These wells and infrastructure will not be permitted until the Bureau completes Native American and SHPO consultation for impacts to the setting of the TCP.

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
John Christensen	Landowner		Yes
Bob Christensen	Landowner		Yes
Christi Haswell	Regulatory Project Manager	Pearl Development	Yes
Paul Huson	Surveyor	Pearl Development	Yes
Ken Fox	Construction Manager	Pearl Development	Yes
Mike Cole	Engineer	Pearl Development	Yes
Al Erwin	Sr. Operations Engineer	XTO Energy	Yes
John Kluz	Construction Foreman	XTO Energy	Yes
Sara Needles	Wyoming SHPO	Wyoming SHPO	No
Brad Rogers	Fish and Wildlife Biologist	USFWS	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.

7. REFERENCES AND AUTHORITIES

Avian Power Line Interaction Committee. 1996. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute. Washington, D.C. 125pp.

AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at <http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html>.

Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.

Code of Federal Regulations (CFR)

1. 40 CFR All Parts and Sections inclusive Protection of Environment Revised as of July 1, 2001.
2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.

Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17pp.

Flaig, K., Flaig J., and R. E. Good. 2005. Ute Ladies'-tresses Orchid Survey Effort For HD Federal CBM POD #1. Western EcoSystems Technology, Inc. Cheyenne, WY. 2pp.

Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.

Good, Rhett. 2005. Wildlife Surveys of Federal Coalbed Methane Leases for XTO Energy in the HD Federal CBM POD #1. Western EcoSystems Technology, Inc. Cheyenne, WY. 18pp.

Grenier, Martin. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp

Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.

Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.

Larson, G.E and Johnson, J.R, 1999. Plants of the Black Hills and Bear Lodge Mountains SDSU College of Agriculture and Biological Sciences South Dakota Agricultural Experiment Station B732

Litzel, R. 2004. Personal communication [January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.

Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988

- Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.
- Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: <http://www.cdc.gov/ncidod/vol9no7/03-0277.htm>.
- Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003
- Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.
- Morton, Jennifer M. and Tom Bills. 2005. XTO Energy's Hartzog Draw Oil / HD CBM #1 Plan of Development Biological Assessment. USDI Bureau of Land Management, Buffalo Field Office. Buffalo, WY. 21pp.
- Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.
- Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (*Haliaeetus leucocephalus*) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.
- Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of Land Management Wildlife Biologist/Sage Grouse Coordinator.
- Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.
- Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah
- Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.
- The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.
- U.S. Department of the Interior, Bureau of Land Management, Buffalo Field Office, Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.
- U.S. Department of the Interior, Bureau of Land Management, Powder River Oil and Gas Project

Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.

U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.

U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.

Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.

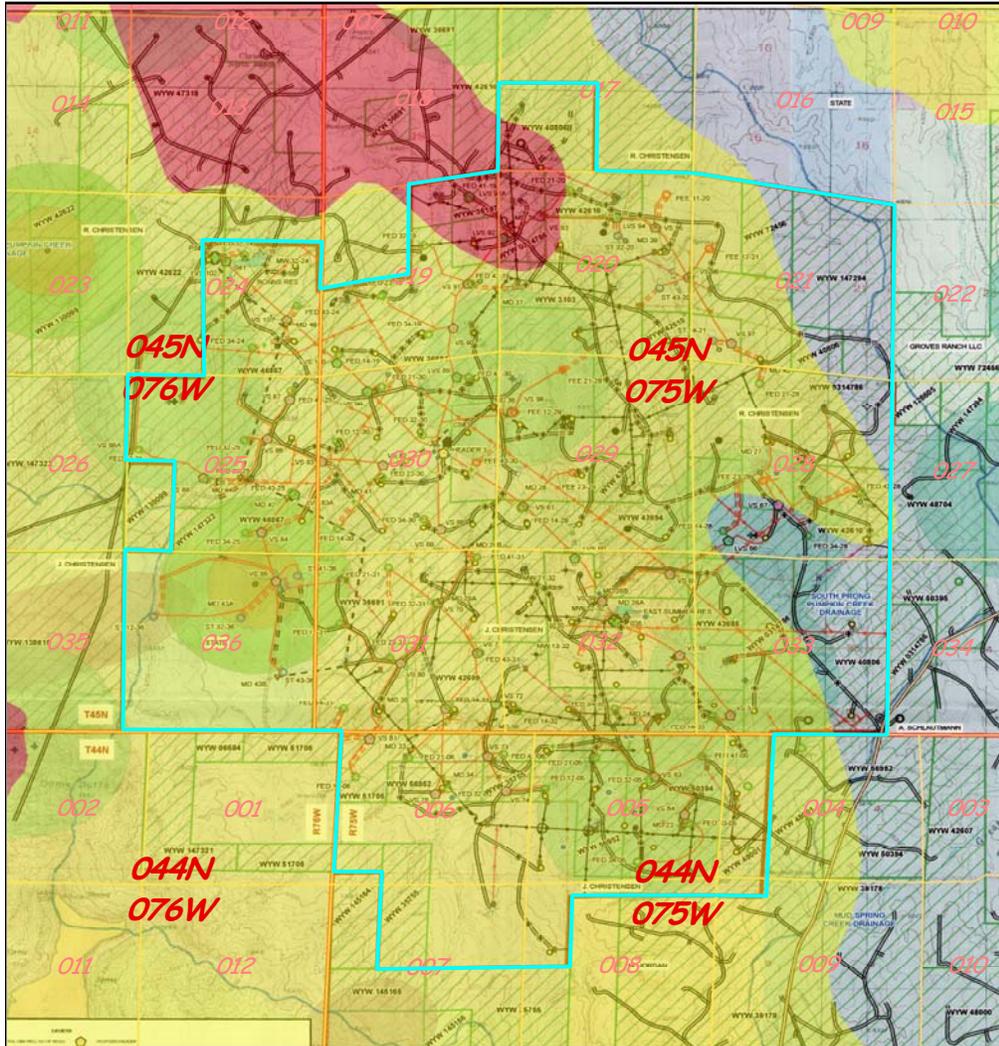
WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments

8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

Kathy Brus, Natural Resource Specialist , Hydrologist
Sharon Soule, Legal Assistant
Randy Nordsven, Supervisory Natural Resource Specialist
Dane Geyer, Petroleum Engineer
Denise Oliverius, Legal Instruments Examiner
G.L. "Buck" Damone III, Archaeologist
Guymen Easdale, Wildlife Biologist
Arnie Irwin, Soil Scientist
Gerald Queen, Geologist
Paul Beels, Assistant Field Manager, Minerals & Lands
Chris E. Hanson, Field Manager

Interdisciplinary Team Lead: Kathy Brus

Attachment 2 HD CBM #2 POD Mule Deer Ranges



**Attachment 2
HD CMB #2 POD
Mule Deer Ranges**

- Mule Deer Ranges (EIS)
RANGE
■ Spring, Summer, Fall
■ Winter Yearlong
■ Yearlong