

**DECISION RECORD
FOR
Lance Oil & Gas Company Inc. (LOG)
Highland Unit Delta
ENVIRONMENTAL ASSESSMENT – WY-070-10-383**

DECISION:

BLM’s decision is to approve Lance Oil & Gas Company Inc’s Highland Unit Delta Coal Bed Natural Gas (CBNG) POD Alternative B of the attached Environmental Assessment (EA). Alternative B is the Modified Proposed Action, and is the result of collaboration between the Bureau of Land Management and Lance Oil & Gas Company Inc. Alternative B has been analyzed in the attached EA and found to have no significant impacts on the human environment, beyond those described in the Powder River Basin Final Environmental Impact Statement (PRB FEIS) thus an EIS is not required.

Details of the approval are summarized below. The project description, operator committed measures and site-specific mitigation measures are included in the attached EA.

Well Sites:

The following 38 Applications for Permit to Drill (APDs) and associated infrastructure are authorized:

	Well Name	Well #	Sec	TWN	RNG	Lease	QTR
1	Highland Delta Powder River Fed	12-5	5	51N	77W	WYW153356	SWNW
2	Highland Delta Powder River Fed	14-5	5	51N	77W	WYW153356	SWSW
3	Highland Delta HU Fed	21-2	2	51N	78W	WYW146342	NENW
4	Highland Delta HU Fed	24-2	2	51N	78W	WYW146342	SESW
5	Highland Delta HU Fed	31-2	2	51N	78W	WYW146342	NWNE
6	Highland Delta HU Fed	33-2	2	51N	78W	WYW146342	NWSE
7	Highland Delta HU Fed	34-2	2	51N	78W	WYW146342	SWSE
8	Highland Delta HU Fed	23-3	3	51N	78W	WYW146343	NESW
9	Highland Delta HU Fed	32-3	3	51N	78W	WYW146343	SWNE
10	Highland Delta HU Fed	34-3	3	51N	78W	WYW146343	SWSE
11	Highland Delta HU Fed	41-3	3	51N	78W	WYW146343	NENE
12	Highland Delta HU Fed	44-3	3	51N	78W	WYW146343	SESE
13	Highland Delta HU Fed	13-4	4	51N	78W	WYW146343	NWSW
14	Highland Delta HU Fed	14-4	4	51N	78W	WYW146343	SWSW
15	Highland Delta HU Fed	21-4	4	51N	78W	WYW146343	NENW
16	Highland Delta HU Fed	23-4	4	51N	78W	WYW146343	NESW
17	Highland Delta HU Fed	24-4	4	51N	78W	WYW146343	SESW
18	Highland Delta HU Fed	32-4	4	51N	78W	WYW146343	SWNE
19	Highland Delta HU Fed	41-4	4	51N	78W	WYW146343	NENE
20	Highland Delta HU Fed	12-9	9	51N	78W	WYW146343	SWNW
21	Highland Delta HU Fed	14-9	9	51N	78W	WYW146343	SWSW
22	Highland Delta HU Fed	24-9	9	51N	78W	WYW146343	SESW
23	Highland Delta HU Fed	41-9	9	51N	78W	WYW146343	NENE
24	Highland Delta HU Fed	13-10	10	51N	78W	WYW146343	NWSW
25	Highland Delta HU Fed	14-10	10	51N	78W	WYW146343	SWSW
26	Highland Delta HU Fed	21-10	10	51N	78W	WYW146343	NENW
27	Highland Delta HU Fed	23-10	10	51N	78W	WYW146343	NESW

	Well Name	Well #	Sec	TWN	RNG	Lease	QTR
28	Highland Delta HU Fed	34-10	10	51N	78W	WYW126721	SWSE
29	Highland Delta HU Fed	41-10	10	51N	78W	WYW146343	NENE
30	Highland Delta HU Fed	43-10	10	51N	78W	WYW126721	NESE
31	Highland Delta HU Fed	44-10	10	51N	78W	WYW126721	SESE
32	Highland Delta HU Fed	11-11	11	51N	78W	WYW146342	NWNW
33	Highland Delta HU Fed	21-11	11	51N	78W	WYW146342	NENW
34	Highland Delta HU Fed	23-11	11	51N	78W	WYW146342	NESW
35	Highland Delta HU Fed	31-11	11	51N	78W	WYW146342	NWNE
36	Highland Delta HU Fed	32-11	11	51N	78W	WYW146342	SWNE
37	Highland Delta HU Fed	41-11	11	51N	78W	WYW146342	NENE
38	Highland Delta HU Fed	42-11	11	51N	78W	WYW146342	SENE

Water Management:

The following water management infrastructure was inspected and approved for use in association with this POD:

Treatment of CBNG water from the following approved facilities:

Facility Name	NEPA Document	QtrQtr	Sec	T	R	Lease	WDP	QtrQtr	Sec	T	R
Kinney Draw EMIT Water Treatment	Kinney Divide-Highland Unit Adds 1 WY-070-EA06-317	NENE	20	51	77	Fee	018	NWSE	20	51	77
Faddis-Kennedy EMIT Water Treatment	Kinney Divide-Highland Unit Adds 1 WY-070-EA06-317	SESW	31	51	77	Fee	016	NESW	32	51	77

Discharge of the treated water through the following locations:

	Discharge Site	Qtr/Qtr	Sec	TWP	RNG	Latitude	Longitude
1	WY0056081-016	NESW	32	51	77	44.34899	-106.15241
2	WY0056081-018	NWSE	20	51	77	44.37728	-106.14821

The operator also proposes to reinject raw CBNG water to the following approved reinjection locations to the Madison aquifer, located near Midwest, Wyoming:

	Injection Well	Qtr/Qtr	Section	TWP	RNG	Permit #
1	10MADSW13	NESW	13	40	79	05-231
2	15MADNW13	NENW	13	40	79	05-231
3	20MADSW12	SWSW	12	40	79	05-231
4	29MADNW12	SWNW	12	40	79	05-231
5	6MADNW12	NWNW	12	40	79	05-231

Operator Committed Measures:

The operator has incorporated several measures to alleviate resource impacts into their Master Surface Use Plan (MSUP), submitted on September 3, 2010. Refer to Section 2.2 of the attached EA and the MSUP for complete details of operator committed measures.

Site-specific Mitigation Measures:

Site-specific Conditions of Approval have been applied to this project, in addition to the programmatic and standard COAs identified in the PRB FEIS, to mitigate the site-specific impacts described in the Environmental Consequences section of the attached EA. For a complete description of all site-specific COA's associated with this approval, see Appendix A of the attached EA.

COMPLIANCE WITH LAWS, REGULATIONS, LAND USE PLANS, AND POLICIES:

This approval is in compliance with all Federal laws, regulations, and policies. This includes, but is not limited to, the Federal Land Policy and Management Act, the National Historic Preservation Act, the Threatened and Endangered Species Act, the Migratory Bird Treaty Act, the Clean Water Act, the Clean Air Act, and the National Environmental Policy Act.

Approval of this alternative is in conformance with the *Powder River Basin Oil and Gas Project Environmental Impact Statement and Proposed Plan Amendment (PRB FEIS)*, *Record of Decision and Resource Management Plan Amendments for the Powder River Basin Oil and Gas Project (PRB FEIS ROD)*, and the Approved Resource Management Plan (RMP) for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), (1985/2001).

This approval is subject to adherence with all of the operating plans, design features, 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 Final Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

RATIONALE:

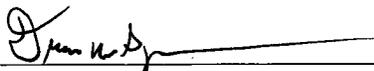
The decision to authorize the selected alternative, as summarized above, is based on the following:

1. Mitigation measures were included to reduce environmental impacts below the level of significance (FONSI) while still meeting the project's purpose and need. Mitigation is discussed in the environmental consequences (section 4) of the attached EA. For a complete description of all site-specific COA's associated with this approval, see attachment A of the HUD EA.
2. The selected alternative will not result in any undue or unnecessary environmental degradation.
3. The Operator, in their POD, has committed to:
 - Remove one well and a water impoundment from the project proposal which were located within a 0.25 mile buffer of a sage-grouse lek
 - Comply with all applicable Federal, State, and Local laws and regulation
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits
 - Offer water well agreements to the owners of record for permitted water wells within a half mile of any federal CBNG producing well
 - Provide water analysis from a designated reference well in each coal zone

4. The Operator has certified that a Surface Use Agreement has been reached with the Landowners
5. The selected alternative incorporates components of the Wyoming Governor's Sage-Grouse Implementation Team's "core population area" strategy, the Governor's executive order, and local research to provide mitigation for sage-grouse, while meeting the purpose and need for the Highland Unit Delta Project.

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: 7/29/10

**FINDING OF NO SIGNIFICANT IMPACT
FOR
Lance Oil & Gas Company Inc. (LOG)
Highland Unit Delta
ENVIRONMENTAL ASSESSMENT WY-070-10-383**

FINDING OF NO SIGNIFICANT IMPACT:

On the basis of the information contained in the EA, and all other information available to me, it is my determination that: (1) the implementation of Alternative B will not have significant environmental impacts beyond those already addressed in PRB EIS to which the EA is tiered; (2) Alternative B is in conformance with the Buffalo Field Office Resource Management Plan (1985, 2001); and (3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Therefore, an environmental impact statement or a supplement to the existing environmental impact statement is not necessary and will not be prepared.

This finding is based on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR '1508.27), both with regard to the context and to the intensity of the impacts described in the EA.

CONTEXT:

Mineral development (coal, oil and gas, bentonite, and uranium) is a long-standing and common land use within the Powder River Basin. More than one fourth of the nation's coal production comes from the Powder River Basin. The PRB FEIS reasonably foreseeable development predicted and analyzed the development of 51,000 CBNG wells and 3,200 oil wells (PRB FEIS ROD pg. 2). The additional CBNG development described in Alternative B is insignificant within the national, regional, and local context.

INTENSITY:

The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment (EA sec. 4). Design features and mitigation measures have been included within Alternative B to prevent significant adverse environmental effects.

The preferred alternative does not pose a significant risk to public health and safety. The geographic area of the POD does not contain unique characteristics identified within the 1985 RMP, 2003 PRB FEIS, or other legislative or regulatory processes.

Relevant scientific literature and professional expertise were used in preparing the EA. The scientific community is reasonably consistent with their conclusions on environmental effects relative to oil and gas development. Research findings on the nature of the environmental effects are not highly controversial, highly uncertain, or involve unique or unknown risks.

CBNG development of the nature proposed with this POD and similar PODs was predicted and analyzed in the PRB FEIS; the selected alternative does not establish a precedent for future actions with significant effects.

There are no cultural or historical resources present that will be adversely affected by the selected alternative (EA section 4). No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected (EA section). The selected alternative will not have any anticipated effects that would threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment

Field Office Manager: John A. [Signature]

Date: 9/28/10

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Lance Oil & Gas Company Inc. (LOG)
Highland Unit Delta
COALBED NATURAL GAS PLAN OF DEVELOPMENT
WY-070-10-383**

1. 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 BLM Buffalo Field Office (BFO). This project environmental assessment (EA) addresses site-specific resources and impacts that were not covered within the PRB FEIS.

1.1. Background

Lance Oil & Gas Company INC. (LOG) originally submitted the Highland Unit Delta POD on February 5, 2008 to the BFO with 37 Federal APD's to develop and produce natural gas resources within coal bearing formations of the Powder River Basin (PRB). They added two more APDs before the onsite for a total of 39. The onsite visits were conducted in April 19-23, 2010 to evaluate the proposal and modify as necessary to alleviate environmental impacts. On May 7, 2010 the Governor sent a letter putting a hold on projects in potential sage-grouse connectivity habitat until his Sage-grouse Implementation Team could make recommendations on July 1, 2010. Highland Unit Delta POD was in this group of projects that were put on hold. As of July 2010 it was determined that the Highland Unit Delta POD does not fall within the final connectivity corridor. As a result, the environmental analysis continued. BLM sent a post-onsite deficiency on July 27, 2010. LOG agreed to remove one well from the project proposal that was in a 0.25 mile protective buffer of a sage-grouse lek. A series of discussions occurred between BLM and LOG based on the initial project and onsite visits. As a result of these discussions, the following adjustments were made to the proposed project:

- 1 well was dropped from the initially proposed project due to location within 0.25 miles of a sage-grouse lek
- Disturbance was reduced by moving 4 wells to areas that did not need a constructed pad
- 8 wells were relocated to reduce fragmentation of sage-grouse habitat
- A total of 10 well pads were adjusted to limit surface disturbance or maintain vegetative buffer from headcuts;
- Mowing in preparation of site disturbance was reduced on 5 well locations (without pads) to retain intact sagebrush habitat
- Site specific reclamation plans were determined necessary (due to poor soils on 2 well locations and due to sandy soils on one access road) to achieve reclamation success
- A total of 2 roads were relocated or engineered to limit soil erosion;
- A requirement for 30-day topsoil stabilization was included for 2 wells/infrastructure;

The above changes as documented in the revised project description provided by LOG in response to BLM's deficiency letter, resulted in a refined proposed project, which is discussed in this document as Alternative B. The initial POD, the post-onsite deficiency letter, and the company's response to the

deficiency letter are included in the Project Administrative Record, available for review at the BLM Buffalo Field Office.

The final project proposal with 38 APDs were considered complete when the BLM received the operator's response to the post onsite deficiencies on September 3, 2010. Proposed COAs were shared with the operator on September 22, 2010.

1.2. Purpose and Need for the Proposed Action

The purpose of the proposed action is to explore, develop and produce oil and gas reserves conducted under the rights granted by a Federal oil and gas lease, as required in 43 CFR 3160, all Onshore Orders, and The Mineral Leasing Act, as amended and supplemented, (30 U.S.C. 181 et seq.).

The need for the action is the requirement to obtain approval for the development of an Oil and Gas Lease through an Application for Permit to Drill (APD) on public lands managed by the Bureau of Land Management under Onshore Order No. 1, pursuant to the authority of the Mineral Leasing Act, as amended and supplemented, (30 U.S.C. 181 et seq.) and prescribed in 43 CFR Part 3160.

1.3. Decision to be Made

Decision to be Made: The BLM will decide whether or not to approve the proposed development of oil and gas resources on the federal leasehold, and if so, under what terms and conditions.

1.4. Conformance with Land Use Plan and Other Applicable Laws, Regulations, and Policies

The proposed action conforms to the terms and the conditions of the 1985 Buffalo RMP and the 2003 PRB FEIS & RMP Amendment. The proposed action is in compliance with all Federal laws, regulations, and policies. This includes, but is not limited to, the Federal Land Policy and Management Act (1976), the National Historic Preservation Act, the Endangered Species Act (1973), the Migratory Bird Treaty Act (1918), the Clean Water Act (1972), the Clean Air Act (1970), and the National Environmental Policy Act (1969).

1.5. Scoping and Issues

External scoping was not conducted for this EA. Extensive external scoping was conducted for the PRB FEIS and is discussed beginning on pg. 15 of the ROD and beginning on pg. 2-1 of the FEIS. This action is similar in scope to the numerous other CBNG PODs that BFO has analyzed; external scoping would be unlikely to identify new issues as was verified by the few POD EAs that were externally scoped such as the Clabaugh POD (WY-070-EA08-134) and Hollcroft/Stotts Draw POD (WY-070-EA07-021).

The BLM interdisciplinary team (ID team) conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resource and land uses. Appendix B identifies those resources and land uses present and affected by the proposed action; those resources and land uses that are either not present, not affected, or were adequately covered by the PRB FEIS will not be discussed in this EA. The ID team identified significant issues for the affected resources to further focus the analysis. This EA addresses those site-specific impacts that were not disclosed within the PRB FEIS that would help in making a reasoned decision or may be related to a potentially significant effect. Issues for this project include:

- Soils and vegetation: reclamation potential and invasive species
- Wildlife: raptor productivity, greater sage-grouse lek occupancy and persistency, mountain plover presence, bald eagle winter roost attendance
- Cultural: resources
- Water: ground water depletion, quality and quantity of produced water

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Two alternatives, A and B, were evaluated. A brief description of each alternative is included in the following sections. Programmatic Mitigation Measures, as determined in PRB FEIS Record of Decision apply to all alternatives, including the No Action Alternative (Alternative A), and are included in Appendix A. Standard Mitigation Measures, Operator-committed Mitigation Measures, and site-specific Conditions of Approval (COAs) would apply only to action alternatives (Alternative B) and also are included in Appendix A.

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 - Operator Proposed Action

Alternative B contains complete APDs and is based on the operator and BLM working to reduce environmental impacts. This alternative summarizes the POD as it was finally, after site visits, submitted to the BLM by Lance Oil & Gas Company on September 10, 2010.

Proposed Action Title/Type: Proposed Action Title/Type: LOG’s Highland Unit Delta CBNG POD.

Proposed Well Information: There are 38 wells proposed within this POD; the wells are vertical bores proposed. Spacing was proposed as close as possible to an 80 acre spacing pattern with 1 well per location. Each well will produce from the Wall coal seams. Proposed well house dimensions are 8 ft wide x 8 ft length x 8 ft height. A list of proposed wells is included in Table 2.1.

Table 2.1 Proposed Wells – Alternative B

	Well Name	Well #	Sec	TWN	RNG	Lease	QTR
1	Highland Delta Powder River Fed	12-5	5	51N	77W	WYW153356	SWNW
2	Highland Delta Powder River Fed	14-5	5	51N	77W	WYW153356	SWSW
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37	Highland Delta HU Fed	41-11	11	51N	78W	WYW146342	NENE
38	Highland Delta HU Fed	42-11	11	51N	78W	WYW146342	SENE

Water Management Proposal: The water management strategies identified by Lance will be treatment of produced water and subsequent discharge to the Powder River and/or transportation of the raw produced water via the Anadarko Salt Creek pipeline to Midwest, Wyoming where it will be injected into the Madison aquifer. Table 2.2 includes the two (2) existing discharge locations proposed for use in association with this POD.

Table 2.2 Proposed Water Management Discharge Points – Alternative B

	Discharge Site	Qtr/Qtr	Sec	TWP	RNG	Latitude	Longitude
1	WY0056081-016	NESW	32	51	77	44.34899	-106.15241
2	WY0056081-018	NWSE	20	51	77	44.37728	-106.14821

County: Campbell

Applicant: Lance Oil & Gas Company INC.

Surface Owners: Powder River Livestock Co., Baumgartner, Lawrence

Drilling and Construction:

- Drilling of 38 total federal CBNG wells in the Wall-Coal zone to depths of approximately 2,100 feet.
- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry and well visitation. Metering would entail 4-16 visits per month to each well.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: Treatment of produced water and subsequent discharge through two (2) existing and previously approved outfalls, to the Powder River and/or transportation of the raw produced water via the Anadarko Salt Creek pipeline to Midwest, Wyoming where it will be injected into the Madison aquifer.
- A road network consisting of 9.13 miles of improved road and 2.28 miles of primitive road.
- No overhead power is proposed. A buried power line network is to be constructed by the operator. No diesel generators are proposed, due to existing primary power in LOGs surrounding projects.
- The power line network is to be buried, instead of power drops, 19 transformer boxes are proposed. Transformer boxes will be approximately 6 feet x 4 feet wide and about 4 feet tall.
- A buried gas, water and power line network.
- 11 compression facilities 9 feet wide by 14 feet tall by 10 feet long. Compressor noise level is expected to be 66.3 decibels at 100 feet distance.

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

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

2.3. Alternatives Considered but Not Analyzed in Detail

The BLM interdisciplinary team made recommendations based on potential for this POD to be included in the sage-grouse connectivity corridor subject to more protective measures for sage-grouse (see the BLM deficiency letter dated July 27, 2010 for complete details). The Wyoming State Governor's working group found increased protective measures for this POD would not be necessary to maintain greater sage-grouse persistence in NE Wyoming, and therefore they did not include this project in the connectivity corridor.

2.4. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure recommended by the BLM and proposed by the operator (Alternative B), are presented in Table 2.3.

Table 2.3 Summary of Alternatives

Facility	Alternative A (No Action) Existing Number/ Acres/Miles	Alternative B (Operator Proposal) Proposed Number/ Acres/Miles
Total CBNG Wells	37 qty	38
Well Locations		22.22ac total
Nonconstructed		20 qty x .59 = 11.8
Constructed		11 qty x .70 = 7.7
Slotted		8 qty x .59 = 4.72
Wells with interim reclamation	37 qty x .1 = 3.7ac	3.9
Gather/Metering Facilities		
Number of Facilities	30	0
Acreage of Facilities	15.54ac	0.0
Compressors		11
Number of Compressors		0 additional acres co-located on well pads
Number of Ancillary Facilities (Staging/Storage Areas)	4 ac	1.5ac
Acres (Miles) of Template/ Spot Upgrade Roads		
No Corridor		46.14 (7.61mi)
With Corridor	17.73ac (2.93mi)	0
Acres (Miles) of Engineered Roads		
No Corridor	85.06ac (12.73mi)	9.19ac (1.52mi)
With Corridor		0
Acres (Miles) of Primitive Roads		
No Corridor	62.23ac (14.67mi)	9.69ac (2.28mi)
With Corridor	42.16ac (9.94mi)	
Miles of Buried Power		
No Corridor		6.95ac (1.64mi)
With Corridor		
Miles of Pipeline		
No Corridor		
With Corridor		
Miles of Overhead Power Drops		0.17ac
Number of Treatment Facilities	2.8 ac. 2/(19.8 ac)	
Number of Impoundments		0
On-channel		0
Off-channel		0
Lined		
Unlined		
Water Discharge Points	30 qty (0.6 ac)	
Stock Tanks	1qty (0.02 ac)	6 qty (0.12 ac)
TOTAL ACRES DISTURBANCE	260.08	97.98 plus 260.08 existing = 357.16 acres

3. DESCRIPTION OF AFFECTED ENVIRONMENT

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. A screening of all resources and land uses potentially affected is included in Appendix B. Resources that would be unaffected, or not affected beyond the level analyzed within the PRB FEIS, are not discussed within the EA.

3.1. Project Area Description

The Highland Unit Delta project of development area is approximately 22 miles east of Buffalo, Wyoming. The POD can be accessed on the west by crossing Crazy Woman Creek, and it can be accessed on the east side from the Upper Powder River Road. Crazy Woman Creek and the Powder River form the east and west boundaries of the project. Mitchell Draw and Kinney Draw are boundaries on the north and south. The eastern portion on the POD has deeply incised topography with steep drainages leading east toward the Powder River. The western portion of the POD is relatively flat with rolling hills and large areas of grasslands draining generally west to Crazy Woman Creek. Topography varies from 3,800 feet to 4,300 feet in elevation above sea level.

The entire POD area is utilized for cattle grazing. The land is mixed surface ownership underlain by federally managed minerals. Surface owners include Powder River Livestock Co., Bob Baumgartner, Chas and Dan Lawrence, and public land managed by the Bureau of Land Management. This CBNG project is completely surrounded by CBNG projects. Most of the surrounding projects are permitted and operated by LOG. The west access is shared with LOGs private mineral development and their Highland Unit Gamma POD. Eastern access is shared with the western portion of LOGs Kinney Divide Unit POD.

3.2. Soils, Ecological Sites and Vegetation

3.2.1. Soils

The Powder River Basin is composed of relatively young soils which have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams. Soils have surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive though vary with texture, slope and other characteristics. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 2 inches on ridges to 12+ inches in bottomland.

The map unit symbols for the soils for the identified soils found within the POD boundary are listed in Table 3.1 below. Ecological Site Descriptions are soil and vegetation community descriptions compiled by the Natural Resources Conservation Service (NRCS) for the purpose of resource identification, and providing management and reclamation recommendations.

The majority, 63%, of the project area has loamy soils. Loamy soils have fair reclamation potential due to soil structure, stability and higher proportions of organic matter. Loamy soils may still be problematic if development is sited on steeper slopes or in drainages. Sandy soils cover 6% of the project area. Sandy soils can be tough to reclaim when primitive roads are placed on these soils without proper surfacing and water runoff mitigation. In this project area the Samday-Shingle-Badland complex are the most challenging to reclaim. These soils are found on steeper slopes with shallow topsoil and limited reclamation potential. 28% of the project area is covered by the Samday-Shingle-Badland complex. Shallow soils are challenge due other limiting factors such as thin layers of topsoil and low organic matter.

Table 3.1 Dominant Soils Affected by the Proposed Action

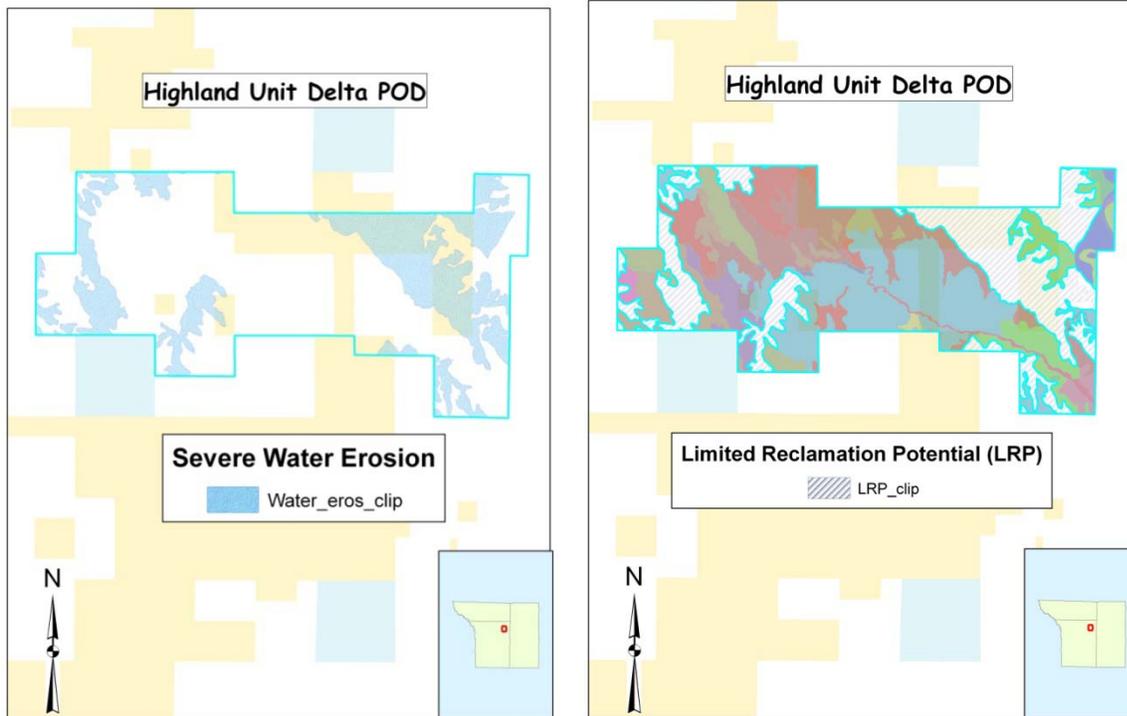
Map Unit Symbol	Map Unit Name	Ecological Site Description	Percent of POD by ESD
708	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	Loamy	63%
709	Theedle-Shingle loams, 3 to 30 percent slopes	Loamy	
639	Forkwood-Cushman loams, 0 to 6 percent slopes	Loamy	
707	Theedle-Kishona loams, 6 to 20 percent slopes	Loamy	
640	Forkwood-Cushman loams, 6 to 15 percent slopes	Loamy	
614	Forkwood loam, 0 to 6 percent slopes	Loamy	
615	Cambria-Kishona-Zigweid loams, 6 to 15 percent slopes	Loamy	
607	Haverdad loam, 0 to 3 percent slopes	Loamy	
641	Forkwood-Ulm loams, 0 to 6 percent slopes	Loamy	
622	Cambria-Kishona-Zigweid loams, 0 to 6 percent slopes	Loamy	
684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	Badland complex	28%
718	Vonalee-Terro-Taluca fine sandy loams, 3 to 30 percent slopes	Sandy loam	6%
612	Clarkelen fine sandy loam, 0 to 3 percent slopes	Sandy loam	
611	Draknab sandy loam, 0 to 3 percent slopes	Sandy loam	
649	Haverdad-Clarkelen complex, 0 to 3 percent slopes	Complex	2.5%
616	Clarkelen-Draknab complex, 0 to 3 percent slopes	Complex	
938	Water	Water	0.4%
624	Shingle-Haverdad association, 0 to 80 percent slopes	Association	0.3%

Soils within the project area were identified from the North Johnson County Survey Area, Wyoming (WY719). The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

Map unit 684 for the Samday-Shingle-Badland complex has been colored white and made translucent on the POD map in Figure 3.1. It is clear from this map that development has been located outside of the Samday-Shingle-Badland complex. The following maps indicate identical areas covered by the Samday-Shingle-Badland complex are also affected by severe water erosion and limited reclamation potential. The pattern is illustrated in Figures 3.2 and 3.3. In this project, areas of existing areas of high erosion and limited reclamation were avoided.

Figure 3.2 Soils Susceptible to Erosion

Figure 3.3 Limited Reclamation Potential



3.2.1.1. Slope Hazard

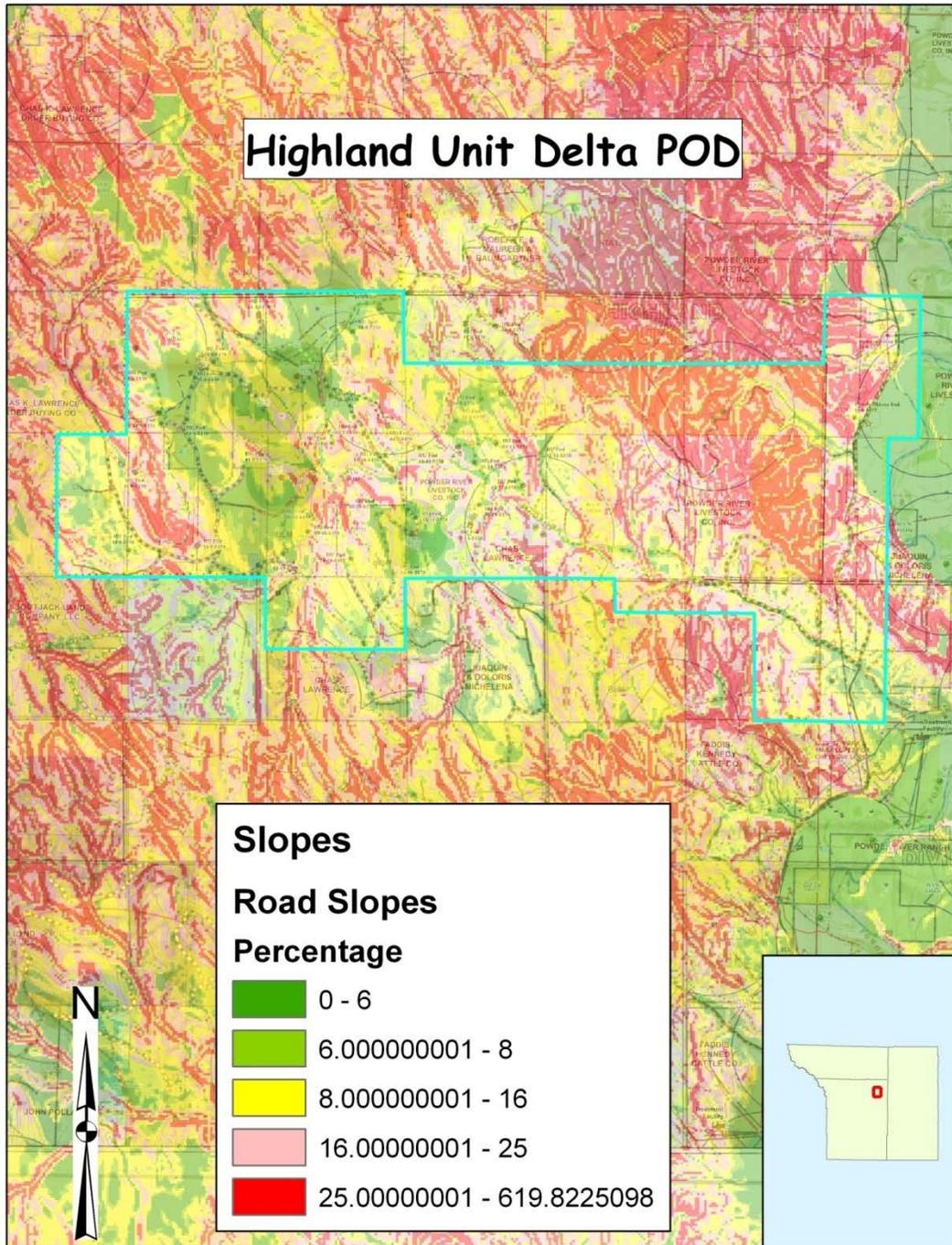
A soil’s stability is greatly affected by the slope on which it occurs, in general, the greater the slope, the greater the potential for slumping, landslides and water erosion. Approximately 20% in the project area has slopes of 25% or more. Slopes greater than 25% are shown on Figure 3.4 below.

Soils with slopes of less than 25% may also be prone to high erosion because of the soil type, particle size, texture, or amount of organic matter. Soil types in the POD area with slopes 25% or greater, as defined by the Natural Resources Conservation Service (NRCS; USDA NRCS 2007), are listed in Table 3.2 along with the percentage of the project area.

Table 3.2 Slopes and Percentages

% Slope	% of Project Area
0-24%	80%
Greater than or Equal to 25%	20%

Figure 3.4 Areas of Slopes Exceeding 25% within the Project Area



3.2.2. Ecological Sites

Ecological Site Descriptions (Table 3.3) are used to provide site and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information.

A summary of the ecological sites within the project area are listed in Table 3.3 along with the percentage of the total area identified within the POD boundary.

Table 3.3 Summary of Ecological Sites

Ecological Site Description	ESD Percent of POD	Map Unit Symbol
Loamy	63%	708, 709, 639, 707, 640, 614, 615, 607, 641, 622
Badland complex	28%	684
Sandy loam	6%	718, 612, 611
Complex	2.5%	649, 616
Water	0.4%	938
Association	0.3%	624

Loamy soils are deep to moderately deep (greater than 20" to bedrock), well drained & moderately permeable. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture. Major Soil Series correlated to this site includes: Theedle, Kishona, Shingle, Forkwood, Cushman, Cambria, Haverdad, Ulm and Zigweid.

Onsites revealed loamy sites generally in the western portion of the POD, sandy sites were in the north central area and shallow sites were found on access routes and on the eastern portion of the project. Badland areas exist in the area but were avoided. The dominant ecological sites and plant communities identified during the onsite were loamy soils with mostly mixed sagebrush/grass plant communities.

3.2.3. Vegetation

3.2.3.1. General Description

Mixed sagebrush/grass plant communities were identified on the majority of the disturbance sites in this project. The northeast corner of the POD has steeper slopes covered with sparse vegetation. The majority of wells and infrastructure are located in the western portion which contains a higher production of grasslands with a mosaic of sagebrush shrublands. Vegetation indentified at the onsite includes western wheatgrass, Wyoming big sage, prairie junegrass, sandberg bluegrass, and bluebunch wheatgrass. It was evident that cheatgrass (downy brome) has invaded this project area.

Historically, the mixed sagebrush/grass plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush control. Big sagebrush is a significant component of this 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. Dominant grasses include rhizomatous wheatgrasses, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and sandberg bluegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur.

Below are the transitions that occur due to reclamation, grazing and environmental pressures. They are based on NRCS ecological site information and illustrate the differences in functional value to animals and wildlife that depend on plant community health.

The grass, forb, shrub ratios determine habitat utilization, season use and cover for wildlife. Plant communities react to disturbance, management and environmental pressure. According the NRCS ecological site information, ecological functions vary with different plant communities. In general:

Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing and /or foraging areas for sage-grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Mixed Sagebrush/Grass Plant Community: The combination of an overstory of sagebrush and an understory of grasses and forbs provide a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage-grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range.

Heavy Sagebrush Plant Community: This plant community can provide important winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides excellent escape and thermal cover for large ungulates, as well as nesting and brood rearing habitat for sage-grouse.

Western Wheatgrass/Cheatgrass Plant Community: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage-grouse when it occurs proximal to woody cover.

Blue Grama Sod and Go-back Land Plant Communities: These communities provide limited foraging for antelope and other grazers. They may be used by sage-grouse if proximal to woody cover and if the Historic Climax Plant Community or the Western Wheatgrass/Cheatgrass Plant Community is limiting. Generally, these areas are prone to go back to an initial seral stage which begins with weeds such as Russian thistle, koshia and can be infested by invasive species.

3.2.4. Invasive Species

A database containing invasive species locations and other data is maintained by the Wyoming Energy Resource Information Clearinghouse (WERIC). The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of the WERIC database (www.weric.info):

- Leafy spurge
- Russian knapweed
- Whitetop
- Scotch thistle
- Salt cedar
- Russian olive

Additionally, the operator or BLM confirmed the following infestations and/or documented additional weed species during field investigations:

- Salt cedar

- Leafy spurge
- Russian knapweed
- Scotch thistle
- Canada thistle
- Common cocklebur
- Buffalo bur
- Russian thistle

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

3.2.5. Wetlands/Riparian

The National Wetland Inventory (NWI) identifies approximately 53 acres of sporadic, isolated wetlands within the POD boundary. These wetlands have for the most part formed in low lying areas where surface water accumulates for extended periods of time. Some of the wetlands are adjacent to streams, others may be the result of leaking livestock water facilities, and others may be the result of natural springs. Identification and management of wetland resources is under the jurisdiction of the U.S. Army Corps of Engineers.

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 Big Horn Environmental Consultants (BHEC). BHEC performed surveys for mountain plover, sharp-tailed grouse, greater sage-grouse, bald eagles, raptor nests, mountain plovers, Ute ladies'-tresses orchid and blowout penstemon habitat and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in (2008, 2010). PRBIWG accepted protocol is available on the Wyoming Energy Resource Information Clearinghouse website (www.weric.info). There is no established protocol for survey for blowout penstemon.

WGFD is the agency responsible for management of wildlife populations in the state of Wyoming. WGFD has developed several guidance documents that BLM BFO wildlife staff relies upon in evaluating impacts to wildlife and wildlife habitats. WGFD documents used to analyze the proposed project under the current analysis are referenced in this section.

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2009a), WGFD developed impact thresholds to evaluate impacts to wildlife from oil and gas development. For species or habitats discussed in this EA where impact thresholds have been developed, those thresholds will be disclosed and discussed both in relation to the current conditions (Affected Environment) and in relation to reasonable foreseeable development, including development associated with the proposed project (Impacts Analysis). Moderate impacts occur when impairment of habitat function becomes discernable. High impacts occur when impairment of habitat function increases. Extreme impacts occur where habitat function is substantially impaired. Mitigation for each level of impact is discussed in the guidelines. Thresholds for impacts are generally determined by well densities.

3.3.1. Threatened, Endangered, Proposed, and Candidate Species

3.3.1.1. Threatened and Endangered Species

Threatened, Endangered, Candidate and Proposed species that will be impacted beyond the level analyzed within the PRB FEIS are described below.

3.3.1.1.1. Black-footed ferret

The black-footed ferret is listed as Endangered under the ESA. The affected environment for black-footed ferrets is discussed in the PRB FEIS on pg. 3-175. There are 1,144 acres of prairie dog colonies within the project area and the Arvada potential black-footed ferret release area is 3.1 miles to the north of the project area. Habitat for black-footed ferret is present in the Highland Unit Delta POD

3.3.1.1.2. Blowout Penstemon

Blowout penstemon is listed as Endangered under the ESA. It is a regional endemic species with documented populations in the Sand Hills of west-central Nebraska and the northeastern Great Divide Basin of Carbon County, Wyoming. Suitable blowout penstemon habitat consists of sparsely vegetated, early successional, shifting sand dunes and blowout depressions created by wind. In Wyoming, the habitat is typically found on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges. No habitat for blowout penstemon was observed during surveys in the POD by BHEC in 2008 and 2010.

3.3.1.1.3. Ute Ladies'-Tresses Orchid

The Ute ladies'-tresses orchid (ULT) is listed as Threatened under the ESA. The affected environment for ULT is discussed in the PRB FEIS on pg. 3-175. No populations of ULT are known to occur in the area. Surveys conducted by BHEC indicated that ephemeral drainages in the POD have heavy clay soils and immediately rise to upland vegetation. Surveys in the Powder River corridor portion of the project area have shown that habitat is not suitable for ULT (BHEC 2010). No ULT habitat exists in the Highland Unit Delta POD.

3.3.1.2. Proposed Species

3.3.1.2.1. Mountain Plover

The USFWS reinstated a proposal to list the mountain plover under ESA on June 29, 2010 (USFWS 2010). The species is also a Wyoming BLM sensitive species, a Wyoming game and Fish Department Species of Greatest Conservation Need (SGCN), and is a USFWS Bird of Conservation Concern for Region 17. The affected environment for mountain plover is discussed in the PRB FEIS on pg. 3-177 to 3-178.

The Highland Unit Delta POD has large prairie dog colonies in the western portion of the POD that include areas of relatively flat terrain with short vegetation which may be considered as moderately suitable for plovers. Surveys for mountain plovers have been conducted in the area by BHEC since 2004. No mountain plovers have been observed during surveys in the project area.

3.3.1.3. Candidate Species

3.3.1.3.1. Greater Sage-grouse

In 2010, USFWS determined that the sage-grouse is warranted for federal listing across its range, but listing is precluded by other higher priority listing actions. In addition to being listed as a Wyoming BLM sensitive species, sage-grouse are listed as a WGFN species of greatest conservation need, because populations are declining and they are experiencing ongoing habitat loss. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17.

The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects

to Nesting Habitat (2008) recommends that impacts be considered for leks within four miles of oil and gas developments. WGFD records indicate that seven sage-grouse leks occur within four miles of the project area. These seven lek sites are identified in the following table.

Table 3.4 Sage-grouse leks within 4 miles of the Highland Unit Delta project area (all occupied)

Lek Name	Legal Location	Distance from Project Area (mi)	WGFD Category of Impact
Alvaro	T52N, R80W SW Sec. 26	3.3 northwest	Extreme
Fleetwood Draw	T51N, R79W SE Sec. 23	2.9 southwest	Extreme
Kinney Draw I	T51N, R78W SE Sec. 4	Within POD	High
Kinney Draw II	T51N, R78W SW Sec. 10	Within POD	High
Kinney Draw III	T51N, R78W NW Sec. 11	Within POD	Extreme
Nurse Draw	T51N, R78W NW Sec. 3	Within POD	Moderate
Thompson Creek Rd II	T52N, R70W SE Sec. 13	3.6 northwest	Moderate

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (2009), WGFD categorized impacts to sage-grouse by number of well pad locations per square mile within two miles of a lek and within identified nesting/brood-rearing habitats greater than two miles from a lek. Moderate impacts occur when well density is between one and two well pad locations per square mile or where there is less than 20 acres of disturbance per square mile. High impacts occur when well density is between two and three well pad locations per square mile or when there are between 20 and 60 acres of disturbance per square mile. Extreme impacts occur when well density exceeds three well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile.

3.3.2. BLM Sensitive Species

Wyoming BLM has prepared a list of sensitive species on which management efforts should be focused towards maintaining habitats under a multiple use mandate. The goals of the policy are to:

- Maintain vulnerable species and habitat components in functional BLM ecosystems
- Ensure sensitive species are considered in land management decisions
- Prevent a need for species listing under the ESA
- Prioritize needed conservation work with an emphasis on habitat

The authority for the sensitive species 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. BLM Wyoming sensitive species that will be impacted beyond the level analyzed within the PRB FEIS are described below.

3.3.2.1. Northern Leopard Frog

The affected environment for northern leopard frog is discussed in the PRB FEIS on pg. 3-181. This is a WGFD Species of Greatest Conservation Need (SGCN), with a rating of NSS4, indicating that the species is common (widely distributed throughout its native range and populations are stable) and habitat is stable. BHEC (2010) reports northern leopard frogs as being common along the edge of the Powder River.

3.3.2.2. Bald Eagle

The affected environment for bald eagles is described in the PRB FEIS on pg. 3-175. At the time the PRB FEIS was written, the bald eagle was listed as a threatened species under the ESA. Due to successful recovery efforts, it was removed from the ESA on 8 August 2007. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to

avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, the BLM shall continue to comply with all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (PRB Oil & Gas Project BO), #WY07F0075) (USFWS 2007) shall continue to be complied with.

In addition to being listed as a Wyoming BLM sensitive species, bald eagles are a WGFD SGCN with a NSS2 rating, due to populations being restricted in numbers and distribution, ongoing loss of habitat, and sensitivity to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17.

The nearest documented bald eagle nest is on the Clear Creek drainage 3.7 miles north of the Highland Unit Delta POD boundary. The eastern portion of the POD is in the Powder River corridor which is used as roosting habitat for wintering bald eagles.

3.3.2.3. Brewer's Sparrow

The affected environment for Brewer's sparrow is discussed in the PRB FEIS on pg. 3-200. In addition to being listed as a BLM Wyoming sensitive species, Brewer's sparrows are a WGFD SGCN, with a rating of NSS4 because populations are declining, habitat is vulnerable with no ongoing loss, and the species is not sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17. Brewer's sparrows are common in sagebrush communities in northeastern Wyoming and probably occur in the project area.

3.3.2.4. Western Burrowing Owl

The affected environment for western burrowing owl (burrowing owl) is discussed in the PRB FEIS on pg. 3-186. In addition to being listed as a Wyoming BLM sensitive species, burrowing owls are a WGFD SGCN, with a rating of NSS4 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, habitat is restricted or vulnerable without substantial recent or ongoing loss, and it may be sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action, and they are also a USFWS BCC in Region 17. Burrowing owls nests have been documented in the Highland Unit Delta POD (see the nest table in the raptor section).

3.3.2.5. Black-tailed Prairie Dog

The affected environment for black-tailed prairie dogs is discussed in the PRB FEIS (pg 3-179). At the time the PRB FEIS was written, the black-tailed prairie dog was added to the list of candidate species for federal listing in 2000 (USFWS 2000). It was removed from the list in 2004. Wyoming BLM considers black-tailed prairie dogs a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a WGFD SGCN, with a rating of NSS3, because populations are declining, and habitat is vulnerable but not undergoing significant loss.

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 aerial imagery indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001, but aerial surveys conducted in 2003 indicated that approximately 47% of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier et al. 2004). Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented and isolated (Miller et al. 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems that affect long term population viability, such as landowner poisoning and disease (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

Big Horn Environmental Consultants delineated 31 black-tailed prairie dog colonies primarily in the western portion of the POD ranging in size from 1.6 to 862 acres and totaling 1,144 acres. Their sizes and locations area listed in the table below.

Black-Tailed Prairie Dog Colonies Surveyed by Big Horn Environmental Consultants in 2010 for the Highland Unit Delta POD

QQ	Section(s)	Twp N	Rng W	Size (in acres)
NWNE	3	51	78	16
NENE	3	51	78	10.8
SENW	3	51	78	4.5
SE	4	51	78	862
SW	3	51	78	contiguous with above
E 1/2	9	51	78	contiguous with above
W 1/2	10	51	78	contiguous with above
SENE	8	51	78	5.7
SWNE	17	51	78	32.6
NWNW	15	51	78	57
SWNE	15	51	78	30.7
NENE	15	51	78	2
NENE	10	51	78	3.7
SESE	3	51	78	10.6
NENE	10	51	78	contiguous with above
NWNW	11	51	78	contiguous with above
SESW	2	51	78	3.7
NWSE	2	51	78	6
SESE	2	51	78	5.6
SWSW	11	51	78	5.6
NENE	14	51	78	8.9
SWNW	14	51	78	19.1
SWNW	14	51	78	1.8
SENW	13	51	78	5.8
NENW	13	51	78	0.63
SWSE	12	51	78	4
NESE	12	51	78	6.1
SWNW	12	51	78	1.6
NWNW	12	51	78	7
SWSW	1	51	78	4.2
SESE	17	51	77	23.5

3.3.3. Big Game

The Wyoming Dept. of Game and Fish has mapped the project area as yearlong range for pronghorn and winter yearlong range for mule deer. The eastern portion of the POD along the Powder River is within the yearlong range of white-tailed deer. Yearlong use is when a population of animals makes general use of habitat within the range on a year-round basis. Winter-yearlong use occurs when animals make general use of habitat on a year-round basis; however, there is a significant influx of additional animals into the area from other seasonal ranges during the winter months. Mule deer and pronghorn sign was noted during onsite visits in T51N, R78W sections 2, 4, and 11. No crucial big game habitat is known to occur in the area. Populations of pronghorn and deer within their respective hunt areas are above WGFD objectives. The most current big game range maps are available from WGFD.

The affected environment for pronghorn and deer is discussed in the PRB FEIS on pp. 3-117 to 3-122 and pp. 3-127 to 3-132, respectively.

3.3.4. Upland Game Birds

3.3.4.1. Plains Sharp-tailed Grouse

No sharp-tailed grouse leks have been located in the POD area but sharp-tails have been observed (BHEC 2008). The HUD project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter. The affected environment for plains sharp-tailed grouse is discussed in the PRB FEIS on pp. 3-148 to 3-150.

3.3.5. Aquatic Species

The POD is drained by ephemeral draws, the main ones being Kinney Draw and Nurse Draw. The eastern POD boundary extends to the Powder River. The Powder River Basin ecosystem and fishery is discussed in further detail in the PRB FEIS (pp. 3-153 to 3-166).

3.3.6. Migratory Birds

Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the year. According to Instruction Memorandum No. 2008-050, BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the Migratory Bird Treaty Act.

Habitat occurring in the project area includes rough to moderately rough terrain with numerous ridges and deep draws, to flatter grassland in the western portion of the POD. The primary vegetation throughout the project area is sagebrush grassland with scattered stands of ponderosa pine and juniper. The eastern portion of the POD is in the Powder River migration corridor. Many species that are of high management concern use these areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds have declined more consistently than any other ecological association of birds over the last 30 years (WGFD 2009).

The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified three groups of high-priority bird species in Wyoming: Level I – those that clearly need conservation action, Level II – species where the focus should be on monitoring, rather than active conservation, and Level III – species that are not otherwise of high priority but are of local interest. Those species that are anticipated to occur in the project area are listed in Table 3.5.

Table 3.5 High priority bird species that occur in the major vegetation type within the Highland Unit Delta POD project area

Level	Species	Wyoming BLM Sensitive
Level I	Brewer's sparrow	Yes
	Ferruginous hawk	Yes
	Greater sage-grouse	Yes
	Long-billed curlew	Yes
	McCown's longspur	
	Mountain plover	Yes
	Sage sparrow	Yes
	Short-eared owl	
	Upland sandpiper	
	Western burrowing owl	Yes

Level	Species	Wyoming BLM Sensitive
Level II	Black-chinned hummingbird	
	Bobolink	
	Chestnut-collared longspur	
	Grasshopper sparrow	
	Lark bunting	
	Lark sparrow	
	Loggerhead shrike	Yes
	Sage thrasher	Yes
	Vesper sparrow	
Level III	Common poorwill	
	Say's phoebe	

The affected environment for migratory birds is discussed further in the PRB FEIS (pp. 3-150 to 3-153).

3.3.7. Raptors

Five species of raptor have been documented to having used nests within 0.5 miles of the project area: burrowing owl, golden eagle, great-horned owl, northern harrier, and red-tailed hawk.

Golden eagles are listed as a BCC by USFWS for Bird Conservation Region BCR Region 17, which encompasses the project area. BCCs are those species that represent USFWS's highest conservation priorities, outside of those that are already listed under ESA. The goal of identifying BCCs is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. Golden eagles were also identified as a Level III species in the Wyoming Bird Conservation Plan. Burrowing owls are classified as BLM sensitive species.

Nineteen raptor nest sites have been documented to occur within 0.5 miles of the project boundary. These nests are listed in Table 3.6. None of the nests were active in 2010. In 2009, two red-tailed hawk nests were active (BHEC 2010). The affected environment for raptors is discussed in the PRB FEIS on pp. 3-141 to 3-148.

Table 3.6 Raptor Nests in the Highland Unit Delta project area

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
3537	400421E 4915708N	S16 T51N R78W	CTL	2009	Poor	INAC	n/a
				2008	Good	ACTI	GOEA
				2007	Good	ACTI	GOEA
				2005	Nest Gone	INAC	n/a
				2004	Nest Gone	INAC	n/a
3670	409040E 4920998N	S32 T52N R77W	CTL	2010	Good	INAC	n/a
				2009	Good	INAC	n/a
				2008	Excellent	INAC	n/a
				2007	Good	ACTI	GOEA
				2006	Excellent	INAC	n/a
				2005	Good	INAC	n/a
				2004	Unknown	INAC	n/a

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
3676	408970E 4917391N	S8 T51N R77W	CTL	2010	Substrate Gone	INAC	n/a
				2009	Excellent	ACTI	RETA
				2008	Good	ACTI	RETA
				2007	Good	ACTI	RETA
				2006	Good	ACTI	RETA
				2005	Fair	INAC	n/a
				2004	Nest Gone	INAC	n/a
3679	409026E 4921046N	S32 T52N R77W	CTL	2010	Good	INAC	n/a
				2009	Good	INAC	n/a
				2008	Excellent	INAC	n/a
				2007	Good	INAC	n/a
				2006	Excellent	ACTI	GOEA
				2005	Good	INAC	n/a
				2004	Good	ACTI	GOEA
3869	402643E 4919431N	S3 T51N R78W	CTD	2010	Good	INAC	n/a
				2009	Good	ACTI	RETA
				2008	Fair	INAC	n/a
				2007	Good	ACTI	GOEA
				2006	Fair	INAC	n/a
				2005	Nest Gone	INAC	n/a
				2004	Nest Gone	INAC	n/a
3870	399766E 4919837N	S4 T51N R78W	JUN	2010	Fair	INAC	n/a
				2009	Fair	INAC	n/a
				2008	Poor	INAC	n/a
3871	404307E 4917804N	S11 T51N R78W	JUN	2010	Fair	INAC	n/a
				2009	Good	INAC	n/a
				2008	Fair	INAC	n/a
				2007	Fair	INAC	n/a
				2006	Good	INAC	n/a
				2005	Nest Gone	INAC	n/a
4364	404392E 4917725N	S11 T51N R78W	CTL	2010	Poor	INAC	n/a
				2009	Good	INAC	n/a
				2008	Fair	INAC	n/a
				2007	Good	INAC	n/a
				2006	Good	OCCU	UNRA

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
4901	403902E 4920251N	S2 T51N R78W	CTL	2010	Fair	INAC	n/a
				2009	Fair	INAC	n/a
				2008	Poor	INAC	n/a
				2007	Good	INAC	n/a
4902	403574E 4920459N	S2 T51N R78W	GHS	2010	Nest Gone	INAC	n/a
				2009	Nest Gone	INAC	n/a
				2008	Unknown	INAC	n/a
				2007	Unknown	OCCU	NOHA
4950	402881E 4915141N	S23 T51N R78W	JUN	2009	Good	INAC	n/a
				2008	Good	ACTI	GRHO
				2007	Fair	INAC	n/a
4951	403029E 4915526N	S23 T51N R78W	JUN	2010	Fair	INAC	n/a
				2009	Good	INAC	n/a
				2008	Good	INAC	n/a
				2007	Good	INAC	n/a
4957	403886E 4920267N	S2 T51N R78W	CTL	2010	Poor	INAC	n/a
				2009	Good	INAC	n/a
				2007	Fair	INAC	n/a
5820	402643E 4919434N	S3 T51N R78W	CTD	2010	Poor	INAC	n/a
				2009	Good	INAC	n/a
				2008	Good	ACTI	RETA
6253	401522E 4915823N	S15 T51N R78W	POL	2010	Unknown	DNLO	n/a
				2009	Unknown	DNLO	n/a
				2008	Good	ACTI	RETA
6257	402359E 4916483N	S15 T51N R78W	ABB	2010	Unknown	INAC	n/a
				2009	Unknown	INAC	n/a
				2008	Unknown	ACTI	BUOW
12214	406320E 4919029N	S TN RW	JUN	2010	Good	INAC	n/a
12215	405017E 4920360N	S TN RW	JUN	2010	Fair	INAC	n/a
12216	408770E 4919184N	S TN RW	CTL	2010	Good	INAC	n/a

Notes:

1. ABB = Abandoned burrow; CTL = Cottonwood (live); CTD = Cottonwood (dead); JUN = Juniper; GHS = Ground/Hillside; POL = Ponderosa pine (live).

2. ACTI = Active; DNLO = Did not locate; INAC = Inactive; OCCU = Occupied; UNK = Unknown.
3. BUOW = Burrowing owl; GOEA = Golden eagle; GRHO = Great-horned owl; NOHA = Northern harrier; RETA = Red-tailed hawk.

3.4. Water Resources

The project area is within the Upper Powder River drainage system. The Wyoming Department of Environmental Quality (WDEQ) has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state. The Wyoming Oil and Gas Conservation Commission (WYOGCC) has authority for permitting and bonding off channel pits that are located over State and fee minerals.

3.4.1. Groundwater

The groundwater in this project area has historically been used for stock water or domestic purposes. A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 28 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 4 to 940 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following general 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). For additional water quality limits for groundwater, please refer to the WDEQ web site.

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

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

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

The production of CBNG necessitates the removal of some degree of the water saturation in the coal zones to temporarily reduce the hydraulic head in the coal. The Buffalo Field Office has been monitoring coal zone pressures as expressed in depth to water from surface since the early 1990s in the PRB (Figure 3.3).

The areas to the south and west of the Highland Unit Delta POD have been intensely developed with CBNG production. As a result, the target coal zone pressure may have been reduced through off set water Production. There are 2 BLM groundwater monitoring wells which are located within six miles of the Highland Unit Delta POD boundary, as listed in the table below.

Monitor Well Name	QtrQtr	Sec	T N	R W	Distance from HUD POD, mi	Total Depth, ft	Initial WL, ft depth from surface	Most Recent WL, ft depth from surface	Drilled by	Date Installed
Coal Gulch –Big George	SWSW	26	51	78	2.6 S	1970	473	739	Lance	9-8-05
Rose Draw-Wall	SESE	19	52	77	2.3 N	1986	0	72	Lance	2008

The Coal Gulch Groundwater monitoring well initial water level, which is indicative of the pressure in the coal zone, was recorded at 473 feet below ground level. The most recent measurement recorded the water level at 739 feet below ground level, for a decline of 266 feet since the well was completed in September, 2005.

Another issue identified as a potential problem in the PRB FEIS is the hydraulic connectivity between the coal beds in the basin and shallower Wasatch formation sandstone aquifers. At many monitoring locations, wells were completed in shallower sands to track any changes in water levels. The only monitoring location with a well drilled to a sand zone in this area is at the Rose Draw location. Because monitoring began at this location in mid 2009, the interpretation of the data and any prediction of potential trends at this location would be premature. The history of these wells, which are located outside the Highland Unit Delta POD boundary, may suggest that the pressure in the coal zone in the project area may have been reduced by the surrounding production.

This level of depressurization is within the potential predicted in the PRB FEIS which was determined through the Regional Groundwater Model for that document. For additional information, please refer to the PRB FEIS Chapter 4 Groundwater and the Wyoming State Geological Survey’s Open File Report 2009-10 titled “1993-2006 Coalbed Natural Gas (CBNG) Regional Groundwater Monitoring Report: Powder River Basin, Wyoming” which is available on their website at <http://www.wsgs.uwyo.edu>.

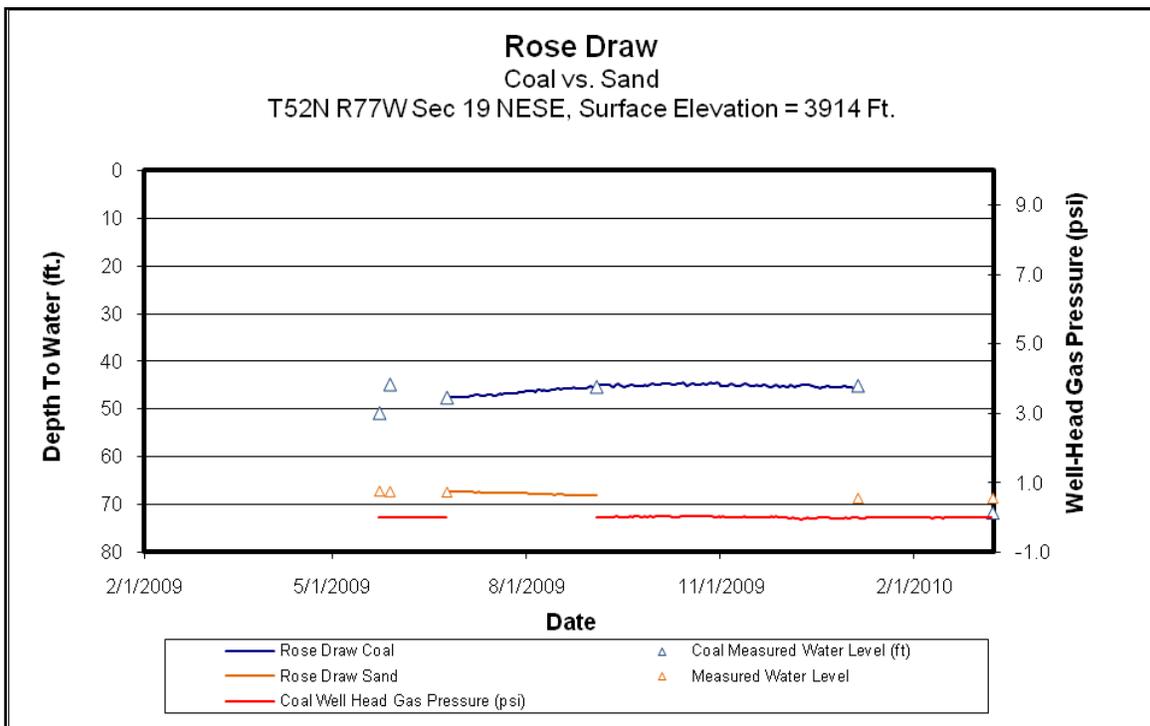
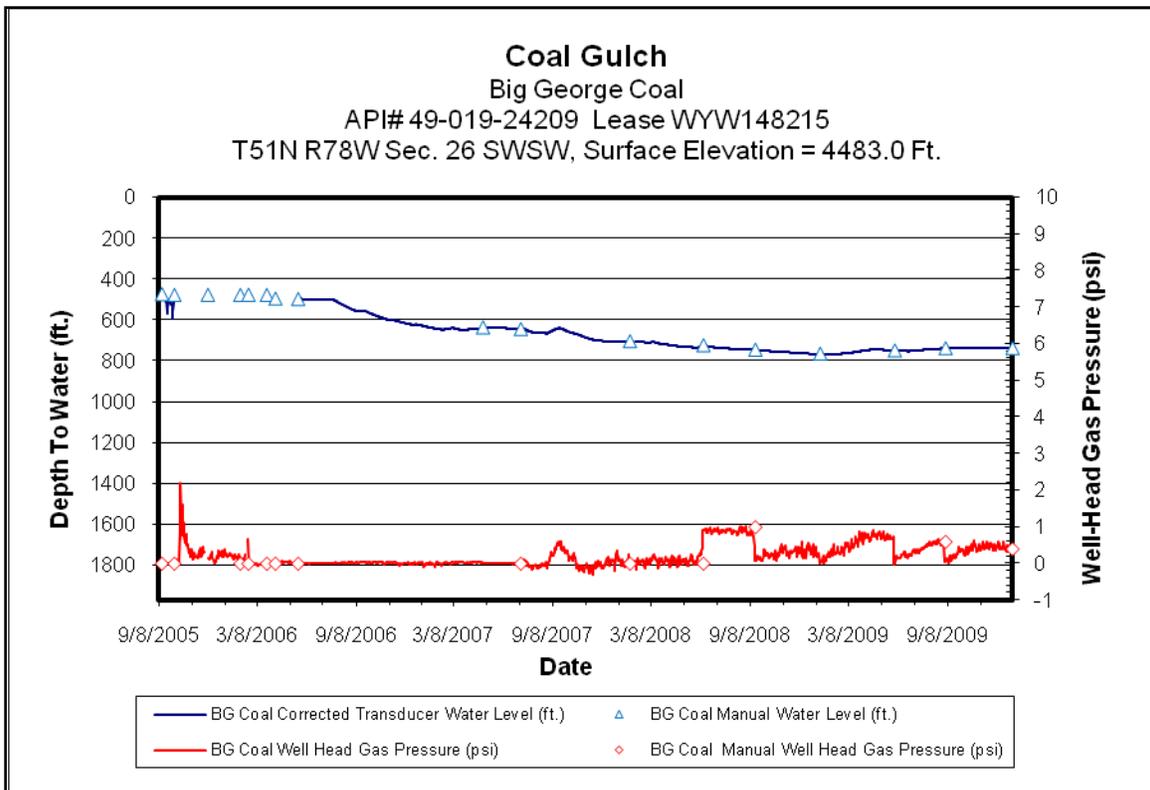


Figure 3.3 Depth to Water from Surface

3.4.2. Surface Water

The project area is within the Upper Powder River watershed. Most of the drainages in the area are

ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, WY (PRB FEIS page 3-49).

The operator has identified one natural spring, CKL #8, within one mile of the POD boundary at T51N, R78W, Sec 16 SWNE. The spring, which was identified in SEO records, could not be found during a field investigation; therefore a sample could not be collected. Conversations with the landowner indicate the spring has been dry in recent years, see WMP. A sample will be collected, if the spring becomes active.

NAME	TWN	RNG	SEC	QTR	Estimated Flow (GPM)
CKL #8	51	78	16	SWNE	No Flow

The Powder River flood plain contains wetland and riparian areas, as well as continuous cottonwood galleries invaded by salt cedar. Kinney Draw does contain sporadic cottonwood stands and isolated riparian areas along its course.

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

3.5. Cultural Resources

Class III cultural resource inventory was performed for the Highland Delta POD prior to on-the-ground project work (BFO project no. 70080103). NPAS conducted a block class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports*. Seth Lambert, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located in or near the project area.

Site Number	Site Type	Eligibility
48JO476	Prehistoric	NE
48JO1901	Prehistoric	NE
48JO1902	Prehistoric	NE
48JO1903	Historic	NE

Site Number	Site Type	Eligibility
48JO1904	Prehistoric	NE
48JO1905	Historic	NE
48JO1907	Prehistoric	NE
48JO1908	Prehistoric	NE
48JO1909	Prehistoric	NE
48JO1912	Prehistoric	NE
48JO1918	Prehistoric	NE
48JO2585	Historic	NE
48JO3281	Prehistoric	NE
48JO3283	Historic	NE
48JO3683	Historic	NE
48JO3684	Prehistoric	NE
48JO3695	Prehistoric	UN
48JO3696	Prehistoric	NE
48JO3794	Prehistoric	UN
48JO3795	Prehistoric	NE
48JO3796	Prehistoric/Historic	NE
48JO3820	Prehistoric/Historic	NE
48JO3821	Historic	NE
48JO3822	Historic	NE
48JO4023	Historic	NE
48JO4024	Historic	NE
48JO4025	Historic	NE
48JO4026	Prehistoric/Historic	NE
48JO4027	Historic	NE
48JO4028	Prehistoric	NE
48JO4029	Prehistoric	NE
48JO4030	Prehistoric	NE

3.6. Air Quality

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

Existing air pollutant emission sources within the region include following:

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

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

4. ENVIRONMENTAL CONSEQUENCES

This section describes the environmental consequences of the proposed action, alternative B. The effects analysis addresses the direct and indirect effects of implementing the proposed action, the cumulative effects of the proposed action combined with reasonably foreseeable Federal and non-federal actions, identifies and analyzes mitigation measures (COAs), and discloses any residual effects remaining following mitigation.

4.1. Alternative A

The No Action Alternative was analyzed as Alternative 3 in the PRB FEIS, and is incorporated by reference into this EA. Information specific to resources for this alternative is included within the PRB Final EIS on pages listed in Table 4.1.

Table 4.1 Discussion of the No Action Alternative in the PRB FEIS

Resource		Type of Effect	Page(s) of PRB FEIS
Project Area Description	Geologic Features and Mineral Resources	Direct and Indirect Effects	4-164 and 4-134
		Cumulative Effects	4-164 and 4-134
Soils, Vegetation, and Ecological Sites	Soils	Direct and Indirect Effects	4-150
		Cumulative Effects	4-152
	Vegetation	Direct and Indirect Effects	4-163
		Cumulative Effects	4-164
	Wetlands/Riparian	Direct and Indirect Effects	4-178
		Cumulative Effects	4-178

Resource		Type of Effect	Page(s) of PRB FEIS
Wildlife	Sensitive Species - Greater Sage-Grouse	Direct and Indirect Effects	4-271
		Cumulative Effects	4-271
	Aquatic Species	Direct and Indirect Effects	4-246
		Cumulative Effects	4-249
	Migratory Birds	Direct and Indirect Effects	4-234
		Cumulative Effects	4-235
	Waterfowl	Direct and Indirect Effects	4-230
		Cumulative Effects	4-230
	Big Game	Direct and Indirect Effects	4-186
		Cumulative Effects	4-211
Raptors	Direct and Indirect Effects	4-224	
	Cumulative Effects	4-225	
Water	Ground Water	Direct and Indirect Effects	4-63
		Cumulative Effects	4-69
	Surface Water	Direct and Indirect Effects	4-77
		Cumulative Effects	4-69
Economics and Recovery of CBNG Resources	Direct and Indirect Effects	4-362	
	Cumulative Effects	4-370	
Cultural Resources	Direct and Indirect Effects	4-286	
Air Quality	Direct and Indirect Effects	4-386	
	Cumulative Effects	4-386	

4.2. Alternative B

Alternative B contains complete APDs and is based on the operator and BLM working to reduce environmental impacts. This alternative summarizes the POD as it was finally, after field site visits, submitted to the BLM by LOG on September 3, 2010.

In an effort to protect sage-grouse habitat, LOG moved wells, added design features to reduce human visitation, developed a travel management plan, and included expedient reclamation methods in the project proposal.

In addition, to minimize effects to sage-grouse leks LOG removed a well and a pit from the 0.25 mile buffer for lek protection in section 11. See the Highland Unit Delta POD proposal for complete details. Four sage -grouse leks were identified in the Highland Unit Delta POD, they cover areas in sections 3, 4, 9, 10, and 11. The 13-11 well was originally located less than 0.1 miles from an active lek. Lance agreed to remove the well location from the project proposal. They also agreed to relinquish their permit to build a pit near the 13-11 well that was permitted (but not yet built) for the Highland Unit Gamma POD.

There are two existing roads that traverse within 0.25 mile of leks, which are proposed to be used in this POD. One access road runs east/west from section 3 to 4 through the 0.25 mile lek buffer, and the other access curves through a 0.25 mile lek buffer in sections 10 and 11. Two additional existing ranch road segments go through the same leks but will not be used for oil and gas traffic; they will be signed to keep CBNG development from driving on these existing private surface roads that travel through leks.

4.2.1. Project Area Land Use

Land owners requested stock tanks to water livestock; there are six stock tanks proposed in the Highland Unit Delta POD.

4.2.2. Soils, Ecological Sites and Vegetation

4.2.2.1. Soils

The Samday-Shingle-Badland complex is the problematic soil in this project area. This soil is the foundation for poor reclamation potential and erosion; 28% of the Highland Unit Delta POD area is covered by this soil. The project was designed to avoid this badland soil, first by the rancher who placed the ranch roads, and again by past PODs with use of existing disturbance to improve roads. The Highland Unit Delta POD was designed to use existing improved roads to steer clear of badland soils. Staying out of these soils also avoids issues with erosion, poor reclamation and road instability.

Erosion, poor reclamation and road instability are not major issues for this project. Two wells were placed in areas with small sections of poor reclamation potential. The operator included reclamation plans to account for poor soils. The operator's design features along with the BLM mitigation measures and subsequent COAs will reduce impacts to soils and promote reclamation.

Although 20% of the project area is in slopes >25%, due to the way the project was designed, very small portions of disturbance effect slopes >25%. The access roads to wells in section 5 were moved out of steep slopes during the onsite review. Soils in the POD are expected to be stabilized by the operator following the Highland Unit Delta POD reclamation plan in the MSUP pages 21-25 and their Storm Water Pollution Prevention Plan.

LOG has three seed mixes to be used depending on the ecological site. Seed mixes are listed in the Highland Unit Delta POD reclamation plan (MSUP on pages 24-25) by broad soil types Loam, Shallow and Sandy. Shallow soil is the limiting factor for thirteen wells in the project. Three wells have sandy soil and twenty two were identified with loamy soil. Wells by soil type are listed below. Treatment of topsoil during construction effects reclamation. The operator explains proper treatment of topsoil in the Highland Unit Delta POD MSUP on page 5.

LOG's design features included details for revegetation in the Highland Unit Delta POD reclamation plan in the MSUP pages 21-25. A good portion of the project area had good vegetation for sage-grouse. LOG included additional sage-grouse mitigation, (Highland Unit Delta POD book under the Wildlife Mitigation tab). Many of these BMPs LOG included in their mitigation also reduce impacts to vegetation and soils from construction such as focusing on a landscape scale approach, pre-planning, clustering disturbance corridors, consolidating facilities, using remote telemetry, car pooling, and utilizing dust control measures.

The operator has committed to the control of noxious weeds and species of concern using the following measures identified in their Integrated Pest Management Plan (IPMP). Control Methods include physical, biological, and chemical methods. Physical methods include mowing during the first season of establishment, prior to seed formation, and hand pulling of weeds (for small or new infestations). Biological methods include the use of domestic animals, or approved biological agents. Chemical methods include the use of herbicides, done in accordance with the existing Surface Use Agreement with the private surface owner. Preventive practices include use of certified weed-free seed mixtures will be used for re-seeding, and vehicles and equipment will be washed before leaving areas of known noxious weed infestations. Education will be provided by the company for its employees and contractors through the county weed districts and federal agencies. Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area.

4.2.2.1.1. Direct and Indirect Effects Soils, Ecological Sites and Vegetation

The impacts listed below, singly or in combination, would increase the potential for valuable soil loss due to increased water and wind erosion, invasive plant establishment, and increased sedimentation and salt loads to the watershed system.

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

- Mixing of horizons – occurs where construction on 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.
- This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.
- 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.
- Modification of hill slope hydrology.
- An important component of soils in Wyoming’s semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are predominantly composed of cyanobacteria, green and brown algae, mosses and lichens. They are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (BLM 2003). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily disturbed or destroyed by surface disturbances associated with construction activities.

These impacts, singly or in combination, would increase the potential for valuable soil loss due to increased water and wind erosion, invasive/noxious/poisonous plant spread, invasion and establishment, and increased sedimentation and salt loads to the watershed system.

4.2.2.1.2. Cumulative Effects Soils, Ecological Sites and Vegetation

The designation of the duration of disturbance is defined in the PRB FEIS (pg 4-1 and 4-151). Most soil disturbances would be short term impacts with expedient interim reclamation and site stabilization, as committed to by the operator in their POD Surface Use Plan and as required by the BLM in COAs.

Geomorphic effects of roads and other surface disturbance range from chronic and long-term contributions of sediment into waters of the state to catastrophic effects associated with mass failures of road fill material during large storms. Roads can affect geomorphic processes primarily by: accelerating erosion from the road surface and prism itself through mass failures and surface erosion processes; directly affecting stream channel structure and geometry; altering surface flow paths, leading to diversion or extension of channels onto previously unchanneled portions of the landscape; and causing interactions among water, sediment, and debris at road-stream crossings.

The POD covers approximately 7,500 acres. The summary of existing disturbance in section 2.4 above indicates 37 existing wells within the POD boundary with approximately 260 acres of existing disturbance. The Highland Unit Delta POD adds an additional 98 acres of disturbance. Out of the 7,500 acres 358 or 4.77% will be disturbed by oil and gas development. In addition, there is one surface mine 0.4 miles east of the POD that is approximately 3.8 acres in size. Finally, the entire POD is leased for livestock grazing. All of these disturbances are cumulative on soil resources.

4.2.2.1.3. Mitigation Measures Soils, Ecological Sites and Vegetation

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

- Two existing road segments will be signed to keep oil and gas traffic from using existing private surface roads that travel through leks. Place five “No Oil and Gas Traffic” signs, one at each entrance/exit. There will be three signs placed in section 3, one sign placed in section 9 and one in section 10.
- In areas where there are poor soils, low reclamation potential or a high potential for wind or water erosion, the operator must stabilize topsoil within 30-days of construction. Specifically the access road to the 32-4 and the 21-4 well location.
- The operator will use seed mix with species specific for each soil type. Seed mixes are listed in the Highland Unit Delta POD reclamation plan in the MSUP on pages 24-25.

Seed Mixes	Well Number
Loamy	12-5, 14-5, 23-3, 32-3, 34-3, 13-4, 14-4, 23-4, 24-4, 32-4, 41-4, 12-9, 14-9, 41-9, 13-10, 14-10, 23-10, 32-10, 34-10, 41-10, 44-10, 31-11,
Shallow	24-2, 31-2, 41-3, 44-3, 21-4, 24-9, 21-10, 11-11, 21-11, 23-11, 32-11, 41-11, 42-11
Sandy	21-2, 33-2, 34-2

- The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved “Reference Site” or NRCS Ecological Site Transition State. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.
- Compaction would be remediated by ripping.
- Stock tanks will be placed away from well pads

4.2.2.1.4. Residual Effects Soils, Ecological Sites and Vegetation

Residual Effects were also identified in the PRB FEIS at page 4-408 such as the loss of vegetative cover, despite expedient reclamation, for several years until desired native vegetation is successfully established. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage.

There will be shifts in the plant communities. This impacts ecological function and net primary production, effecting range and wildlife values through ecosystem degradation. General effects of construction can be the lack of ecosystem function. If an area is not reclaimed or if seeding fails, the plant community could be reduced to a “Go-back Land Plant Community” (Section 3.2 Plant Communities and Ecological Function).

Control efforts by the operator are limited to the surface disturbance associated the implementation of the project. 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 leafy spurge, Russian knapweed, whitetop, Scotch thistle, salt cedar and Russian olive. Cheat grass and other invasive

species that are present within non-physically disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser extent, Japanese brome (*B. japonicus*) are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time; these annual bromes would continue to be found within the project area.

4.2.3. Wildlife

4.2.3.1. Threatened, Endangered, Proposed, and Candidate Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in 4.2.

Table 4.2 Summary of Threatened and Endangered Species Habitat and Project Effects

Common Name (scientific name)	Habitat	Project Effects	Rationale
<i>Endangered</i>			
Black-footed ferret	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NLAA	Potential habitat will be reduced due to construction in prairie dog colonies.
Blowout penstemon	Sparsely vegetated, shifting sand dunes	NE	No suitable habitat present.
<i>Threatened</i>			
Ute ladies’-tresses orchid	Riparian areas with permanent water	NE	No suitable habitat present.
<i>Proposed</i>			
Mountain Plover	Short-grass prairie with slopes < 5%	NLJ	Project activities may favor or be detrimental.
<i>Candidate</i>			
Greater Sage-grouse	Basin-prairie shrub, mountain-foothill shrub	MIIH	Sagebrush cover will be affected.
Project Effects LAA - Likely to adversely affect NE - No Effect NLAA - May Affect, not likely to adversely affect individuals or habitat. NLJ – Not likely to jeopardize MIIH – May impact individuals and health			

4.2.3.1.1. Threatened and Endangered Species

4.2.3.1.1.1. Black-Footed Ferret

4.2.3.1.1.1.1. Direct and Indirect Effects

Direct and indirect effects to black-footed ferret are discussed in the PRB FEIS. Prairie dog colonies will be impacted by proposed activities in T54N R778W Sections 3, 4, 9, 10, and 11. Suitable habitat is of sufficient size to support a black-footed ferret population and the project area is 3.1 miles south of the Arvada prairie-dog complex, identified by WGFD as a potential black-footed ferret reintroduction site. It is extremely unlikely that any black-footed ferret is present in the project area. However, if any become present, the proposed action will most likely make portions of the project area unsuitable for ferret inhabitation. Implementation of the proposed development “*may affect, but is not likely to adversely affect*” the black-footed ferret.

4.2.3.1.1.1.2. Cumulative Effects

The cumulative effects to black-footed ferrets are discussed in the PRB FEIS (pg. 4-251).

4.2.3.1.1.1.3. Mitigation Measures

No mitigation measures are proposed.

4.2.3.1.1.1.4. Residual Effects

None identified.

4.2.3.1.1.2. Blowout Penstemon

4.2.3.1.1.2.1. Direct and Indirect Effects

Suitable habitat is not present within the project area. Implementation of the proposed coal bed natural gas project will have “no effect” on blowout penstemon. No further impact analysis is needed.

4.2.3.1.1.3. Ute Ladies’-Tresses Orchid

4.2.3.1.1.3.1. Direct and Indirect Effects

Suitable habitat is not present within the project area. Implementation of the proposed coal bed natural gas project will have “no effect” on Ute ladies’-tresses orchid. No further impact analysis is needed.

4.2.3.1.2. Proposed Species

4.2.3.1.2.1. Mountain Plover

4.2.3.1.2.1.1. Direct and Indirect Effects

Impacts to mountain plover are discussed in the PRB FEIS (pages 4-254 to 4-255). Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline corridors and roads, may provide suitable nesting habitat for plovers. On the other hand, increased traffic, construction, and human activities within one-quarter mile may be disruptive to nesting behaviors.

4.2.3.1.2.1.2. Cumulative Effects

The cumulative impacts to mountain plovers are discussed in the PRB FEIS.

4.2.3.1.2.1.3. Mitigation Measures

Because suitable habitat is present, continued surveying for presence of mountain plovers will be required.

4.2.3.1.2.1.4. Residual Effects

No residual impacts to mountain plovers have been identified because surveys have not shown them to be present in the project area.

4.2.3.1.3. Candidate Species

4.2.3.1.3.1. Greater Sage-grouse

4.2.3.1.3.1.1. Direct and Indirect Effects

Impacts to sage-grouse associated with energy development are discussed in detail in the *12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (USFWS 2010). Impacts to sage-grouse are generally a result of loss and fragmentation of sagebrush habitats associated with roads and infrastructure. Research indicates that sage-grouse hens also avoid nesting in developed areas.

Alternative B of the Highland Unit Delta POD will introduce 38 CBM well locations and approximately 130 miles of road and utilities to the area. This will disturb approximately 98 acres of surface in sage brush steppe ecotype.

In addition, vehicle traffic and human presence in the area will be incrementally increased above the current level from existing development. The wells and infrastructure in T51N, R78W Sections 3, 4, 10, and 11 will increase disturbances to 4 leks. Three leks within the POD, Nurse Draw, Kinney Draw I and Kinney Draw II will move into the extreme impact WGFD threshold category with the construction of the wells proposed in this POD. Modeled high quality nesting and winter habitat in these sections will be fragmented by the wells and access corridors.

4.2.3.1.3.1.2. Cumulative Effects

Recent research suggests that the cumulative and synergistic effects of current and foreseeable CBNG development within the vicinity of the project area are likely to impact the local sage-grouse population, cause declines in lek attendance, and may result in local extirpation. The cumulative impact assessment area for this project encompasses the project area and the area that is encompassed by a four mile radius around the four sage-grouse leks that occur within four miles of the project boundary. Analysis of impacts up to four miles was recommended by the State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008).

The sage-grouse population within northeast Wyoming has been exhibiting a steady long term downward trend, as measured by lek attendance (WGFD 2008b). Figure 3 illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Research suggests that these declines may be a result, in part, of CBNG development, as discussed in detail in USFWS (2010).

Excluding the 38 wells from the project, there are approximately 401 proposed wells (Automated Fluid Minerals Support System [AFMSS] 9/16/10) within the cumulative effects analysis area. With the addition of these wells, well density would increase to 6.9 wells per square mile. With approval of Alternative B (38 proposed well locations) well density would increase to 7.2 wells per square mile, well above the one well per square mile recommendation by the State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development. With the approval of Alternative B, 6 of the 7 leks in the cumulative impacts analyses area would exceed the WGFD threshold category for extreme impacts (3 currently are in the extreme category).

The PRB FEIS (BLM 2003) states that "the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270)." Based on the impacts described in the Powder River Basin Oil and Gas Project FEIS and the findings of more recent research, the proposed action may contribute to a decline in male attendance at the four leks that occur within four miles of the project area, and, potentially, extirpation of the local grouse population.

4.2.3.1.3.1.3. Mitigation Measures

In order to reduce the likelihood that activities associated with noise, construction, and human disturbance will cause sage-grouse abandonment of leks and adjacent nesting habitats within the HUD POD, BLM will implement a timing limitation on all surface-disturbing activities within and adjacent to identified nesting habitats across the project area. Because nesting grouse have been shown to avoid infrastructure by up to 0.6 miles, the intent of this timing restriction is to decrease the likelihood that grouse will avoid these areas and increase habitat quality by reducing noise and human activities during the breeding season.

4.2.3.1.3.1.4. Residual Effects

A timing limitation does not mitigate loss and fragmentation of habitat, or changes in disease

mechanisms. Suitability of the project area for sage-grouse will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with CBNG development.

4.2.3.2. BLM-Sensitive Species

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

The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-265.

4.2.3.2.1. Northern Leopard Frog

4.2.3.2.1.1. Direct and Indirect Effects

Elements of the project are not proposed in the riparian corridors where northern leopard frog occurrence was recorded. There will be no direct effect on northern leopard frogs. Water produced by project wells will be sent to treatment facilities and ultimately be discharged into the Powder River and are not expected to impact northern leopard frogs.

4.2.3.2.1.2. Cumulative Effects

Refer to PRB FEIS sensitive species impacts discussion.

4.2.3.2.1.3. Mitigation Measures

None proposed.

4.2.3.2.1.4. Residual Effects

None identified.

4.2.3.2.2. Bald Eagle

4.2.3.2.2.1. Direct and Indirect Effects

Two wells, the 12-5 and 14-5 are within a mile of winter roost areas in cottonwood galleries along the Powder River. Operation and maintenance activities for these wells will add to existing heavy traffic along the Powder River Road and facilities present in the area which could cause eagles to avoid roosting in the area.

4.2.3.2.2.2. Cumulative Effects

The cumulative effects for bald eagles associated with Alternative B are described in the PRB FEIS (pp. 4-251 to 4-253).

4.2.3.2.2.3. Mitigation Measures

Winter bald eagle timing limitations will applied to surface disturbing activities.

4.2.3.2.2.4. Residual Effects

Activity from the Highland Unit Delta project will add a slight increase in disturbance to wintering bald eagles in the Powder River corridor.

4.2.3.2.3. Brewer's Sparrow

4.2.3.2.3.1. Direct and Indirect Effects

Approximately 98 acres of surface will be disturbed during the development of this project. Much of this will be in sagebrush cover that serves as habitat for Brewer's sparrows.

4.2.3.2.3.2. Cumulative Effects

PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-273.

4.2.3.2.3.3. Mitigation Measures

No additional mitigation beyond the seasonal restrictions for sage-grouse and raptor nests that will also provide protection to any nesting sparrows present.

4.2.3.2.3.4. Residual Effects

Aside from the direct loss of sagebrush cover, Brewer's sparrows may nest in areas not covered by seasonal nesting protections for other species. These sparrows would be subject to disturbance and possible loss of nests during construction activities.

4.2.3.2.4. Western Burrowing Owl

4.2.3.2.4.1. Direct and Indirect Effects

The documented burrowing owl nest in the project area is near an existing major road which will receive an increase in traffic with the implementation of the proposed project. There is an increase in the possibility of collision with vehicles.

4.2.3.2.4.2. Cumulative Effects

The cumulative effects associated with Alternatives B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-221.

4.2.3.2.4.3. Mitigation Measures

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

4.2.3.2.4.4. Residual Effects

No further effects identified.

4.2.3.2.5. Black-tailed Prairie Dog

4.2.3.2.5.1. Direct and Indirect Effects

Impacts to black-tailed prairie dogs are discussed in the PRB FEIS on pg. 4-255 to 4-256. Fourteen wells and their access corridors are proposed for construction within prairie dog colonies in the western portion of the POD. Individual prairie dogs may be disrupted or killed by vehicles and construction operations. The overall population number and habitat acreage will not be changed.

4.2.3.2.5.2. Cumulative Effects

The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-273.

4.2.3.2.5.3. Mitigation Measures

No further mitigation measure applied.

4.2.3.2.5.4. Residual Effects

No further effects identified.

4.2.3.3. Big Game

4.2.3.3.1. Direct and Indirect Effects

Alternative B of the Highland Unit Delta project will disturb approximately 98 acres of terrestrial habitat. It will involve approximately 130 miles of new road into areas with no previous access. This will cause an increase in disturbance, displacement, habitat fragmentation, exposure to hunting and possible vehicle collisions. There will be a slight decrease in available forage. Declines in big game populations are expected. Impacts to big game animals from CBM development is discussed further in the PRB FEIS on pp.4-181 to 4-215.

4.2.3.3.2. Cumulative Effects

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-181 to 4-215.

4.2.3.3.3. Mitigation Measures

No further mitigation measure applied.

4.2.3.3.4. Residual Impacts

No further effects identified.

4.2.3.4. Upland Game Birds

4.2.3.4.1. Plains Sharp-tailed Grouse

4.2.3.4.1.1. Direct and Indirect Effects

The impacts to sharp-tailed grouse will be similar to those for sage-grouse.

4.2.3.4.1.2. Cumulative Effects

The cumulative effects associated with Alternatives B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-221.

4.2.3.4.1.3. Mitigation Measures

No further mitigation measure will be applied.

4.2.3.4.1.4. Residual Impacts

The residual effects to sharp-tailed grouse are similar to those described for sage-grouse.

4.2.3.5. Aquatic Species

4.2.3.5.1. Direct and Indirect Effects

Water produced by project wells will be sent to treatment facilities and ultimately be discharged into the Powder River where it may have a slight impact on the riparian habitat.

4.2.3.5.2. Cumulative Effects

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, (pp. 4-247 to 4-249).

4.2.3.5.3. Mitigation Measures

No further mitigation measure will be applied.

4.2.3.5.4. Residual Impacts

No further effects identified.

4.2.3.6. Migratory Birds

4.2.3.6.1. Direct and Indirect Effects

Direct and indirect effects to migratory birds are discussed in the PRB FEIS (pp. 4-231 to 4-235).

Disturbance of habitat within the project area is likely to impact migratory birds. Native habitats will be lost directly with the construction of wells, roads, and pipelines. Reclamation and other activities that occur in the spring may be detrimental to migratory bird survival. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Activities will likely displace migratory birds farther than the immediate area of physical disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

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

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

4.2.3.6.2. Cumulative Effects

The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-235. No additional mitigation measures are required.

4.2.3.6.3. Mitigation Measures

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

4.2.3.6.4. Residual Effects

Sage-grouse timing limitations will apply to the portion of the POD in T51 and 52N, R78W. Those migratory bird species and individuals that are still nesting when the sage-grouse timing limitations are

over (June 15) may have nests destroyed, or be disturbed, by construction activities. Protections around active raptor nests (Feb 1- July 31) extend past most migratory bird nesting seasons. Only a percentage of known nests are active any given year, so the protections for migratory birds from June 15-July 31 will depend on how many raptor nests area active.

4.2.3.7. Raptors

4.2.3.7.1. Direct and Indirect Effects

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

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation be located in such a way as to provide adequate biologic buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities. A list of documented raptor nests within 0.5 mile of project components is shown in Table 4.3.

Table 4.3 Proposed and existing infrastructure within 0.5 mile of documented raptor nests within the Highland Unit Delta project area

BLM ID	Infrastructure
3869	• Wells 23-3, 34-3, 44-3 and access corridors.
3870	• Wells 3-4, 23-4, and access corridors.
3871	• Wells 23-11, 32-11, 42-11 and access corridors.
4364	• Same as 3871.
4901	• Wells 21-2, 31-2, 33-2.
4902	• Wells 21-2, 31-2.
4957	• Same as 4901.
5820	• Same as 3869.
6257	• Access corridors in the SENE Section 15 T51N, R78W

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (pp. 4-216 to 4-221).

4.2.3.7.2. Cumulative Effects

The cumulative effects associated with Alternatives B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-221.

4.2.3.7.3. Mitigation Measures

Eleven wells and their infrastructure will have timing limitations placed during nesting season on surface disturbing activities.

4.2.3.7.4. Residual Impacts

Timing limitations during the nesting season protect nesting raptors from disturbance during the construction phase, but once wells are in place operation and maintenance activities are required regardless of the time of year. Even though wells were moved to reduce disturbance to nests, activity may decrease the desirability of some raptors to return to use nests sites.

4.2.4. Water Resources

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

The WMP for this project area includes the transport through pipeline to one of two (2) previously permitted existing EMIT water treatment facilities within the Upper Powder River watershed. The treated CBNG produced water will be discharged directly into the Upper Powder River. Alternatively, untreated water would be added to the existing pipeline to be transported to the Salt Creek Field in Midwest for injection into the Madison formation.

The maximum water production is predicted to be 20 gpm per well or 780 gpm (1.74 cubic feet per second (cfs) or 1,258 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 60,319 acre-feet in 2010 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 2% of the total volume projected for 2010. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.2.4.1. Groundwater

4.2.4.1.1. Direct and Indirect Effects

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 312 gpm will infiltrate at or near the discharge points (503 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 4 to 940 feet compared to 1,200 to 2,150 feet to the Big George coal. The operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to “...resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater stored within the Wasatch - Tongue River sand and coals, and sands units above and below the coals is almost 750 million acre-feet of recoverable groundwater are (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).

4.2.4.1.2. Cumulative Effects

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

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water “...cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65).

4.2.4.1.3. Mitigation Measures

Adherence to the drilling COAs, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures should protect any 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.

4.2.4.1.4. Residual Effects

The production of CBNG necessitates the removal of some degree of the water saturation in the coal zones to temporarily reduce the hydraulic head in the coal. The Buffalo Field Office has been monitoring coal zone pressures as expressed in depth to water from surface since the early 1990’s in the PRB.

The areas to the north, south and west of the Highland Unit Delta POD have been intensely developed with CBNG production. As a result, the target coal zone pressure may have been reduced through off set water production.

4.2.4.2. Surface Water

4.2.4.2.1. Direct and Indirect Effects

Produced Water Quality

Table 4.3 shows the average values of EC and SAR as measured at selected USGS gauging stations at high and low monthly flows as well as the Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water (there is no current standard for EC). It also shows constituent limits for TDS, SAR and EC detailed in the project area WYPDES permit, and the concentrations found in the POD’s representative water sample.

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

Sample location or Standard	TDS mg/l	SAR	EC µmhos/cm
Upper Powder River Watershed at Arvada, WY Gauging station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		4.76 7.83	1,797 3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	500 2,000 5,000	8	
WDEQ Water Quality Requirement for WYPDES Permit #WY0056081 At discharge point	NA	NA	7,500
Predicted Produced Water Quality Raw Big George Coal EMIT Treated Big George Coal RO Treated Big George Spring CKL #8	2,560 791 75 No Flow	40.1 18.8 20.4 No Flow	3,990 1,320 99 No Flow

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 2,560 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. For more information, please refer to the WMP included in this POD.

LOG proposes to treat and discharge CBNG produced water within the Highland Unit Delta POD directly into the Powder River through the use of the Kinney Draw and/or Faddis-Kennedy treatment facility. By utilizing the EMITS counter-current ion exchange system and/or the RO treatment processes, LOG will be assured that all discharge water complies with applicable WDEQ WYPDES discharge limitations, including months where LOG must discharge water at Montana state-line standards. As part of their future water management strategy, LOG is also proposing to transport produced water to an area near Midwest, Wyoming, where the water will be reinjected into the Madison aquifer. The CBNG water will be collected from the wells through the proposed corridors depicted on Map C. The proposed corridors will tie into the existing and approved County Line Pump Station, which would then transport the water to the reinjection location.

The operator has obtained a Wyoming Pollutant Discharge Elimination System WYPDES permit for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES Permit WY0056081 at page 4):

pH	6.5 to 9.0
Specific Conductance, EC	7500 mg/l max
Sulfates	3000 mg/l max
Total Recoverable Radium 226 + 228	1 pCi/l max
Dissolved Iron	300 µg/l max
Dissolved Copper	6 µg/l max

Total Barium	1800 µg/l max
Total Arsenic	8.4 µg/l max
Chlorides	150 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the Total Actual Monthly Load Limits for the permit. The operator, through the Assimilative Capacity Program, is permitted to discharge specific amounts of Total Dissolved Solids and Dissolved Sodium per month. The load, set in pounds and found on pg 2-3 of the permit, is calculated to meet water quality targets for the Powder River taken at the Montana border. The quantities fluctuate by the month based on irrigation potential. There will be no discharge permitted to the Powder River during the months of August and September.

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.

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

Produced Water Control

LOG proposes to treat and discharge CBNG produced water within the Highland Unit Delta POD directly into the Powder River through the use of the Kinney Draw and/or Faddis-Kennedy treatment facility. By utilizing the EMITS counter-current ion exchange system and/or the RO treatment processes, LOG will be assured that all discharge water complies with applicable WDEQ WYPDES discharge limitations, including months where LOG must discharge water at Montana state-line standards. As part of their future water management strategy, LOG is also proposing to transport produced water to an area near Midwest, Wyoming, where the water will be reinjected into the Madison aquifer. The CBNG water will be collected from the wells through the proposed corridors depicted on Map C. The proposed corridors will tie into the existing and approved County Line Pump Station, which would then transport the water to the reinjection location.

Produced Water Quantity

There are two (2) existing water discharge points (WDP) proposed to be used for this project. The Faddis-Kennedy and Kinney Draw treatment facilities have been permitted under WYDEQ Chapter 3 guidelines for treatment facilities and are provided in the WMP, see Attachment B. The permit for the outfalls associated with the Faddis-Kennedy treatment facility and the Kinney Draw treatment facility is WY0056081. The WYPDES permit for the facilities will be modified as necessary to include the proposed wells in the HUD POD. The Faddis-Kennedy and Kinney Draw EMIT treatment facilities have been inspected and have been found to be 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.

No new impoundments are proposed to be constructed for this project.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 39 wells is anticipated to be a total of 780 gpm or 1.74 cfs which will be added directly to the Powder River. This volume is 2.5% of the predicted total CBNG produced water contribution. For

more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 3). Based on the area of the Powder River watershed above the POD (6,050 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 48,400 wells which could produce a maximum flow rate of 968,000 gpm (2,160 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 1.74 cfs, is much less than the volume of runoff estimated from the 2-year storm event for the Upper Powder River (5,941 cfs).

Springs

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. Currently there is one SEO permitted spring located within one mile of the HUD POD, spring CKL #8. A field investigation of the spring conducted on 1/31/07, found that the spring was not active. Conversation with the landowner, June 2007, indicated that the spring has been dry in recent years. If the spring becomes active, sampling will be conducted.

In-channel downstream impacts are addressed in the WMP for the Highland Unit Delta POD prepared by WWC Engineering for LOG.

Several concerns have been raised regarding the downstream impacts of the Highland Unit Delta POD. Hydrologic facilities will be monitored and/or mitigated in accordance with BLM guidelines. Downstream hydrological impacts from the Highland Unit Delta POD are expected to be minimal due to the fact that the treated water will be discharged directly into the Powder River. LOG does not expect the quality of water within the Powder River will be degraded since CBNG produced water will be treated prior to discharging it to the Powder River. Proper design of the outfalls will prevent adverse affects such as erosion and sedimentation from the CBNG water discharge.

Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges.

Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas.” (PRB FEIS Page 4-175).

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that “(they) may be lost by bank undercutting caused by the increased surface water flows in channels.” Included in the ROD is programmatic mitigation “which may be appropriate to apply at the time of APD approval if site

specific conditions warrant.”(ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: “To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.”(ROD Page A-32).

4.2.4.2.2. Cumulative Effects

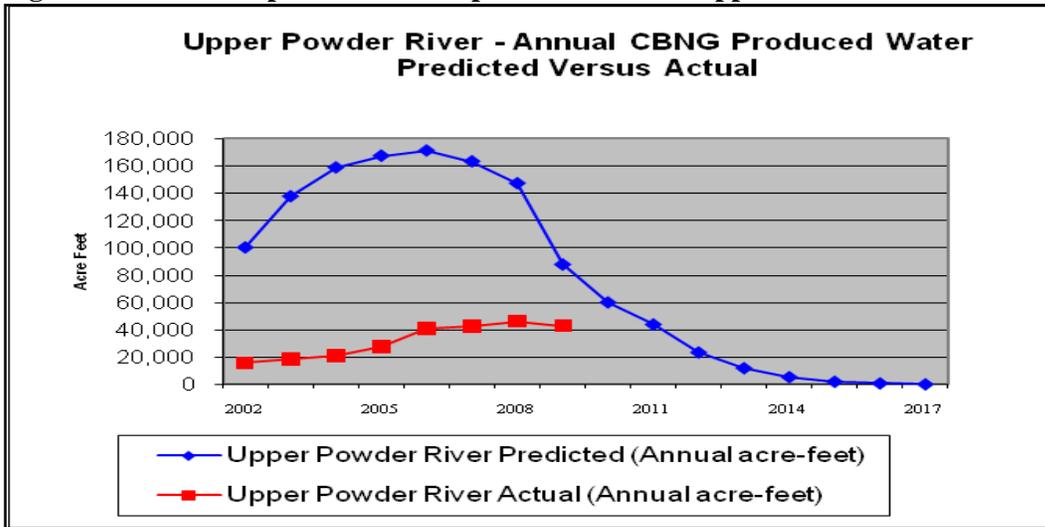
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2009, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 255,531 acre-ft of water compared to the predicted 1,135,537 acre-ft disclosed in the PRB FEIS (Table 2-8 pages 2-26). These figures are presented graphically in Figure 4.1 and Table 4.5 following. This volume is 22.5 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.5 Actual vs predicted water production in the Upper Powder River watershed *2009 Data Update 04-06-10*

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521	45,936	31.1	212,522	20.3
2009	88,046	1,135,567	43,009	48.8	255,531	22.5
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		255,531			

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



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

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 22.5% 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 manage the volume of water discharged.

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

4.2.4.2.3. Mitigation Measures

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. Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

The operator has committed to monitor the water discharge points and the channels downstream for stability. If erosion is noted, the operator will be required to repair and stabilize the area using selected mitigation techniques.

The operator has also committed to expediently stabilize and revegetate disturbance within channel and floodplain associated with this project.

4.2.4.2.4. Residual Effects

“Streams enhanced by large volumes of CBM produced water may begin to establish meander patterns on longer wavelengths in response to increased flows. Stream drainages would readjust to their existing natural flows at the end of the project’s life. Downcutting (stream erosion) and sediment deposition (aggradation) are natural processes that occur as stream drainages age through time. Downcutting occurs within the upper reaches of a drainage system as the stream channel becomes incised through erosion, until the slope of the stream and its velocity are reduced and further erosion is limited. Sediment is deposited within the lower, slower reaches of a stream.

Surface drainages could be degraded from erosion caused by increased surface flow, unless rates of CBM discharge and outfall locations are carefully controlled. Increased flows could cause downcutting in fluvial environments, resulting in increased channel capacity over time within the upper and middle reaches of surface drainages.” (PRB FEIS pg 4-118).

4.2.5. Cultural Resources

4.2.5.1. Direct and Indirect Effects

Non eligible site(s) 48JO1903, 48JO3821, 48JO3822 and 48JO4026 will be impacted by surface disturbance in the proposed project. No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI (A) (1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 09/22/10 that no historic properties exist within the APE. If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

4.2.5.2. Cumulative Effects

Construction and development of oil and gas resources impacts cultural resources through ground disturbance, unauthorized collection, and visual intrusion of the setting of historic properties. This results in fewer archaeological resources available for study of past human life-ways, changes in human behavior through time, and interpreting the past to the public. Additionally, these impacts may compromise the aspects of integrity that make a historic property eligible for the National Register of Historic Places. Recording and archiving basic information about archaeological sites and the potential for subsurface cultural materials in the proposed project area serve to partially mitigate potential cumulative effects to cultural resources.

Fee actions constructed in support of federal actions can result in impacts to historic properties. Construction of large plans of coalbed natural gas development on split estate often include associated infrastructure that is not permitted through BLM. Project applicants may connect wells draining fee minerals, or previously constructed pipelines on fee surface with a federal plan of development. BLM has no authority over such development which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. The cumulative effect of numerous federal approvals can result in impacts to historic properties. Archeological inventories reveal the location of sites and although the BLM goes to great lengths to protect site location data, that information can potentially get into the wrong hands. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

4.2.5.3. Mitigation Measures

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).

4.2.5.4. Residual Effects

During the construction phase, there will be numerous crews working across the project area using heavy construction equipment without the presence of archaeological monitors. Due to the extent of work and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

4.2.6. Air Quality

4.2.6.1. Direct and Indirect Effects

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

4.2.6.2. Cumulative Effects

Impacts of surface disturbing activities on air quality were analyzed in the 2003 Powder River RMP/FEIS (pgs 4-354-404). There are approximately 13,093 Federal wells existing in the Buffalo Field Office, which are predominately 84% coalbed methane production wells. Analysis of cumulative impacts for reasonably foreseeable development (RFD) of oil and gas wells on public lands in the Buffalo Field Office is presented in the 2003 Powder River RMP/FEIS.

4.2.6.3. Mitigation Measures

- 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.

4.2.6.4. Residual Effects

The U.S. Environmental Protection Agency (EPA) established air quality standards (NAAQS) for criteria pollutants. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂), and lead (Pb). Air pollutant concentrations greater than the NAAQS standards represent a risk to human health.

EPA has delegated regulation of air quality to the State of Wyoming and is administered by the Wyoming Department of Environmental Quality. Wyoming Ambient Air Quality Standards (WAAQS) and NAAQS identify maximum limits for concentrations of criteria air pollutants at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health that, by law, require public safeguards be

implemented. State standards must be at least as protective of human health as federal standards, and may be more restrictive than federal standards, as allowed by the Clean Air Act.

4.3. Summary of Effects

Table 4.6 provides a comparison of the cumulative effects associated with the alternatives.

Resource/Species	Alternative A	Alternative B
Wetlands/Riparian Areas	No existing wetlands/riparian areas would be disturbed.	No existing wetlands/riparian areas would be disturbed.
Wildlife		
Big Game	No habitat loss or fragmentation. Would likely see increased traffic passing through due to surrounding mineral development	Greatest habitat loss.
		Greatest habitat fragmentation.
Raptors	No habitat loss.	Greatest foraging habitat fragmentation.
	No wells authorized near nests.	Eleven wells within 0.5 miles of nests.
Migratory Birds	No habitat loss.	Greatest habitat loss.
		Greatest habitat fragmentation.
	No habitat fragmentation.	Overhead electric poses predation & collision risk.
Threatened and Endangered Species		
Bald eagle	No habitat loss	Overhead electricity increasing mortality risk from electrocution.
Sensitive Species		
Greater Sage-Grouse	No habitat loss.	Greatest habitat loss.
	No decision on overhead electricity. Overhead power could be routed through project area on private surface without BLM discretion increasing predation and collision risk. Grouse may avoid overhead power lines.	Greatest predation and collision risk associated with overhead power lines.
West Nile Virus	No Impact	Likely to have effect on the overall spread of WNV.

5. CONSULTATION & COORDINATION

Agencies summarized in Table 5.1 were consulted on the proposed project to confirm compliance with applicable laws and regulations.

Table 5.1 Consultations

Contact	Title	Organization	Present at Onsite
Mary Hopkins	SHPO	Wyoming State Historic Preservation Office	no
Pauline Schuette	Wildlife Biologist	U.S. Fish & Wildlife Service	no
Bud Stewart	Energy Coordinator	WGFD	no

6. OTHER PERMITS REQUIRED

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

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APPENDIX A: CONDITIONS OF APPROVAL FOR THE APPLICATION
FOR PERMIT TO DRILL

POD Name: Highland Unit Delta POD

Operator Name: Lance Oil and Gas Inc.

Field Office: Buffalo Field Office
Address: 1425 Fort Street
Buffalo, Wyoming 82834

Office Telephone Number: 307-684-1100

List of Wells:

	Well Name	Well #	Sec	TWN	RNG	Lease	QTR
1	Highland Delta Powder River Fed	12-5	5	51N	77W	WYW153356	SWNW
2	Highland Delta Powder River Fed	14-5	5	51N	77W	WYW153356	SWSW
3	Highland Delta HU Fed	21-2	2	51N	78W	WYW146342	NENW
4	Highland Delta HU Fed	24-2	2	51N	78W	WYW146342	SESW
5	Highland Delta HU Fed	31-2	2	51N	78W	WYW146342	NWNE
6	Highland Delta HU Fed	33-2	2	51N	78W	WYW146342	NWSE
7	Highland Delta HU Fed	34-2	2	51N	78W	WYW146342	SWSE
8	Highland Delta HU Fed	23-3	3	51N	78W	WYW146343	NESW
9	Highland Delta HU Fed	32-3	3	51N	78W	WYW146343	SWNE
10	Highland Delta HU Fed	34-3	3	51N	78W	WYW146343	SWSE
11	Highland Delta HU Fed	41-3	3	51N	78W	WYW146343	NENE
12	Highland Delta HU Fed	44-3	3	51N	78W	WYW146343	SESE
13	Highland Delta HU Fed	13-4	4	51N	78W	WYW146343	NWSW
14	Highland Delta HU Fed	14-4	4	51N	78W	WYW146343	SWSW
15	Highland Delta HU Fed	21-4	4	51N	78W	WYW146343	NENW
16	Highland Delta HU Fed	23-4	4	51N	78W	WYW146343	NESW
17	Highland Delta HU Fed	24-4	4	51N	78W	WYW146343	SESW
18	Highland Delta HU Fed	32-4	4	51N	78W	WYW146343	SWNE
19	Highland Delta HU Fed	41-4	4	51N	78W	WYW146343	NENE
20	Highland Delta HU Fed	12-9	9	51N	78W	WYW146343	SWNW
21	Highland Delta HU Fed	14-9	9	51N	78W	WYW146343	SWSW
22	Highland Delta HU Fed	24-9	9	51N	78W	WYW146343	SESW
23	Highland Delta HU Fed	41-9	9	51N	78W	WYW146343	NENE
24	Highland Delta HU Fed	13-10	10	51N	78W	WYW146343	NWSW
25	Highland Delta HU Fed	14-10	10	51N	78W	WYW146343	SWSW
26	Highland Delta HU Fed	21-10	10	51N	78W	WYW146343	NENW
27	Highland Delta HU Fed	23-10	10	51N	78W	WYW146343	NESW
28	Highland Delta HU Fed	34-10	10	51N	78W	WYW126721	SWSE
29	Highland Delta HU Fed	41-10	10	51N	78W	WYW146343	NENE
30	Highland Delta HU Fed	43-10	10	51N	78W	WYW126721	NESE

	Well Name	Well #	Sec	TWN	RNG	Lease	QTR
31	Highland Delta HU Fed	44-10	10	51N	78W	WYW126721	SESE
32	Highland Delta HU Fed	11-11	11	51N	78W	WYW146342	NWNW
33	Highland Delta HU Fed	21-11	11	51N	78W	WYW146342	NENW
34	Highland Delta HU Fed	23-11	11	51N	78W	WYW146342	NESW
35	Highland Delta HU Fed	31-11	11	51N	78W	WYW146342	NWNE
36	Highland Delta HU Fed	32-11	11	51N	78W	WYW146342	SWNE
37	Highland Delta HU Fed	41-11	11	51N	78W	WYW146342	NENE
38	Highland Delta HU Fed	42-11	11	51N	78W	WYW146342	SENE

List of Discharge Points:

	Discharge Site	Qtr/Qtr	Sec	TWP	RNG	Latitude	Longitude	Maximum Est. Flow (GPM)
1	WY0056081-016	NESW	32	51	77	44.34899	-106.15241	780
2	WY0056081-018	NWSE	20	51	77	44.37728	-106.14821	780

SITE SPECIFIC

Site-Specific Conditions of Approval

In addition to the operator committed measures, and those incorporated from the PRB FEIS, the BLM is including the following site-specific COAs to alleviate environmental impacts:

Surface Use

1. Prior to construction, the operator will remove all staking for those areas which were not approved with the POD/APD. Note well 13-11 was removed from the project by the operator.
2. Submit new POD maps with only approved wells and infrastructure, prior to the pre-construct.
3. In order to reduce disturbance in the sage-grouse lek in section 11 submit a sundry to remove the impoundment from the Highland Unit Gamma POD.
4. To limit travel through leks, place five “No Oil and Gas Traffic” signs; one at each entrance/exit through leks. There will be three signs placed in section 3, one sign placed in section 9 and one sign in section 10.

Township/Range	Section	QTR	Location
T51N, R78W	3	NWSW	Place sign at road south of the ranch operations
T51N, R78W	3	SESW	Place sign at road, west of well 23-3, which heads north through lek toward ranch operations
T51N, R78W	3	SESW	Place sign at road that veers southwest through lek toward the 13-10 well
T51N, R78W	9	NESE	Place sign east of the 43-9 well on road south of the lek
T51N, R78W	10	NWSW	Place sign north side of 13-10 well location, on the road that heads north toward the lek

5. For all wells spudded after November 1, the reserve pit fluids must be removed immediately following completion activities to avoid potential conflicts with raptor timing limitations and the

standard COA that reserve pits be closed within 90 days, unless an exception is granted by the BLM Authorized Officer.

6. Improved roads with utility corridor working width will not exceed 50 feet with a clearing and blading not to exceed 40 feet in width unless a specific design is included in the plan and profile section of the master surface use plan.
7. Primitive roads with utility corridor working width will not exceed 40 feet with a clearing and blading not to exceed 30 feet in width.
8. Pipeline installation and/or corridors without road access working width will not exceed 35 feet with clearing and blading not to exceed 20 feet.
9. All pit spoil must be placed back in the pit once dry. The pit area should usually be mounded slightly to allow for settling and positive surface drainage.
10. All permanent above-ground structures, including well houses, compressor stations, and transformer boxes, not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the Highland Unit Delta POD is Covert Green.
11. In areas where there are steep slopes and/or fragile soils, improved roads used in conjunction with accessing federal wells must be fully built (including all water control structures such as wing ditches, culverts, relief ditches, low water crossings, surfacing, etc.) and functional to BLM standards as outlined in the BLM Manual 9113 prior to drilling of the well. Specifically for this POD approved engineered roads must be fully built prior to accessing the well for drilling. The remaining roads in this POD, not constructed prior to drilling, will be fully built within 30 days of completion of the well they are used to access.
12. In areas where there are poor soils, low reclamation potential or a high potential for wind or water erosion, the operator must stabilize topsoil within 30-days of construction; specifically the access road to the 32-4 and the 21-4 well location.
13. The operator will seed on the contour to a depth of no more than 0.5 inch. To maintain quality and purity, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the seed mix in the Highland Unit Delta MSUP pages 24 and 25.

Seed Mixes	Well Number
Loamy	12-5, 14-5, 23-3, 32-3, 34-3, 13-4, 14-4, 23-4, 24-4, 32-4, 41-4, 12-9, 14-9, 41-9, 13-10, 14-10, 23-10, 32-10, 34-10, 41-10, 44-10, 31-11,
Shallow	24-2, 31-2, 41-3, 44-3, 21-4, 24-9, 21-10, 11-11, 21-11, 23-11, 32-11, 41-11, 42-11
Sandy	21-2, 33-2, 34-2

Road Construction

1. The operator is responsible for having the licensed professional engineer(s) certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
2. All engineered road segments must be complete including culverts and low water crossings before the drilling rig or other drilling equipment moves onto the pad.

3. The main existing access road through sections 15, 10, 3, 4, 9, & 16 will require maintenance to level ruts and reestablish crown. Surfacing material on this portion of road will meet the grading requirements for “Grading W” as outlined in the Wyoming Highway Department’s Standard Specification for Road and Bridge Construction due to the high anticipated levels of Average Daily Traffic (ADT).
4. Turnouts will be provided on engineered and template resource roads as outlined in the BLM Manual 9113 .45E(7), which is every 1000’ or intervisible for single lane roads.
5. Replace the 15 mph speed limit sign with a 10 mile per hour speed limit signs at STA: 10+00 on Engineered road 44-3-5178 due to the limited meeting sight distance.

Wildlife

Raptors:

The following conditions will alleviate impacts to raptors:

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

Township/Range	Section	Wells and Infrastructure
T51N, R78W	2	• Wells 21-2, 31-2, 33-2.
	3	• Wells 23-3, 32-3, 34-3, 44-3 and access corridor.
	4	• Wells 13-4, 23-4, and access corridors.
	11	• Wells 23-11, 32-11, 42-11 and access corridors.
	15	• Access corridors in the SENE Section 15 T51N, R78W
T52N, R78W	35	• The access corridor in the SW ¼ of Section 35.

2. Surveys for new raptor nests shall be conducted, annually, within 0.5 miles of the POD boundary on or after 15 April, and prior to or during the first nest occupancy check.
3. Nest occupancy checks shall be completed for all raptor nests identified within a 0.5 mile of any infrastructure associated with the POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy checks shall continue for the first five years on all identified nests within a 0.5 mile of the POD boundary. Survey results will be submitted to a Buffalo BLM biologist in writing no later than 31 July of each survey year and will include a map showing updated COA 0.5 mile raptor buffers.
4. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized during the breeding season (February 1 – July 31).

Western Burrowing Owl:

The following conditions will alleviate impacts to burrowing owls:

1. No surface disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities within the prairie dog town(s). This timing limitation will be in effect unless surveys determine the nest(s) to be inactive. This timing limitation will affect the road and utility corridor in T51N, R76W section 15.

Sage-Grouse:

The following conditions will reduce impacts to sage-grouse:

No surface disturbing activities are permitted from March 15 to June 30. This condition will be implemented on an annual basis for the life of the project. This condition applies to all POD surface disturbing activities in Township 51 North, Range 78 West and Township 52 North, Range 78 West.

- a. A 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. Maximum design speed on all operator-constructed and maintained roads (except county roads) will not exceed 25 miles per hour except travel along roads within 1/2 mile of the Kinney Draw I, II, III sage-grouse leks and the Nurse Draw lek. These roads will be posted at 10 mph.
- c. Disruptive activity is restricted on or within a 0.25 mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6:00 pm to 8:00 am from March 15-May 15. "Disruptive activities are those that "...require people and/or activity to be in nesting habitats for a duration of 1 hour or more during a 24 hour period..." (BLM 2009). This condition applies to the Kinney Draw I, II, and III leks and the Nurse Draw lek.

Mountain Plover

The following conditions will alleviate impacts to mountain plovers:

1. A mountain plover nesting survey is desired in suitable habitat prior to commencement of surface disturbing activities in the prairie dog towns located on the attached mountain plover survey maps, below. If the survey is not conducted prior to commencement of surface disturbing activities, it shall be conducted during the first breeding season following POD approval. No surface disturbing activities are permitted in suitable habitat areas on the attached maps, from March 15-July 31, until a mountain plover nesting survey has been conducted for the current breeding season.
2. If a mountain plover is identified, then a seasonal disturbance-free buffer of 1/4 mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
 - a. 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.
 - b. No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.

PROGRAMMATIC

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.

STANDARD

General

1. All contractors/operators will have a complete copy of the approved APD/POD, including COAs, at the drill site, during the construction of the roads and drill pad, the drilling of the well, completion of the well, and all other related construction activities.
2. A pre-construction field meeting shall be conducted prior to beginning any dirt work approved under this POD. The operator shall contact the BLM Authorized Officer NRS Jennifer Spegon @ 307-684-1059 at least 4-days prior to beginning operations so that the meeting can be scheduled. The operator is responsible for having all contractors present (dirt contractors, drilling contractor, pipeline contractor, project oversight personnel, etc.) including the overall field operations superintendent, and for providing all contractors copies of the approved POD, project map and BLM Conditions of Approval pertinent to the work that each will be doing.
3. Approval of this APD does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease that would entitle the applicant to conduct operations thereon. In addition, approval of this APD does not imply that the operator has legal access to the drilling location. When crossing private surface 43 CFR 3814 regulations must be complied with and when crossing public surface off-lease the operator must have an approved right-of-way.
4. Confine all equipment and vehicles to the access road(s), pad(s), and area(s) specified in the approved APD or POD.
5. The approval of this project does not grant authority to use off lease Federal lands. No surface disturbing activity, or use of off-lease federal lands, is allowed on affected leases until right-of-way grants become effective which is the date signed by the authorized officer.
6. This POD is valid for two years from the date of approval or until the oil and gas lease expires/terminates, whichever occurs first. If this well intends to earn a lease extension, diligent operations (actual drilling) must be in progress over the lease expiration date, advance lease rentals must have been paid, and a letter stating drilling operations were in progress must be submitted to this office no later than five days past the expiration date. If the APD terminates, any surface disturbance created under the application must be reclaimed according to an approved plan.
7. The operator will be in compliance with all applicable local, state and/or federal laws, regulations, and/or statutes.
8. A progress report must be filed a minimum of once a month starting with the month the well was

spudded continuing until the well is completed. The report must be filed by the 25th of each month on a Sundry Notice (Form 3160-5). The report will include the spud date, casing information such as size, grade, weight, hole size, and setting depth, amount and type of cement used, top of cement, depth of cementing tools, casing test method, intervals tested, perforated, acidized, fractured and results obtained and the dates all work done.

9. In the event abandonment of the hole is desired, an oral request may be granted by this office but must be timely followed within 5 days with a "Notice of Intention to Abandon" (Form 3160-5). The "Subsequent Report of Abandonment" (Form 3160-5) must be submitted within 30 days after the actual plugging of the well bore, reporting where the plugs were placed, and the current status of the surface restoration.
10. Whether the well is completed as a dry hole or as a producer, two copies of all logs run, core descriptions, core analysis, well-test data, geologic summaries, sample descriptions, and all other surveys or data obtained and compiled during the drilling, work over, and/or completion operations will be filed with Form 3160-4. A gamma ray log shall be run from T.D. to ground surface.
11. The operator is responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects on site. If archaeological, historical, or vertebrate fossil materials are discovered, the operator is to suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations are not to resume until written authorization to proceed is issued by the Authorized Officer.
12. Within five (5) working days, the Authorized Officer will evaluate the discovery and inform the operator of actions that will be necessary to prevent loss of significant cultural or scientific values.
13. The operator is responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator will be allowed to resume operations.
 - a. If any cultural values [sites, artifacts, human remains (Appendix L FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. The authorized officer will conduct an evaluation of the cultural values to establish appropriate mitigation, salvage or treatment. The operator is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials, and contact the authorized BLM officer (AO). Within five working days the AO will inform the operator as to:
 - whether the materials appear eligible for the National Register of Historic Places;
 - the mitigation measures the operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and,
 - a time-frame for the AO to complete an expedited review under 36 CFR 800.11 to confirm, through the State Historic Preservation Officer, that the findings of the AO are correct and that mitigation is appropriate. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the operator will then be allowed to resume construction measures.

- b. If paleontological resources, either large or conspicuous, and/or a significant scientific value are discovered during construction, the find will be reported to the Authorized Officer immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological values. Operations within 250 feet of such a discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The applicant will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operation.
14. The operator shall be responsible for the prevention of fires on public lands caused by its employees, contractors or subcontractors. During conditions of extreme fire danger, surface use operations may be limited or suspended in specific areas.
15. All survey monuments found within the area of operations shall be protected. Survey monuments include, but are not limited to: General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U. S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any survey monuments, the incident shall be reported in writing to the Authorized Officer.
16. If any time the facilities located on public lands authorized by the terms of the lease are no longer included in the lease (due to a contraction in the unit or other lease or unit boundary change) the BLM will process a change in authorization to the appropriate statute. The authorization will be subject to appropriate rental, or other financial obligation determined by the authorized officer.
17. Gas produced from this well may not be vented or flared beyond an initial authorized test period of 30 days or 50 MMCF following its completion, whichever first occurs, without the prior written approval of the authorized officer. If gas is vented or flared without approval beyond the test period authorized above, you may be directed to shut-in the well until the gas can be captured or approval to continue venting or flaring as uneconomic is granted. You shall be required to compensate the lessor for that portion of the gas vented or flared without approval which is determined to have been avoidably lost.
18. The first producing well drilled to each targeted coal zone will be designated as the POD "Reference Well". Reference wells will not be required for PODs within a 6 mile radius of the first reference well designated by the operator, nor for co-mingled coal zones. The designated reference well must be equipped to be sampled at the well head. A reference well sample will be collected from the wellhead and submitted for analysis; using the list of analytes identified in WDEQ WYPDES Application for Permit to Surface Discharge Produced Water from CBM New Discharges, Renewals, or Major Modifications, within 30 to 60 days of initial water production. Results of the analysis will be submitted to the BFO-BLM authorized Officer as they become available and will include the following information: Operator Name, POD Name, Well Name and location and Date Sampled.
19. By November 1 each year, companies will submit the following information, attached to a Sundry Form 3160-5, where construction and development have taken place in the last year.
- Georeferenced spatial data depicting as-built locations of all facilities, wells, roads, pipelines, power lines, reservoirs, discharge points, and other related facilities to the BLM for all PODs.
 - Two as-built copies of Map D.

20. If any dead or injured threatened, endangered, proposed, or candidate species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374), their law enforcement office (307-261-6365), and the BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours. 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.
21. Operators shall comply with all other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (ES-6-WY-07-F012).
22. 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.

DRILLING AND PRODUCTION OPERATIONS

1. The spud date will be reported electronically, (see website location above) to the Authorized Officer 24 HOURS BEFORE SPUDDING, unless otherwise required in site specific conditions of approval.

Spud Notice Site:

http://www.wy.blm.gov/minerals/og/og_notices/spud_notice.php

2. The operator shall complete coal bed natural gas wells (case, cement and under ream) as soon as possible, but no later than 30 days after drilling operations, unless an extension is given by the BLM Authorized Officer.

Well Control Equipment

1. The well control equipment approved in this project lists the minimum requirements.
2. The flow line shall be a minimum of 30 feet from the well bore and securely anchored. The 30-foot length of line is a minimum and operators must make consideration for increasing this length for topography and/or wind direction.
3. The flow line shall be a straight run.
4. The flow line must be constructed from non-flammable material.
5. All cuttings and circulating medium shall be directed to and contained in a reserve pit.
6. The nearest edge of the pits shall be a minimum of 25' from the rig.
7. A minimum of 2' of freeboard shall be maintained in the pits at all times.
8. The authorized officer may modify these requirements at any time if it is determined that increased pressure control is deemed necessary.
9. Verbal notification shall be given to the Authorized Officer at least 24 hours before formation tests, BOP tests, running and cementing casing, and drilling over lease expiration dates.

Casing Program

1. The minimum requirement for casing centralizers is as follows: all casing strings will have centralizers on the bottom three joints (i.e. a minimum of one centralizer per joint starting with the shoe joint).
2. In addition, the production casing string shall be centralized with API approved centralizers using the following specifications:
 - 2.1. One centralizer per~120' (specifically every third or fourth joint depending on joint length).
 - 2.2. One centralizer 25' above surface casing shoe.
3. Surface casing length shall follow current requirements set forth by the WOGCC. Increased surface casing may be required so that the surface casing shoe may be set into a competent formation.

Cement Program

1. If there are indications of inadequate primary cementing of the surface, intermediate, or production casing strings; such as but not limited to no returns to surface, cement channeling, fallback or mechanical failure of equipment, the operator will evaluate the adequacy of the cementing operations. This evaluation will consist of running a cement bond log (CBL) or an alternate method approved by the Authorized Officer (AO) no sooner than 12 hours and no later than 24 hours from the time the cement was first pumped.
2. If the evaluation indicates inadequate cementing, the operator shall contact a BLM Buffalo Field Office Petroleum Engineer for approval of remedial cementing work. Remedial cementing will consist of, but may not be limited to:
 - 2.1. Perforating and squeezing cement to ground surface should the top of cement (TOC) be below the surface casing shoe. This shall be done within 36 hours of the completion of pumping the primary cement job.
 - 2.2. One-inching cement to ground surface should the top of cement (TOC) be above the surface casing shoe.
 - 2.3. Fallback that is found to be less than 30' from ground surface may be topped off with cement slurry.
3. The adequacy of the remedial cementing operations shall be verified by a cement bond log (CBL) or an alternate method approved by the Authorized Officer (AO). All remedial work shall be completed and verified prior to drilling out the casing shoe or perforating the casing for purposes other than remedial cementing.
4. The cement mix water used must be the same water used to develop the cement program and be of adequate quality, so as not to degrade the setting properties. Waters containing high carbonates or bicarbonates (greater than 2,000 ppm) should be avoided.

Production Equipment

1. All gas measurement equipment that deviates from Onshore Order #5 (or WY NTL 2004-1 in the case of electronic flow computers) shall be approved via a Notice of Intent sundry (Form No. 3160-5) prior to installation and use. This includes any type of primary device other than a standard orifice plate meter. Requests for a variance from the minimum standards of Onshore Order #5 must list:

The specific type of equipment.

How this equipment will meet or exceed the requirements of Onshore Order #5.

The location, specific well and lease number where the equipment will be used.

2. An appropriate pressure gauge is required to be installed on each casing annulus to monitor this pressure.
3. Other actions such as off-lease measurement, commingling, allocation, etc. shall be approved via a Notice of Intent sundry (Form No. 3160-5). Submission of additional information in the POD shall not be construed as permission for these items. If the operator wishes to utilize off-lease gas measurement for wells approved in this POD, they are required to obtain approval via a Notice of Intent sundry (Form No. 3160-5) prior to any gas production. A map shall be attached to the sundry

that delineates where the individual wells will be measured for federal royalty. Unless this POD is committed to a Federal Oil & Gas Unit or Agreement, the production from all Federal wells shall be measured for Federal royalty prior to being combined with production from any other Federal, Indian, or non-Federal leases.

Well and POD Building Identification

1. From the time a well pad is constructed or a well is spudded (if no well pad needed), until abandonment, all well locations must be properly identified with a legible sign. The sign will include the well name and number, operator name, lease number, and the surveyed location.
2. At each POD building site where federal wells are metered, the operator is required to maintain a legible sign displayed in a conspicuous place. This sign is required to be in place at the time metering goes online. The sign shall include: POD name, Operator, Federal well names and numbers, Federal lease numbers being metered at the POD building, and surveyed location of the building.

Protection of Fresh Water Resources

All oil and gas operations shall be conducted in a manner to prevent the pollution of all freshwater resources. All fresh waters and waters of present or probable future value for domestic, municipal, commercial, stock or agricultural purposes will be confined to their respective strata and shall be adequately protected. Special precautions will be taken to guard against any loss of artesian water from the strata in which it occurs and the contamination of fresh water by objectionable water, oil, condensate, gas or other deleterious substance to such fresh water.

Miscellaneous Conditions

1. Any changes to the approved drilling plan and/or these conditions of approval shall be approved by the BLM-Buffalo Field Office Petroleum Engineer prior to being implemented.

After hour's numbers:

Petroleum Engineer: Matthew Warren

Home Telephone: 307-620-0103

Petroleum Engineer: James Evans

Home Telephone: 307-331-5421

2. If any cores are collected, a copy of all analysis performed shall be submitted to the BLM-Buffalo Field Office Petroleum Engineer.

SURFACE USE STANDARD

A. Construction

1. Prior to construction, the operator will remove all staking (engineered road, pads, well stakes, etc.) for those areas which were not approved with the POD/APD.
2. All roads, well pads, rig slots, culverts, spot upgrades and locations where engineered construction will occur will be completely slope staked for review prior to construction.
3. Topsoil will be segregated for all excavation including the entire disturbance area for constructed pads and excavated areas for rig leveling, reserve pits, constructed roads, spot upgrades, reservoir upgrades, outfalls and utility trenches and redistributed for interim reclamation activities. This requirement will not be applied for pipelines installed with wheel trenchers.
4. The operator will not push soil material and overburden over side slopes or into drainages. All soil material disturbed will be placed in an area where it can be retrieved without creating additional undue surface disturbance and where it does not impede watershed and drainage flows.
5. Maintain a minimum 20-foot undisturbed vegetative border between disturbance areas and the edge of adjacent drainages, unless otherwise directed by the BLM Authorized Officer.
6. Reserve pits will be adequately fenced during and after drilling operations until pit is reclaimed so as to effectively keep out wildlife and livestock. Adequate fencing, in lieu of more stringent requirements by the surface owner, is defined as follows:
 - Construction materials will consist of steel or wood posts. Three or four strand wire (smooth or barbed) fence or hog panel (16-foot length by 50-inch height) or plastic snow fence must be used with connectors such as fence staples, quick-connect clips, hog rings, hose clamps, twisted wire, etc. Electric fences will not be allowed.
 - Construction standards: Posts shall be firmly set in ground. If wire is used, it must be taut and evenly spaced, from ground level to top wire, to effectively keep out animals. Hog panels must be tied securely into posts and one another using fence staples, clamps, etc. Plastic snow fencing must be taut and sturdy. Fence must be at least 2-feet from edge of pit. 3 sides fenced before beginning drilling, the fourth side fenced immediately upon completion of drilling and prior to rig release. Fence must be left up and maintained in adequate condition until pit is closed.
7. The reserve pit will be oriented to prevent collection of surface runoff. After the drilling rig is removed, the operator may need to construct a trench on the uphill side of the reserve pit to divert surface drainage around it. If constructed, the trench will be left intact until the pit is closed.
8. The reserve pit will be lined with an impermeable liner if permeable subsurface material is encountered. An impermeable liner is any liner having permeability less than 10^{-7} cm/sec. The liner will be installed so that it will not leak and will be chemically compatible with all substances that may be put in the pit. Liners made of any man-made synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use. In gravelly or rocky soils, a suitable bedding material such as sand will be used prior to installing the liner.
9. The reserve pit will be constructed so that at least half of its total volume is in solid cut material (below natural ground level).
10. The culvert locations will be staked prior to construction. The culvert invert grade and finished road

grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

Soil Type	Road Grade 2-4%	Road Grade 5-8%	Road Grade 9-12%	Road Grade 13-16%
Highly erosive Granitic or sandy	240	180	140	100
Intermediate Erosive clay or loam	310	260	200	150
Low erosive shale or gravel	400	325	250	175

11. Provide 4” of aggregate where grades exceed 8%. Surface material must meet requirements set forth in Wyoming Supplement to BLM Road Manual 9113.
12. The minimum diameter for culverts will be 18 inches. However, all culverts will be appropriately sized in accordance with standards in BLM Manual 9113 or at the discretion of the Authorized Officer.
13. Maximum speed on all operator-constructed and maintained roads will not exceed 25 miles per hour.
14. Pipeline construction shall not block nor change the natural course of any drainage. Pipelines shall cross perpendicular to drainages. Suspended pipelines shall provide adequate clearance for maximum runoff.
15. During construction, emissions of particulate matter from well pad and road construction would be minimized by application of water or other non-saline dust suppressants with at least 50 percent control efficiency. Dust inhibitors (surfacing materials, non-saline dust suppressants, and water) will be used as necessary on unpaved roads that present a fugitive dust problem. The use of chemical dust suppressants on public surface will require prior approval from the BLM Authorized Officer.

B. Operations/Maintenance

1. All waste, other than human waste and drilling fluids, will be contained in a portable trash cage. This waste will be transported to a State approved waste disposal site immediately upon completion of drilling operations. No trash or empty barrels will be placed in the reserve pit or buried on location. Operators and their contractors will comply with all state and local laws and regulations pertaining to disposal of human and solid waste will be complied with.
2. Sewage shall be placed in a self-contained, chemically treated porta-potty on location.
3. The operator and their contractors shall ensure that all use, production, storage, transport and disposal of hazardous and extremely hazardous materials associated with the drilling, completion and production of these wells will be in accordance with all applicable existing or hereafter promulgated federal, state and local government rules, regulations and guidelines. All project-related activities involving hazardous materials will be conducted in a manner to minimize potential environmental impacts. In accordance with OSHA requirements, a file will be maintained onsite containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds and/or substances which are used in the course of construction, drilling, completion and production operations.

4. Produced fluids shall be put in test tanks on location during completion work. Produced water will be put in the reserve pit during completion work per Onshore Order #7.
5. The only fluids/waste materials which are authorized to go into the reserve pit are RCRA exempt exploration and production wastes. These include:
 - drilling muds & cuttings
 - rigwash
 - excess cement and certain completion & stimulation fluids defined by EPA as exempt

It does not include drilling rig waste, such as:

- spent hydraulic fluids
- used engine oil
- used oil filter
- empty cement, drilling mud, or other product sacks
- empty paint, pipe dope, chemical or other product containers
- excess chemicals or chemical rinsate

Any evidence of non-exempt wastes being put into the reserve pit may result in the BLM Authorized Officer requiring specific testing and closure requirements.

6. Reserve pits will be closed as soon as possible, but no later than 90 days from time of drilling/well completion, unless the BLM Authorized Officer gives an extension. Pits must be dry of fluids or they must be removed via vac-truck or other environmentally acceptable method prior to backfilling, re-contouring and replacement of topsoil. Mud and cuttings left in pit must be buried at least 3-feet below re-contoured grade. The operator will be responsible for re-contouring any subsidence areas that develop.
7. The fluids and mud must be dry in the reserve pit before re-contouring pit area. The operator will be responsible for re-contouring of any subsidence areas that develop from closing a pit before it is completely dry. The plastic pit liner (if any) will be cut off below grade and properly disposed of at a state authorized landfill before beginning to re-contour the site.
8. The operator will be responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance associated with this project (well locations, roads, water management facilities, etc.) Use of pesticides shall comply with the applicable Federal and State laws.
9. Prior to the use of pesticides on public land, the holder shall obtain from the BLM authorized officer a pesticide use permit (PUP). The PUP must include a written approval of a plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application, location of storage and disposal of containers, and any other information deemed necessary by the authorized officer to such use.

C. Producing Well

1. Landscape those areas not required for production to the surrounding topography as soon as possible. The fluids and mud must be dry in the reserve pit before re-contouring pit area. The operator will be responsible for re-contouring and reseeding of any subsidence areas that develop.
2. Any spilled or leaked oil, produced water or treatment chemicals must be reported in accordance with NTL-3A and immediately cleaned up in accordance with BLM requirements. This includes clean-up and proper disposition of soils contaminated as a result of such spills/leaks.

3. Distribute stockpiled topsoil evenly over those areas not required for production (ie.,cut/fill slopes, road ditches, pipelines, etc.) and reseed with approved seed mix.
4. Upgrade and maintain access roads and drainage control (e.g., culverts, drainage dips, ditching, crowning, surfacing, etc.) as necessary and as directed by the BLM Authorized Officer to prevent soil erosion and accommodate safe, environmentally-sound access.

D. Reclamation/Dry Hole

1. BLM will not release the performance bond until all disturbed areas associated with the APD/POD have been successfully revegetated (evaluation will be made after the second complete growing season) and has met all other reclamation goals of the surface owner and surface management agency.
2. A Notice of Intent to Abandon and a Subsequent Report of Abandonment must be submitted for abandonment approval.
3. For performance bond release approval, a Final Abandonment Notice (with a surface owner release letter on split-estate) must be submitted prior to a final abandonment evaluation by BLM.
4. Phased reclamation plans will be submitted to BLM for approval prior to individual POD facility abandonment via a Notice of Intent (NOI) Sundry Notice. Individual facilities, such as well locations, pipelines, discharge points, impoundments, etc. need to be addressed in these plans as they are no longer needed. Individual items that will need to be addressed in reclamation plans include:
 - Configuration of reshaped topography, drainage systems, and other surface manipulations
 - Waste disposal
 - Revegetation methods, including specific seed mix (pounds pure live seed/acre) and soil treatments (seedbed preparation, fertilization, mulching, etc.). On private surface, the landowner should be consulted for the specific seed mix.
 - Other practices that will be used to reclaim and stabilize all disturbed areas, such as water bars, erosion fabric, hydro-mulching, etc.
 - An estimate of the timetables for beginning and completing various reclamation operations relative to weather and local land uses.
 - Methods and measures that will be used to control noxious weeds, addressing both ingress and egress to the individual well or POD.
 - Decommissioning/removal of all surface facilities
 - Closure and reclamation of areas utilized or impacted by produced CBNG water, including discharge points, reservoirs, off-channel pits, land application areas, livestock/wildlife watering facilities, surface discharge stream channels, etc.
 - Refer to *BLM Impoundment Reclamation Guidance* for further information on reclaiming impoundments.
 - Refer to the *Wyoming Reclamation Policy* for further guidance on reclamation.
5. All disturbed lands associated with this project, including the pipelines, access roads, water management facilities, etc will be reclaimed and reseeded within 180 days of well plugging. The reclamation work must be in accordance with the surface use plan and any pertinent site-specific COAs.
6. Disturbed lands will be re-contoured back to conform with existing undisturbed topography. No depressions will be left that trap water or form ponds.

7. The fluids and mud must be dry in the reserve pit before re-contouring pit area. The operator will be responsible for re-contouring of any subsidence areas that develop from closing a pit before it is completely dry. The plastic pit liner (if any) will be cut off below grade and properly disposed of at a state authorized landfill before beginning to re-contour the site.
8. Before the location has been reshaped and prior to redistributing the topsoil, the operator will rip or scarify the drilling area and access road on the contour to 4" below the compacted layer. The rippers are to be no farther than 24 inches apart.
9. Distribute the topsoil evenly over all disturbed areas. Prepare the seedbed and seed with approved seed mix.
10. Soil fertility testing and the addition of soil amendments may be required to stabilize some disturbed lands.
11. Any mulch utilized for reclamation needs to be certified weed free.
12. Waterbars are to be constructed at least one (1) foot deep, on the contour with approximately two (2) feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars are to be constructed with the berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar should be constructed at the top of the backslope. Subsequent waterbars should follow the following general spacing guidelines:

Slope (percent)	Spacing Interval (feet)
< 2	200
2 - 4	100
4 - 5	75
> 5	50

Appendix B: Affected Resource and Species Worksheets

Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
Air quality	Yes	Yes	No	PRB FEIS: 4-354-404
Noise	Yes	Yes	Yes	PRB FEIS: 3-291-298, 4-404-406, 4-377-386
Cultural	Yes	Yes	No	PRB FEIS: 3-206-228, 4-273-288, 4-394
Native American religious concerns	No	No	No	PRB FEIS: 3-218-219, 3-228, 4-277-278
Traditional Cultural Properties	No	No	No	PRB FEIS: 3-218-219, 4-277-278
Mineral Potential				PRB FEIS: 3-66-70, 3-230, 4-127-129
Coal	No	No	Yes	PRB FEIS: 3-66
Fluid Minerals	Yes	Yes	Yes	PRB FEIS: 3-68-69
Locatable Minerals	No	No	No	PRB FEIS: 3-70
Other leasables	No	No	No	Not in PRB FEIS
Salable minerals	No	No	No	Not in PRB FEIS
Paleontology	No	No	Yes	PRB FEIS: 3-65-66, 4-125-127
PFYC 3	Yes	No	Yes	PRB FEIS: 3-65-66, 4-125-127
PFYC 5	No	No	Yes	PRB FEIS: 3-65-66, 4-125-127
Rangeland management				Not in PRB FEIS
Existing range improvements	No	No	No	Not in PRB FEIS
Proposed range improvements	No	No	No	Not in PRB FEIS
Recreation				PRB FEIS: 3-263-273, 4-319-328
Developed site	No	No	Yes	PRB FEIS: 3-266, 4-326
Walk-in-Area	No	No	Yes	PRB FEIS: 3-264-270
Social & Economic				PRB FEIS: 3-275-289, 4-336-370
Environmental Justice	No	No	Yes	PRB FEIS 3-287-290
Transportation	Yes	Yes	No	PRB FEIS 3-248-252
Soils & Vegetation				PRB FEIS: 3-78-107, 4-134-152, 4-153-164, 4-393-394, 4-406
Erosion Hazard	Yes	Yes	No	PRB FEIS: 3-82, 4-135
Poor Reclamation Potential	Yes	Yes	No	PRB FEIS: 3-86, 4-149-152
Slope hazard	Yes	Yes	No	PRB FEIS: 3-81, 4-135
Forest products	No	No	Yes	PRB FEIS: 3-271-272
Prime and Unique Farmland	No	No	Yes	
Invasive Species	Yes	Yes	No	PRB FEIS: 3-103-108, 4-153-172
Wetlands/Riparian	No	No	No	PRB FEIS: 4-117-124, 3-108-113, 4-172-178, 4-406
Special Designations				
Proposed ACEC	No	No	Yes	PRB FEIS Appendix R, ROD RMP pgs. 9-10
Wild & Scenic River	No	No	Yes	PRB FEIS: 3-273
Wilderness Characteristics/Citizen	No	No	No	

Proposed				
Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
WSA	No	No	No	
Visual Resources				PRB FEIS: 3-252-263, 4-302-314, 4-403
Class II	No	No	Yes	PRB FEIS: 3-253-263
Class III	No	No	Yes	PRB FEIS: 3-253-263
Water				PRB FEIS: 3-1-56, 4-1-122, 4-135, 4-33, 4-405
Floodplains	No	No	Yes	
Ground water	Yes	Yes	Yes	PRB FEIS: 3-1-30, 4-1-69, 4-392, 4-405
Surface water	No	No	Yes	PRB FEIS: 4-85-86, 4-117-124, 3-36-56, 4-69-122, 4-393, 4-405
Drinking water	No	No	Yes	PRB FEIS: 3-52, 4-50-52
Wildland Urban Interface				
Waste Management	Yes	Yes	Yes	PRB FEIS: 4-370-376
Wildlife				PRB FEIS: 3-113-153, 4-179, 4-247, 4-397
ESA listed, proposed, or candidate species	Yes	Yes	No	PRB FEIS: 4-251 -273, BA & BO
BLM sensitive species	Yes	Yes	Yes	PRB FEIS: 4-258
General wildlife	Yes	Yes	Yes	PRB FEIS: 4-181-226
West Nile virus potential	No	No		

Threatened, Endangered, Proposed, and Candidate Species Worksheet

Common Name	Habitat	Presence? (NP, NS, S, K)	Direct Impacts Anticipated?	Intend to apply COA?	Direct, indirect, and/or cumulative impacts anticipated beyond the level analyzed within the PRB FEIS?
<i>Endangered</i>					
Black-footed ferret	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP Habitat present	NO	NO	4-251, BA & BO 1,144 acres of prairie dog colony. 3.1 miles south of Arvada Potential BBF release area.
Blowout penstemon	Sparsely vegetated, shifting sand dunes	NP	NO	NO	Not in FEIS
<i>Threatened</i>					
Ute ladies'-tresses orchid	Areas with appropriate hydrology	NP	NO	NO	4-253, BA & BO
<i>Proposed</i>					
Mountain plover	Short-grass prairie with slopes < 5%	S	NO	YES	4-254, 4-255 & BA 1,144 acres of prairie dog colony. Meeting moderate plover habitat suitability.

Common Name	Habitat	Presence? (NP, NS, S, K)	Direct Impacts Anticipated?	Intend to apply COA?	Direct, indirect, and/or cumulative impacts anticipated beyond the level analyzed within the PRB FEIS?
<i>Candidate</i>					
Greater sage-grouse	Basin-prairie shrub, mountain-foothill shrub	K	YES	YES	4-257 to 4-273

Sensitive Species worksheet

Common Name	Habitat	Presence? (NP, NS, S, K)	Direct Impacts Anticipated ?	Intend to apply COA?	Direct, indirect, and/or cumulative impacts anticipated beyond the level analyzed within the PRB FEIS?
<i>Amphibians</i>					4-258
Northern leopard frog	Beaver ponds and cattail marshes from plains to montane zones.	K	NO	NO	
Columbia spotted frog	Ponds, sloughs, small streams, and cattails in foothills and montane zones. Confined to headwaters of the S Tongue R drainage and tributaries.	NP	NO	NO	
<i>Fish</i>					4-259 & 4-260
Yellowstone cutthroat trout	Cold-water rivers, creeks, beaver ponds, and large lakes in the Upper Tongue sub-watershed	NP	NO	NO	
<i>Birds</i>					4-260 to 4-264
Baird's sparrow	Shortgrass prairie and basin-prairie shrubland habitats; plowed and stubble fields; grazed pastures; dry lakebeds; and other sparse, bare, dry ground.	NS	NO	NO	
Bald eagle	Mature forest cover often within one mile of large water body with reliable prey source nearby.	K	YES	YES	4-251 to 4-253 & BA
Brewer's sparrow	Sagebrush shrubland	S	YES	NO	
Ferruginous hawk	Basin-prairie shrub, grasslands, rock outcrops	S	NO	YES (raptor timing)	
Loggerhead shrike	Basin-prairie shrub, mountain-foothill shrub	S	YES	NO	

Common Name	Habitat	Presence? (NP, NS, S, K)	Direct Impacts Anticipated ?	Intend to apply COA?	Direct, indirect, and/or cumulative impacts anticipated beyond the level analyzed within the PRB FEIS?
Long-billed curlew	Grasslands, plains, foothills, wet meadows	S (migrants)	NO	NO	
Northern goshawk	Conifer and deciduous forests				
Peregrine falcon	Cliffs	K (migrant)	NO	NO	
Sage sparrow	Basin-prairie shrub, mountain-foothill shrub	NS	NO	NO	
Sage thrasher	Basin-prairie shrub, mountain-foothill shrub	NS	NO	NO	
Trumpeter swan	Lakes, ponds, rivers	NP	NO	NO	
Western Burrowing owl	Grasslands, basin-prairie shrub	K	YES	YES	
White-faced ibis	Marshes, wet meadows	S	NO	NO	Powder River riparian habitat
Yellow-billed cuckoo	Open woodlands, streamside willow and alder groves	S	NO	NO	Powder River riparian habitat
<i>Mammals</i>					4-264 &4-265
Black-tailed prairie dog	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	YES	YES	4-255, 4-256
Fringed myotis	Conifer forests, woodland chaparral, caves and mines	NS	NO	NO	
Long-eared myotis	Conifer and deciduous forest, caves and mines	NS	NO	NO	
Spotted bat	Cliffs over perennial water.	NS	NO	NO	
Swift fox	Grasslands	NS (possible)	NO	NO	
Townsend's big-eared bat	Caves and mines.	NS	NO	NO	
<i>Plants</i>					4-258
Limber pine	Mountains, associated with high elevation conifer species	NP	NO	NO	
Porter's sagebrush	Sparsely vegetated badlands of ashy or tuffaceous mudstone and clay slopes 5300-6500 ft.	NP	NO	NO	

Common Name	Habitat	Presence? (NP, NS, S, K)	Direct Impacts Anticipated ?	Intend to apply COA?	Direct, indirect, and/or cumulative impacts anticipated beyond the level analyzed within the PRB FEIS?
William's wafer parsnip	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NO	NO	

Non-designated wildlife worksheet

Common Name / Group	Presence? (NP, NS, S, K)	Direct Impacts Anticipated?	Intend to apply COA?	Direct, indirect, and/or cumulative impacts anticipated beyond the level analyzed within the PRB FEIS?
Big Game	K	Yes	No	4-181 to 4-215
Aquatics	K	No	No	4-235 to 4-249
Migratory Birds	K	Yes	No	4-231 to 4-235
Raptors	K	Yes	Yes	4-216 to 4-221
Plains Sharp-tailed Grouse	S	Yes	No	4-221 to 4-226