

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

**Petro-Canada Resources (USA), Inc.
Mitchell Draw Unit 2**

ENVIRONMENTAL ASSESSMENT –WY-070-07-139

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Petro-Canada’s Mitchell Draw Unit 2 Coal Bed Natural Gas (CBNG) POD comprised of the following 64 Applications for Permit to Drill (APDs), as follows:

	Well Name	Number	QtrQtr	Sec	T N	R W	Lease Number
1	MITCHELL DRAW 2 MDU	21-44WA	SESE	21	52N	77W	WYW159007
2	MITCHELL DRAW 2 MDU	21-44LA	SESE	21	52N	77W	WYW159007
3	MITCHELL DRAW 2 MDU	21-44CO	SESE	21	52N	77W	WYW159007
4	MITCHELL DRAW 2 MDU	21-44CA	SESE	21	52N	77W	WYW159007
5	MITCHELL DRAW 2 MDU	22-14CA*	SENE	22	52N	77W	WYW151680
6	MITCHELL DRAW 2 MDU	22-14WA	SENE	22	52N	77W	WYW151680
7	MITCHELL DRAW 2 MDU	22-14CO	SENE	22	52N	77W	WYW151680
8	MITCHELL DRAW 2 MDU	22-14LA	SENE	22	52N	77W	WYW151680
9	MITCHELL DRAW 2 MDU	22-22CA	NWNW	22	52N	77W	WYW151680
10	MITCHELL DRAW 2 MDU	22-22CO	NWNW	22	52N	77W	WYW151680
11	MITCHELL DRAW 2 MDU	22-22LA	NWNW	22	52N	77W	WYW151680
12	MITCHELL DRAW 2 MDU	22-22WA	NWNW	22	52N	77W	WYW151680
13	MITCHELL DRAW 2 MDU	22-24CA	SENE	22	52N	77W	WYW151680
14	MITCHELL DRAW 2 MDU	22-24CO	SENE	22	52N	77W	WYW151680
15	MITCHELL DRAW 2 MDU	22-24LA	SENE	22	52N	77W	WYW151680
16	MITCHELL DRAW 2 MDU	22-24WA	SENE	22	52N	77W	WYW151680
17	MITCHELL DRAW 2 MDU	22-32CA	NWSW	22	52N	77W	WYW151680
18	MITCHELL DRAW 2 MDU	22-32CO	NWSW	22	52N	77W	WYW151680
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22	MITCHELL DRAW 2 MDU	22-33CO	SWSW	22	52N	77W	WYW151680
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27	MITCHELL DRAW 2 MDU	22-42LA	NWSE	22	52N	77W	WYW151680
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31	MITCHELL DRAW 2 MDU	22-44WA	SESE	22	52N	77W	WYW151680
32	MITCHELL DRAW 2 MDU	22-44LA	SESE	22	52N	77W	WYW151680

	Well Name	Number	QtrQtr	Sec	T N	R W	Lease Number
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35	MITCHELL DRAW 2 MDU	27-12WA	NWNE	27	52N	77W	WYW146321
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39	MITCHELL DRAW 2 MDU	27-23LA	SWNW	27	52N	77W	WYW146321
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42	MITCHELL DRAW 2 MDU	28-11LA	NENE	28	52N	77W	WYW146321
43	MITCHELL DRAW 2 MDU	28-11WA	NENE	28	52N	77W	WYW146321
44	MITCHELL DRAW 2 MDU	28-11CA	NENE	28	52N	77W	WYW146321
45	MITCHELL DRAW 2 MDU	28-24CA	SENE	28	52N	77W	WYW146321
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47	MITCHELL DRAW 2 MDU	28-24LA	SENE	28	52N	77W	WYW146321
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50	MITCHELL DRAW 2 MDU	28-42CO	NWSE	28	52N	77W	WYW146321
51	MITCHELL DRAW 2 MDU	28-42LA	NWSE	28	52N	77W	WYW146321
52	MITCHELL DRAW 2 MDU	28-42WA	NWSE	28	52N	77W	WYW146321
53	MITCHELL DRAW 2 MDU	28-44CA	SESE	28	52N	77W	WYW146321
54	MITCHELL DRAW 2 MDU	28-44CO	SESE	28	52N	77W	WYW146321
55	MITCHELL DRAW 2 MDU	28-44LA	SESE	28	52N	77W	WYW146321
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58	MITCHELL DRAW 2 MDU	32-14CO	SENE	32	52N	77W	WYW160053
59	MITCHELL DRAW 2 MDU	32-14LA	SENE	32	52N	77W	WYW160053
60	MITCHELL DRAW 2 MDU	32-14WA	SENE	32	52N	77W	WYW160053
61	MITCHELL DRAW 2 MDU	33-12CA	NWNE	33	52N	77W	WYW146321
62	MITCHELL DRAW 2 MDU	33-12CO	NWNE	33	52N	77W	WYW146321
63	MITCHELL DRAW 2 MDU	33-12LA	NWNE	33	52N	77W	WYW146321
64	MITCHELL DRAW 2 MDU	33-12WA	NWNE	33	52N	77W	WYW146321

There are no stock water impoundments included in the water management strategy for this project.

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

RATIONALE: The decision to authorize Alternative C, as described in the attached Environmental

Assessment (EA), is based on the following:

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
 - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.
9. This POD lies within an area referred to as the Fortification Creek Area (FCA). However, this POD is not within the proposed Fortification Creek Area of Critical Environmental Concern. The project design and mitigation measures are consistent with past management decisions for the Fortification Creek Area; therefore this POD is not subject to the BFO Resource Management Plan Amendment being conducted for the Fortification Creek Area.

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Petro-Canada Resources (USA), Inc.
Mitchell Draw Unit 2
PLAN OF DEVELOPMENT
WY-070-07-139**

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 5 federal oil and gas mineral leases (unitized) issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Petro-Canada’s Mitchell Draw Unit 2 Plan of Development (POD) for 100 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 100 wells proposed within this POD. The wells are vertical bores proposed on an 80 acre spacing pattern with 4 wells per location, each to a different coal zone. Well are located as follows:

	Well Name	Number	QtrQtr	Sec	T	R	Lease Number
1	MITCHELL DRAW 2 MDU	22-14CA*	SENE	22	52N	77W	WYW151680
2	MITCHELL DRAW 2 MDU	22-14WA	SENE	22	52N	77W	WYW151680
3	MITCHELL DRAW 2 MDU	22-14CO	SENE	22	52N	77W	WYW151680
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93	MITCHELL DRAW 2 MDU	34-41CA	NESE	34	52N	77W	WYW146321
94	MITCHELL DRAW 2 MDU	34-41CO	NESE	34	52N	77W	WYW146321
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100	MITCHELL DRAW 2 MDU	34-44WA	SESE	34	52N	77W	WYW146321

County: **Johnson**

Applicant: **Petro-Canada Resources (USA) Inc.**

Surface Owners: **S&B Holding, Holcroft & Co., Powder River Livestock, BLM**

Project Description:

The proposed action involves the following:

- Drilling of **100** total federal CBNG wells, 25 to each of the following coal zones:
 - Lower Anderson 756 to 1245 feet below surface level
 - Canyon 1002 to 1463 feet below surface level
 - Cook 1228 to 1682 feet below surface level
 - Wall 1627 to 2145 feet below surface level.

There will be one well drilled to each coal for a total of four wells drilled at each location.

- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.
- The surface facilities will consist of a well house for each well with the dimensions of **4** ft wide x **6** ft length x **4** ft height and one mini-pod building which will house the individual gas meters for each well. The dimensions of the mini-pod building are 4 ft wide x 4 ft length x 7 ft height.

There will have 4 gas lines entering the building and one leaving. Well metering shall be accomplished at each mini-pod building with the information transmitted to a central location (the water treatment plant) through the use of telemetry. Metering would entail 4 to 5 visits per month to each location.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 17 discharge points and 9 stock water impoundments within the **Upper Powder River** watershed. The operator proposes to treat the water produced in association with CBNG at 5 gypsum treatment sites, associated with on-channel impoundments. The water will discharge to full containment impoundments or be discharged directly to the Upper Powder River as permitted with the Wyoming Pollutant Discharge Elimination System (WYPDES) permit (Permit # WY0054780) as issued by the Wyoming Department of Environmental Quality (WDEQ).
- An unimproved and improved road network to access the wells.
- A buried gas, water, and power line network to service the wells.
- An above ground power line, west of the Powder River, to provide electricity for the project.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B (the original proposed project) based on the operator and BLM working cooperatively to further reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal. At the on-sites, all areas of proposed surface disturbance were inspected to insure that the project would meet the BLM objective of multiple uses which conserves natural resources while extracting Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental

impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the **Mitchell Draw Unit 2** POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Following are the notes, comments, deficiencies, changes and proposed COAs which resulted from the onsites.

Well #	QTR	Sec	Onsite Notes
21-44	SESE	21	New Well - Federal Minerals Operator will provide APDs and Plats. Operator will provide updated maps.
22-22	NWNW	22	Reroute access from 22-32 location to reduce long road around knobs and steep final access up ephemeral drainage. Operator will provide engineering design for new road section. Landowner would like a tire stock tank here. Move Wall well to the east of the farthest east well, away from the ephemeral drainage headcut. Operator will provide a new APD and Plat for the Wall well.
22-24	SESW	22	Landowner would like a tire stock tank here.
22-33	SWSW	22	New location (22-34 moved). Operator will provide new APDs and Plats for this location.
22-34	SESW	22	Removed Well from POD to avoid disturbance to sagebrush habitat.
27-12	NWNE	27	Location should only require slotting for a level place for the tanks, rather than the engineered pad as submitted.
27-14	SENE	27	Relocate well to the east on access road to 27-44 well to centralize disturbance. Operator will provide new APDs and Plats for these wells or provide rationale for leaving well as originally staked and letter of approval from landowner.
27-43	SWSE	27	Must relocate fence.
28-11	NENE	28	Fence will be relocated to allow access to the wells.
28-42	NWSE	28	Access route from 28-34 fee location to SE then to this well will be rerouted slightly and designed due to erosive character of ephemeral drainage. Operator will provide Engineered design and new maps.
32-14	SENE	32	Reroute access route to follow existing two track.
33-12	NWNE	33	Operator will provide an engineered design for the access road from the Powder River. Road will be rerouted to cross ephemeral drainage.
33-14	SENE	33	Access route was rerouted to shorten disturbance by crossing small ridge following existing (but unusable) two track road. Operator will provide new engineered design. Pad will be redesigned. Pad will be constructed to follow contours around the ephememeral drainage (rather than placing fill in the drainage).
34-24	SESW	34	An alternate access from the southeast will be used to access this well.
34-44	SESE	34	Relocated Wall well to the north to reduce the size of the pad required. Operator will level area for tanks without constructing proposed pad. Operator will provide a new APD and Plat for the Wall well.
	SWSW	28	Powder River Crossing. Operator will provide plan for upgrade and maintenance.

Well #	QTR	Sec	Onsite Notes
Boulder Road	SWSW	27	Proposed access road from 28-44 location to the 34-24 location is located in areas of over 60% side slope on erosive soils and badlands. This access road cannot be approved due to the unnecessary and undue degradation which would result from construction.
East Road		35	Relocate access route to existing two track instead of disturbing additional sagebrush habitat in NESW Sec 35. Will be major access to connect the POD. .

The following wells were added to the POD as a result of the onsite:

	Well name	Well #	QTR	Sec	TWP	RNG	Lease
1	Mitchell Draw 2 MDU	21-44CA	SESE	21	52N	77W	WYW159007
2	Mitchell Draw 2 MDU	21-44CO	SESE	21	52N	77W	WYW159007
3	Mitchell Draw 2 MDU	21-44LA	SESE	21	52N	77W	WYW159007
4	Mitchell Draw 2 MDU	21-44WA	SESE	21	52N	77W	WYW159007
5	Mitchell Draw 2 MDU	22-33CA	SWSW	22	52N	77W	WYW151680
6	Mitchell Draw 2 MDU	22-33CO	SWSW	22	52N	77W	WYW151680
7	Mitchell Draw 2 MDU	22-33LA	SWSW	22	52N	77W	WYW151680
8	Mitchell Draw 2 MDU	22-33WA	SWSW	22	52N	77W	WYW151680

The 22-33 location replaced the 22-34 location (which was withdrawn).

The operator withdrew the 33-42 location wells due to leasing issues.

The water management strategy for the POD was revised from channel discharge and discharge to 17 impoundments to water treatment at a central reverse osmosis facility and direct discharge to the Powder River. The water treatment facility will be located in the SWSE Sec 20 and the NWNE Sec 29 T52N R77W on private surface over private minerals.

The Boulder Road, the road section in the SWSW Sec 27 and the NWNW Sec 34, connected the west side of the POD to the north and east wells. With the removal of that section of road, the operator proposed an alternate access along the Powder River flood plain that would connect the existing two track accesses from the 28-24 location to the Fortification Creek road. This road will provide access to 20 locations in the north and east portions of the POD.

On 09-13-07, the operator withdrew the following 9 locations (36 wells) and their associated infrastructure and access routes due to Fortification Creek elk habitat concerns and infrastructure located in highly erosive lands which would have presented reclamation challenges:

	Well Name	Well Number	QtrQtr	Sec	T	R	Lease Number
1	MITCHELL DRAW 2 MDU	27-14CA	SENE	27	52N	77W	WYW146321
2	MITCHELL DRAW 2 MDU	27-14CO	SENE	27	52N	77W	WYW146321
3	MITCHELL DRAW 2 MDU	27-14LA	SENE	27	52N	77W	WYW146321
4	MITCHELL DRAW 2 MDU	27-14WA	SENE	27	52N	77W	WYW146321
5	MITCHELL DRAW 2 MDU	27-31CA	NESW	27	52N	77W	WYW146321

	Well Name	Well Number	QtrQtr	Sec	T	R	Lease Number
6	MITCHELL DRAW 2 MDU	27-31CO	NESW	27	52N	77W	WYW146321
7	MITCHELL DRAW 2 MDU	27-31LA	NESW	27	52N	77W	WYW146321
8	MITCHELL DRAW 2 MDU	27-31WA	NESW	27	52N	77W	WYW146321
9	MITCHELL DRAW 2 MDU	27-43CA	SWSE	27	52N	77W	WYW146321
10	MITCHELL DRAW 2 MDU	27-43CO	SWSE	27	52N	77W	WYW146321
11	MITCHELL DRAW 2 MDU	27-43LA	SWSE	27	52N	77W	WYW146321
12	MITCHELL DRAW 2 MDU	27-43WA	SWSE	27	52N	77W	WYW146321
13	MITCHELL DRAW 2 MDU	27-44CA	SESE	27	52N	77W	WYW146321
14	MITCHELL DRAW 2 MDU	27-44CO	SESE	27	52N	77W	WYW146321
15	MITCHELL DRAW 2 MDU	27-44LA	SESE	27	52N	77W	WYW146321
16	MITCHELL DRAW 2 MDU	27-44WA	SESE	27	52N	77W	WYW146321
17	MITCHELL DRAW 2 MDU	33-14CA	SENE	33	52N	77W	WYW146321
18	MITCHELL DRAW 2 MDU	33-14CO	SENE	33	52N	77W	WYW146321
19	MITCHELL DRAW 2 MDU	33-14LA	SENE	33	52N	77W	WYW146321
20	MITCHELL DRAW 2 MDU	33-14WA	SENE	33	52N	77W	WYW146321
21	MITCHELL DRAW 2 MDU	34-11CA	NENE	34	52N	77W	WYW146321
22	MITCHELL DRAW 2 MDU	34-11CO	NENE	34	52N	77W	WYW146321
23	MITCHELL DRAW 2 MDU	34-11LA	NENE	34	52N	77W	WYW146321
24	MITCHELL DRAW 2 MDU	34-11WA	NENE	34	52N	77W	WYW146321
25	MITCHELL DRAW 2 MDU	34-24CA	SENE	34	52N	77W	WYW146321
26	MITCHELL DRAW 2 MDU	34-24CO	SENE	34	52N	77W	WYW146321
27	MITCHELL DRAW 2 MDU	34-24LA	SENE	34	52N	77W	WYW146321
28	MITCHELL DRAW 2 MDU	34-24WA	SENE	34	52N	77W	WYW146321
29	MITCHELL DRAW 2 MDU	34-41CA	NESE	34	52N	77W	WYW146321
30	MITCHELL DRAW 2 MDU	34-41CO	NESE	34	52N	77W	WYW146321
31	MITCHELL DRAW 2 MDU	34-41LA	NESE	34	52N	77W	WYW146321
32	MITCHELL DRAW 2 MDU	34-41WA	NESE	34	52N	77W	WYW146321
33	MITCHELL DRAW 2 MDU	34-44CA	SESE	34	52N	77W	WYW146321
34	MITCHELL DRAW 2 MDU	34-44CO	SESE	34	52N	77W	WYW146321
35	MITCHELL DRAW 2 MDU	34-44LA	SESE	34	52N	77W	WYW146321
36	MITCHELL DRAW 2 MDU	34-44WA	SESE	34	52N	77W	WYW146321

With the well withdrawals the long access roads on the east side of the POD (East Road) were also withdrawn. 64 wells (16 locations) remain in the POD.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Surface Water

1. Channel Crossings:
 - a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. The operator will supply a copy of the complete approved Chapter 3 permit to construct associated with treatment facilities to BLM as they are issued by WDEQ.

2.3.2.2. Soils

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

2.3.2.3. Vegetation

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

2.3.2.4. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
4. The lower edge of soil or other material stockpiles will be located outside the active floodplain.
5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

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

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

1. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimal disturbance buffer zone of one mile will be established for all bald eagle nest sites (February 1 – August 15). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
2. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle winter roost sites. A seasonal minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
3. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).
4. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's POD.
2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety

requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for the Mitchell Draw Unit 2 POD is Covert Green (PANTONE for Architecture Color Guide 18-0617 TPX).

3. 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 on the date in which the right-of-way grant is signed by the authorized officer of the BLM.
4. Onshore Order #1, as revised effective 05-07-07, requires that all operators certify to the Field Office in writing that they have supplied a copy of the Surface Use Plan to each of the private surface owners affected by the project. This self-certification must be received by this office before construction on the project begins.

Please note, effective 05-07-07, operators must supply a copy of the Surface Use Plan to each of the private surface owners prior to approval of the APD.

5. Please contact Kathy Brus, Natural Resource Specialist, @ (307) 684-1087, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Surface Use

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

Loamy Ecological Site Seed Mix

Species - Cultivar	% in Mix	Lbs PLS*
Thickspike Wheatgrass – <i>Critana</i> or Western Wheatgrass - <i>Rosana</i>	35	4.2
Bluebunch Wheatgrass – <i>Secar</i> or <i>P-7</i>	15	1.8
Green needlegrass - <i>Lodorm</i>	25	3.0
Rocky Mountain beeplant (<i>Cleome serrulata</i>)	10	1.2
White – <i>Antelope</i> or Purple Prairie Clover - <i>Bismarck</i>	5	0.6
Lewis - <i>Appar</i> , Blue, or Scarlet flax	5	0.6
Winterfat – <i>Open Range</i>	5	0.6
Totals	100%	12 lb/acre

*PLS = pure live seed

Shallow Clayey Ecological Site Seed Mix

Species	% in Mix	Lbs PLS*
Thickspike Wheatgrass (<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>)	50	6.0

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

Lowland Ecological Site Seed Mix

Species	% in Mix	Lbs PLS*
<i>Thickspike Wheatgrass</i> – OR <i>Western Wheatgrass</i> -	35	4.2
<i>Green needlegrass</i> -	30	3.6
<i>Basin Wildrye</i>	25	3.0
<i>Prairie coneflower</i>	5	0.6
<i>White or purple prairie clover</i>	5	0.6
Totals	100%	12 lbs/acre

2. Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed.
3. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.
4. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.
5. The operator is responsible for having a licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
6. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

<u>Grade</u>	<u>Drainage Spacing</u>
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
13-15%	150 ft.

7. "Roughed-in" or "Pioneer" roads shall be constructed according to the line and grade shown in the approved engineering designs. Non-engineered roads shall be constructed to a line and grade established to meet the BLM Gold Book and 9113 guidelines as approved in the SUP, and shaped according to an approved design template for that road. Loop roads and all primary corridors servicing more than four wells shall be surfaced prior to placing these roads into service, unless approved otherwise by BLM.
8. Adequate drainage control must be in place at all stages of construction and culverts installed as soon as feasible.
9. Pipeline corridor disturbance shall not exceed the approved disturbance width for road construction.
10. Final grading and surfacing shall occur immediately after utility installation is complete. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.
11. Due to the highly erosive soils along the access route, prior to the pre-construction onsite for this project, the operator shall submit a certification, signed by the landowner, regarding the construction of Road Segments D and E (from Map E – Engineered Access Roads). This certification shall include the following:
 - Documentation that the landowner has reviewed the design for the proposed construction for these road segments, examined the staking in the field, and is aware of the magnitude of surface disturbance that the installation will create.
 - Certification that the landowner intends to retain these roads for his use after CBNG production ceases.
12. Construction of Road D shall be closely monitored by the operator's engineer to ensure that groundwater seepage will not undermine the road's long-term stability. If groundwater is observed during construction, the operator's engineer will specify additional measures as needed to stabilize the fill section.
13. The drilling pits at the following locations will be lined due to proximity to drainages:
 - 32-14
 - 22-12
 - 22-32
 - 22-44 (2 easternmost locations)
14. Due to fragile, erodable soils and the potential for soil degradation due to increased traffic use, the following access routes will be constructed and surfaced prior to drilling the wells. All disturbed surface will require a protective surface treatment to stabilize the area in a manner which eliminates erosion until a self-perpetuating non-weed native plant community has stabilized the site. This treatment must be applied within thirty days of disturbance. Surface treatments may include mulch, matting, netting or tackifiers:
 - 22-22 Access Road
 - 22-14 Access Road
 - 27-23 Access Road
 - Road Segments A, B, D and E.

15. Any topsoil segregated for construction will be respread over side slopes for expedient reclamation.
16. Spot Upgrade SWNE Sec 21: due to steep topography and fragile soils, road improvements and pipeline installation will not disturb the native angle of repose on the south side of the road. Additionally, no additional soil will be pushed over the side slope to the north of the road.
17. Construction through the Powder River floodplain in Sections 21, 27, 32 and 33 will encounter salt cedar and leafy spurge infestations. The operator will clean construction equipment after completion of surface disturbance and prior to moving to sites where no salt cedar or leafy spurge infestations exist.
18. Prior to the pre-construction meeting, the operator will submit additional detail regarding the installation and maintenance of an all season channel crossing for the Powder River low water crossing at NWSW Sec 28.
19. The operator will minimize disturbance to sagebrush habitat wherever possible, but specifically keep the mowing less than 100 feet in diameter at the Wall coal zone well at the 22-42 location.
20. In order to minimize erosion impacts to ephemeral drainages, silt fences or some other sediment detention device will be installed at the toe of the fill on any constructed pad.
21. The use of scoria will not be allowed as rip rap at low water crossings and water discharge points. The light density and lack of durability of scoria does not meet with BLM recommendations for rock at these locations.
22. As-built maps, to be submitted in November of every year that the project is in the construction phase, will include any fee wells, pipelines and access routes as well as the Federal actions.
23. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
Reclamation Standards:
 - C. 3. The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 - C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 - C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 - C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

Wildlife

1. The companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (Powder River). If burying the proposed powerline is impracticable, power lines will be equipped with visibility markers in areas of high avian use.
2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
3. The following conditions will minimize impacts to nesting and roosting bald eagles:
 - a. No surface disturbing activity shall occur within one mile of bald eagle habitat (Powder River) annually from November 1 through April 1, prior to a winter roost survey or from February 1 through August 15, prior to a nesting survey. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
52/77	20	Water treatment ponds
52/77	21	All road corridors and pipelines
52/77	28	Wells 28-24 CA,CO,LA,WA and all road corridors and pipelines
52/77	29	3 phase powerline, water treatment facilities and all road corridors and pipelines
52/77	32	Wells 32-14 CA,CO,LA,WA and all road corridors and pipelines
52/77	33	Wells 33-12 CA,CO,LA,WA and all road corridors and pipelines

- b. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1-mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
 - c. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance-free buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).
 - d. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.
4. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
5277	21	Wells 21-44 CA, CO, LA, WA and all associated road corridors and pipelines
5277	22	Wells 22-22, 22-24, 22-32, 22-42, 22-44 CA, CO, LA, WA ; and all associated road corridors and pipelines
5277	27	Wells 27-12 CA, CO, LA, WA and all associated road corridors and pipelines

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
5277	29	all associated road corridors and pipelines, water treatment facility and 3 phase powerline
5277	32	Wells 32-14 CA, CO, LA, WA all associated road corridors and pipelines

- a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbance activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
 - b. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. Nests to be checked are within a ½ mile or less of the proposed development. The following nests will require productivity checks:
3678, 3679, 3670, 3671, 3672, 3674.
 - c. 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.
5. All pits associated with water treatment facilities containing more than 17,000 mg/L of sodium concentration will be netted to prevent access by migratory birds.

Water Management

1. The operator will provide a copy of the spill prevention plan prepared for the water treatment facility to the BLM BFO.
2. The WYPDES Permit includes additional outfalls which were not included in the water management plan for this project. Only four outfalls which discharge directly to the Powder River are permitted at this time:
 - a. WDP 001 (WYPDES Outfall #011) NWNW Sec 33
 - b. WDP 002 (WYPDES Outfall #014) NWNW Sec 28
 - c. WDP 003 (WYPDES Outfall #013) SWNW Sec 28
 - d. WDP 004 (WYPDES Outfall #017) NWNE Sec 21

Additional outfall locations will require a Sundry notice submittal and additional NEPA analysis.
3. The operator will submit a copy of the monitoring plan for the leak detection system for the impoundments at the water treatment facility. Results of the monitoring shall be made available to the BLM upon request.
4. The operator will submit a copy of the final site specific design the water treatment facility prior to construction of the facility.
5. In order to determine if CBNG development is impacting the flowing wells in the POD area, the operator will be required to sample the wells for water quality (using WYPDES parameters) and determine the flowrate in the spring and the fall of each year. Monitoring will be required through the life of the project and for two years after production ceases. Copies of reports will be submitted to the BLM BFO. The flowing wells are located as follows:
 - a. East #1 Well NESW Sec 33 T52N R77W

b. Ahern #4 Well NWSE Sec 22 T52N R77W

6. To control erosion, no water will be allowed to overflow the tire stock water tanks located near proposed water discharge points.

2.3.4. Alternatives considered but not analyzed in detail

Alternatives for access routes and well locations are always considered by the operator in the planning phase of the POD. The locations proposed were selected based on best management practices, environmental and economic considerations.

One of the most challenging aspects of CBNG production is the management of the water produced in association with the Federal minerals. The original water management strategy for the Mitchell Draw Unit 2 POD was 17 discharge points to 9 impoundments and channels along Fortification Creek and the Powder River. Due to landowner and erosion concerns, the operator chose to revise the water management strategy to treatment with discharge to the Powder River. Land application has not been considered at this time.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 03-27-06. Field inspections of the proposed Mitchell Draw Unit 2 CBNG project were conducted as follows:

- 11-7-06 by Grant Melvin, Erich Zwaagstra, Rusty Rausch, Greg Collins, Ed Porter, Roger Odekoven, Aaron Grosch, Carla Knapp - Petro-Canada; Frank Fisher - Landowner; Lee Harrelson, Larry Gerard, Clint Crago, Kathy Brus - BLM.
- 11-8-06 by Grant Melvin, Erich Zwaagstra, Rusty Rausch, Ed Porter, Roger Odekoven, David Gremel, Aaron Grosch - Petro-Canada; Kathleen Hollcroft - Landowner; Lee Harrelson, Larry Gerard, Chris Perry, Kathy Brus - BLM.
- 11-13-06 by Grant Melvin, Erich Zwaagstra, David Gremel, Carla Knapp, Aaron Grosch - Petro-Canada; Ken Burton and Mr. Slagle- Landowners; Lee Harrelson, Arnie Irwin, Kathy Brus - BLM.
- 12-15-06 by Grant Melvin, Erich Zwaagstra, Rusty Rausch, Aaron Grosch - Petro-Canada; Lee Harrelson, Larry Gerard, Arnie Irwin, Kathy Brus - BLM.
- 07-10-07 by Grant Melvin and Aaron Grosch – Petro-Canada; Chris Hanson, Chris Perry and Kathy Brus – BLM.

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Larry Gerard
Floodplains		X		Kathy Brus
Wilderness Values			X	Kathy Brus
ACECs			X	Kathy Brus
Water Resources	X			Kathy Brus

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Air Quality		X		Kathy Brus
Cultural or Historical Values		X		Clint Crago
Prime or Unique Farmlands			X	Kathy Brus
Wild & Scenic Rivers			X	Kathy Brus
Wetland/Riparian	X			Kathy Brus
Native American Religious Concerns			X	Clint Crago
Hazardous Wastes or Solids		X		Kathy Brus
Invasive, Nonnative Species	X			Kathy Brus
Environmental Justice		X		Kathy Brus

3.1. Topographic Characteristics of Project Area

The Mitchell Draw Unit 2 POD area is located along the Powder River near the confluence of Fortification Creek, approximately 27 miles northeast of Buffalo, WY. The POD area begins on the west of the Powder River at the Powder River County Road in the floodplain, crosses the channel to an upland area which could be described as the Powder River Breaks and extends north to include a portion of the lower Fortification Creek channel.

The area to the east of the river has been designated as the Fortification Creek Special Management Area in the BFO Resource Management Plan (April 2001). This POD does not fall within the Fortification Creek Wilderness Study area, which is located immediately to the east of the POD boundary. The 9 locations which were withdrawn 09-13-07 all fall within the area designated as Yearlong Elk range and the access route to the majority of those wells (the East Road) crosses the area designated as Elk Parturition Range. With the withdrawal of the wells, there will be no direct physical impact (soil and vegetation) from this project to these sensitive areas.

The Powder River floodplain is broad (up to one mile in this area) and vegetated with cottonwoods, salt cedar, willows, and other riparian vegetation. The uplands in this project area are typical badland topography, with sparse vegetation typical of a sagebrush steppe, many deeply incised drainages and steep (over 25% slope) eroded slopes and scattered areas of juniper and cedar growth in the higher elevations. Annual precipitation ranges from 10 to 14 inches of rainfall. The region is considered semi-arid.

The POD area is 3092.6 acres which are primarily privately held (600 acres are BLM managed). Historic uses are ranching, livestock grazing and hunting. There are a few cultivated hay fields west of the river. Elevations range from 3780 feet at the river to 4225 feet above sea level on the east side of the project area. Fortification Creek runs southeast to northwest across the northern portion of the POD. A ridge designated as Kinney Divide dissects the POD in the center, running from the southeast to the northwest. There are existing unimproved roads which provide ranch access running throughout where topography permits.

Access to all of the wells in the project area is from the river channel crossing located in the NWSW Sec 28 T52N R77W.

3.2. Soils and Vegetation

3.2.1. Soils

Soils within the project area were identified from the *North Johnson County Survey Area, Wyoming*. 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.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on the ridges and side slopes to 12+ inches in the bottomland and on the floodplain. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover, and slope. Reclamation potential of soils also varies throughout the project area.

The soils and landforms of this area present distinct challenges for development. Approximately 37 percent of the area within the boundary of the proposed action contains soil mapping units with a named component identified as being a highly erosive. The Bureau of Land Management has an obligation to protect these lands from disturbance which could lead to irretrievable and irreversible impacts, as stated in the ROD. “Areas of highly erosive soils will be avoided when drill sites, two-track access routes, and pipeline routes are surveyed and staked in order to reduce the amount of soil loss.” (ROD page A-31).

The map units identified for the soils within this project area are listed in the table below along with the individual acreage.

Table 3.2 Soil Map Unit Types

Map Unit	Map Unit Name	Acres
611	DRAKNAB SANDY LOAM, 0 TO 3 PERCENT SLOPES	52
612	CLARKELEN FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES	350
613	HAVERDAD-KISHONA LOAMS, 0 TO 3 PERCENT SLOPES	25
615	CAMBRIA-KISHONA-ZIGWEID LOAMS, 6 TO 15 PERCENT SLOPES	324
616	CLARKELEN-DRAKNAB COMPLEX, 0 TO 3 PERCENT SLOPES	159
622	CAMBRIA-KISHONA-ZIGWEID LOAMS, 0 TO 6 PERCENT SLOPES	0
637	FORKWOOD LOAM, 0 TO 3 PERCENT SLOPES	89
639	FORKWOOD-CUSHMAN LOAMS, 0 TO 6 PERCENT SLOPES	16
640	FORKWOOD-CUSHMAN LOAMS, 6 TO 15 PERCENT SLOPES	18
641	FORKWOOD-ULM COMPLEX, 0 TO 6 PERCENT SLOPES	28
649	HAVERDAD-CLARKELEN COMPLEX 0 TO 3 PERCENT SLOPES	326
679	CAMBRIA-ZIGWEID-KISHONA LOAMS, 3 TO 6 PERCENT SLOPES	61
684	SAMDAY-SHINGLE-BADLAND COMPLEX, 10 TO 45 PERCENT SLOPES	1121
685	KISHONA-CAMBRIA-ZIGWEID LOAMS, 6 TO 15 PERCENT SLOPES	4
707	THEEDLE-KISHONA LOAMS, 3 TO 20 PERCENT SLOPES	66
708	THEEDLE-KISHONA-SHINGLE LOAMS, 3 TO 30 PERCENT SLOPES	268
727	HAVERDAD-KISHONA ASSOCIATION, 0 TO 6 PERCENT SLOPES	102
734	KISHONA--ZIGWEID LOAMS, GULLIED, 3 TO 15 PERCENT SLOPES	36
938	WATER	47
	TOTAL	3093

Some of the map units listed above have been identified as highly erosive lands, with a badlands component. Highly erosive soils (low reclamation potential areas) in this pod have been designated using the following criteria and are displayed on the attached map:

- Slopes in excess of 25%
- Soils classified as miscellaneous areas
- Taxon above the family level of soil taxonomy and/or
- Existing ecological sites of Very Shallow or Shale.

identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information. The map units identified for the soils and the associated ecological sites found within the POD boundary are listed in the table below. This area falls within the 10 - 14" Northern Plains precipitation zone.

Table 3.3 Mitchell Draw Unit 2 Ecological Sites

Map Unit	Ecological Site	Acres
684	SHALLOW CLAYEY (10-14NP)	1121
612	LOWLAND (10-14NP)	350
649	LOWLAND (10-14NP)	326
615	LOAMY (10-14NP)	324
708	LOAMY (10-14NP)	268
616	LOWLAND (10-14NP)	159
727	LOWLAND (10-14NP)	102
637	LOAMY (10-14NP)	89
707	LOAMY (10-14NP)	66
679	LOAMY (10-14NP)	61
611	LOWLAND (10-14NP)	52
938	Water	47
734	LOAMY (10-14NP)	36
641	LOAMY (10-14NP)	28
613	LOWLAND (10-14NP)	25
640	LOAMY (10-14NP)	18
639	LOAMY (10-14NP)	16
685	LOAMY (10-14NP)	4
622	LOAMY (10-14NP)	0
	TOTAL	3093

Dominant Ecological Sites and Plant Communities identified in this POD by soil series are described below. A summary of the ecological sites within the project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Table 3.4 Dominant Ecological Sites in the Mitchell Draw Unit 2 Project Area

Ecological Site	Acres	Percentage
SHALLOW CLAYEY	1121	36.3
LOWLAND	1013	32.8
LOAMY	911	29.5
Water	47	1.5

Shallow Clayey Ecological Sites

In this project area, 36 percent of the landforms and soils are shallow clayey sites, located on slopes and ridge tops. Landforms include hill sides, ridges and escarpments in the 10-14" precipitation zone. The soils of this site are shallow (less than 20" to bedrock) well drained soils formed in alluvium or residuum. These soils have moderate to slow permeability and may occur on all slopes. The bedrock is clay shale which is virtually impenetrable to plant roots. The main soil limitations include shallow depth to bedrock,

high clay content and low organic matter content.

A significant percentage of the Shallow Clayey map unit in this area has been classified as Badlands. Badlands have essentially no soil, support little or no vegetation, are steep or very steep, commonly non-stony, barren land dissected with many intermittent drainage channels. Badland is most common in semi-arid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high and geologic erosion is active. These components would be classified as highly erosive lands.

The interpretive plant community for this site is the Rhizomatous Wheatgrasses, Green Needlegrass Community Historic Climax Plant Community (HCPC). The HCPC is defined as the plant community that is best adapted to the unique combination of factors associated with this ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, climatic factors at the time of settlement. This site evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. Potential vegetation is about 80% grasses or grass-like plants, 10% forbs, and 10% woody plants. The site is dominated by cool season midgrasses. Wyoming big sagebrush and winterfat are a conspicuous element of this state, occurring in a mosaic pattern, and makes up 5 to 10% of the annual production. Big sagebrush may become dominant on some areas with the absence of fire. Natural fire occurred frequently in this community and prevented sagebrush from being the dominant landscape. Wildfires are actively controlled in recent times.

The present plant community in this project area is a Mixed Sagebrush/Grass. Historically, this 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 identified include: Western wheatgrass, needleandthread grass, cheatgrass, Japanese brome, Sandburg bluegrass, prairie junegrass and blue gramma. Forbs identified include: Tumble mustard, scarlet globemallow. Other vegetative species identified at onsite: Wyoming big sagebrush, yucca, prickly pear cactus, and greasewood.

When compared to the HCPC, big sagebrush and blue grama have increased. Green needlegrass and bluebunch wheatgrass have decreased, often occurring only where protected from grazing by the big sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the state. The overstory of big sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope.

These sites will prove challenging for reclamation success and may require additional or extraordinary measures for interim and final site stability.

Loamy Ecological Sites

In this project area, 33 percent of the landforms and soils are loamy sites located relatively flat topography, dissected by ephemeral drainages and interspersed with eroded shallow clayey ridges.

The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum. 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. These soils have moderate permeability and may occur on all slopes. The main soil

limitations include low organic matter content and soil droughtiness.

The Rhizomatous Wheatgrasses/ Needleandthread/Big Bluestem plant community is the plant community for this site considered to be the HCPC. This plant community can be found on areas that are properly managed with grazing or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The site is dominated by a mix of warm and cool season mid-grasses.

In this project area, the HCPC has evolved to the Mixed Sagebrush/Grass plant community (described above).

Dominant grasses identified at the onsite which are associated with this ecological site include needleandthread, western wheatgrass, little bluestem and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, bluebunch wheatgrass and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, fringed sagewort and scarlet globemallow. Wyoming big sagebrush canopy ranges from 20% to 30%.

When compared to the HCPC, sagebrush and blue grama have increased. Production of cool-season grasses, particularly green needlegrass, has been reduced. The cool-season mid-grasses are protected by the sagebrush canopy, but this protection makes them unavailable for grazing. Cheatgrass (downy brome), Japanese brome and common pepperweed have invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope.

This plant community is resistant to change. A significant reduction of big sagebrush can only be accomplished through fire or brush management. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

These areas can be reclaimed by traditional methods identified in the programmatic and standard conditions of approval (COA's) relative to reclamation and applying the appropriate "Best Management Practices".

Lowland Ecological Sites

In this project area, 30 percent of the landforms and soils are lowland sites. This site occurs on nearly level land adjacent to streams that run water at least during the major part of the growing season. These soils formed on alluvial fans, drainage ways and stream terraces in the 10-14 inch precipitation zone.

The soils of this site are deep and very deep well-drained soils formed in mixed alluvium. These soils have moderate permeability. A fluctuating water table occurs in these areas and ranges from 1 to 5 feet, but is usually deeper than 3 feet. The main soil limitations include flooding potential and low organic matter content.

The HCPC for this site is the Rhizomatous Wheatgrasses, Green needlegrass, Cottonwood Plant Community. This state evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. Potential vegetation is about 80% grasses or grass-like plants, 10% forbs and 10% woody plants. The state is dominated by cool season midgrasses. The major grasses include rhizomatous wheatgrasses, needleandthread, green needlegrass and slender wheatgrass. Other grasses occurring in this state include Sandberg bluegrass, Canada wildrye, and prairie junegrass. Cottonwoods of various age classes are a conspicuous part of the overstory.

The present plant community is a mature cottonwoods/cool season grass. This plant community evolved under moderate grazing by domestic livestock. 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. Mature Cottonwoods make up the overstory, with minimal recruitment due to grazing practices.

When compared to the HCPC, western wheatgrass and green needlegrass have decreased. Needleandthread and Sandberg bluegrass have increased. Silver sagebrush has increased. Reproduction of cottonwoods is limited. The overstory of cottonwoods and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as birds, mule deer, and antelope. The lack of cottonwood reproduction will reduce the wildlife habitat. The watershed is usually functioning.

Dominant grasses include rhizomatous wheatgrasses, Kentucky bluegrass, needleandthread, and green needlegrass. Grasses of secondary importance include prairie junegrass, Sandberg bluegrass, and slender wheatgrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Also present were Wyoming big sagebrush, greasewood, and willows. Leafy spurge and salt cedar have invaded the site.

These areas can be reclaimed by traditional methods identified in the programmatic and standard conditions of approval (COA's) relative to reclamation and applying the appropriate "Best Management Practices".

For more detailed soil information, see the NRCS Soil Survey 719 – Northern Johnson County.

3.2.3. Wetlands/Riparian

As stated previously, the project area lies along and to the east of the Powder River which has perennial flow and has been classified by the WDEQ as a Class 2AB WW stream. Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters include all permanent and seasonal game fisheries and can be either "cold water" or "warm water" depending upon the predominance of cold water or warm water species present. All Class 2AB waters are designated as cold water game fisheries unless identified as a warm water game fishery by a "ww" notation in the "Wyoming Surface Water Classification List". Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value uses. (WDEQ Water Quality Rules and Regulations, Chapter 1).

The floodplain of the Powder River is well vegetated with a variety of deciduous trees including cottonwood, willows, and salt cedar. In a few areas along the river reach (over 3.5 stream miles within this project area), there are small pools of standing backwater where reeds and cattails thrive. The channel is broad, >50 feet in most places and the floodplain up to a mile wide. This area of the Powder River Basin has not been surveyed by the United States Corps of Engineers for Jurisdictional Wetlands Determination, but the following hydric soil components have been identified through the NRCS Soil Survey:

Hydric Rating	Acres	Percentage of POD Area
Not Hydric	2715	87.8
Partially Hydric	130	4.2
Unknown Hydric	247	8.0

The Fortification Creek channel also flows through the north/northeastern portion of this project area (over 2.1 stream miles in the project area). This creek, designated as Class 3B by the WDEQ, is ephemeral and dry for the majority of the year. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. In general, 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. (WDEQ Water Quality Rules and Regulations, Chapter 1).

There are sporadic persistent pools along Fortification Creek which hold water for longer periods of time. The channel was dry through the project area at the time of the onsites (November and December). Mature cottonwood stands line the channel, but other riparian species were not evident.

3.2.4. Invasive Species

The following noxious weeds and invasive/exotic plant infestations were discovered by a search of inventory maps or databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info) or during subsequent field investigation by the project proponent:

- leafy spurge
- Russian knapweed
- salt cedar

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

- Canada thistle
- cheat grass
- Japanese brome

The Johnson County Weed and Pest identified the potential for the presence of the following additional species in the area:

- Scotch thistle
- buffalo burr
- spotted knapweed
- puncture vine
- black henbane
- wild licorice

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

3.3. Wildlife

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

big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Hayden Wing Consulting (HWC). HWC performed aerial surveys for bald eagle winter roosts in 2005, 2006, 2007 and by BLM in 2006; ground surveys for mountain plover nesting activity; surveyed for greater sage-grouse and sharp-tailed grouse on April 2, 14 and 24, 2007; ground searched for raptor nests and prairie dog colonies on May 22 of 2007.

In 2005, it was determined that suitable Ute Ladies'-tresses habitat does not occur within the Mitchell Draw POD and no Ute ladies'-tresses were found during surveys conducted on August 16, while the orchid was known to be in bloom at the two know population sites in Wyoming (HWA 2005). No additional surveys were conducted.

A BLM biologist conducted field visits on November 13, 14, 15 and December 15, 2006. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the project area include elk, white-tailed deer, mule deer, and antelope. The WGFD has determined the entire project area to be Yearlong for mule deer, white-tailed deer and antelope; and Winter/Yearlong for mule deer. The project area is adjacent to elk Yearlong and range. Mule deer and white-tailed deer are part of the Powder River Herd Unit estimated to be 54,495 in 2005. The herd objective is 52,000. Antelope are part of the Ucross herd unit west of the Powder River. The antelope population in the Ucross herd unit was about 8654 head in 2006, with an objective of 2500. The portion of the POD east of the Powder River is outside any designated antelope seasonal range.

Elk occurred in the Fortification Creek area historically. However, due to the lack of roads and difficult access, little information on numbers and distribution are known. The Fortification Creek elk herd was re-established in 1952 and 1953 by the release of transplanted elk from Montana. Another transplant of 19 yearling bulls from the Jackson area was released into the area in 1974. Over the years the herd has gradually increased to a 1990 post season population estimate of about 400 elk. Currently there are an estimated 250 elk in the Fortification herd, down from an average of 272 in 2002. The current WYGF objective for the herd is 150.

In 1992 a 2.5 year study of the Fortification elk herd was initiated by the WYGF in cooperation with the Bureau of Land Management and area landowners, with the collaring of 17 cow elk. Data from this study allowed the Wyoming Game and Fish Department to better delineate elk ranges. In 2005, a second study was initiated by BLM and 26 elk were collared. These studies indicate high use of ponderosa pine, juniper, and draw habitats by the elk. The Mitchell Draw II project contains suitable year round habitat (juniper, and draws). There has been documented elk use within and around the project area. The data collected from both studies document the following elk observations within and surrounding the project area from 1992-1995 and 2005-2006.

Individual Elk Observations Within and Surrounding the Mitchell Draw II Project Area

Date	Township/Range/Section	Distance From Project Area
10/31/2005	52/77/22	Within project boundaries

Date	Township/Range/Section	Distance From Project Area
06/08/2005	51/77/01	1.0 miles
05/18/2005	51/77/02	1.2 miles
07/13/2005	51/76/36	1.7 miles
01/20/2006	51/76/36	2.0 miles

The Mitchell Draw II project is outside of designated elk ranges, however within the Fortification Creek Area (FCA). Proposed wells and infrastructure within designated elk range were dropped from consideration. Wyoming Game and Fish designated parturition areas are located approximately .25 miles southeast and 2.0 miles east of the POD and elk crucial winter/ yearlong range is located about 1 mile southeast and northeast of the POD.

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

3.3.2. Aquatics

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

3.3.3. Migratory Birds

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

3.3.4. Raptors

Nine new raptor nests were located in the POD. In 2007 there were 4 active nests. Four nests were inactive in 2007, and one was not checked. Eight nests are within 0.25 miles of potential development; one other active nest is within 0.5 miles from potential development.

Table 3.5 Documented raptor nests within the Mitchell Draw II project area (UTM Zone 13, NAD83).

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS 2006	STATUS 2007
3679	Golden eagle (GOEA)	409026 4921046	NESE, 32 5277	Cottonwood live (CTL)	GOOD	Active (ACT)	INAC (Inactive)
3668	Red-tailed hawk (RTHA)	410721 4924563	SENE, 21, 5277	CTL	GOOD	INAC	ACT
3670	GOEA	409040 4920998	NESE, 32, 5277	CTL	GOOD	INAC	ACT
3671	RTHA	408656 4922931	SWNE, 29, 5277	CTL	FAIR	ACT	INAC
3672	RTHA	408702 4922993	SWNE, 29, 5277	CTL	EXCEL	INAC	ACT
3673	RTHA	410278 4925420	SWSE, 16, 5277	CTL	GOOD	ACT	ACT
3674	GOEA	412480 4923636	SWSW, 23, 5277	CTL	FAIR	INAC	INAC
31**	unknown	409421 4921062	NWSW, 33, 5277	CTL	POOR		INAC
BLM	Long-eared owl (LEOW)*		SWSE, 22, 5277	Juniper	GOOD	ACT	Not checked

* nest identified during on-site.

** new nest in 2007

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

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

Approximately 47 acres black-tailed prairie dog colonies were identified during surveys by HWC within the Mitchell Draw 2 project area. Potential Black-footed ferret habitat is not present within the project area.

3.3.5.1.2. Ute's Ladies Tresses Orchid

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

Fortification Creek and its tributaries are intermittent. There are no springs (HWC 2007) within the project area. Suitable orchid habitat is not present within the Mitchell Draw 2 project area, due to the following: 1) appropriate hydrology is generally not present as most areas are composed of upland vegetation; 2) where appropriate hydrology does exist, vigorous and densely rhizomatous vegetation occupies the area; 3) water flow is ephemeral; 4) soils along both the Powder River and Fortification Creek are alkaline with high clay content.

3.3.5.2. Sensitive Species

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

3.3.5.2.1. Bald eagle

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

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

Bald eagles were observed near the project area during the 2006/2007 winter. Six bald eagles were observed at four locations during the first survey. Six bald eagles were observed at two locations during the second survey and eleven bald eagles were observed at four locations during the third survey. The project area has a year round prey base in the form of prairie dogs (47 acres of colonies), lagomorphs (hares and rabbits), and fish.

3.3.5.2.2. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog’s Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS.

Prairie dogs colonies create a biological niche or habitat for many species of wildlife (King 1955, Reading 1989). Agnew (1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading 1989) suggest that richness of associated species on black-tailed prairie dog colonies increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of numerous prey species (Clark 1982, Agnew 1986, Agnew 1988).

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

Approximately 47 acres of black-tailed prairie dog colonies were identified during site visits by HWC within the project area.

Name	Acres	Location
Colony 1	42	SW Sec 28 5277
Colony 2	5	NWNE Sec 32 5277

3.3.5.2.3. Grouse

3.3.5.2.3.1. Greater Sage Grouse

Sage-grouse listed as a sensitive species by BLM (Wyoming). In recent years, seven petitions have been submitted to the U.S. Fish and Wildlife Service (FWS) to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was “not warranted” following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse.

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs throughout the project area in a patchy mosaic of sparse (0-5% cover), low (5-10% cover), moderate (10-15% cover), and dense (15-25% cover) stands. On average, the sagebrush ranged in size from 15 to 20 inches tall. Suitable sage-grouse habitat is present throughout the project area. Steep topography and scattered junipers occur throughout the project area. Sage-grouse scat was rarely found during each site visit and grouse were not observed during field visits, although brood rearing habitat occurs along the Powder River and Fortification Creek. No sage grouse leks occur within 3.0 miles of the Mitchell Draw 2 project area. The closest lek is 4 miles southwest of the POD.

3.3.5.2.3.2. Sharp-tailed grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is common where grasslands are intermixed with other shrublands, especially wooded draws, shrubby riparian areas, and wet meadows (PRB FEIS 3-148).

HWC Consultants did not document a sharp-tailed grouse lek or individuals within the Mitchell Draw II project area. The closest sharp-tailed lek is 5 miles north east of the POD.

3.3.5.2.4. Mountain plover

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

In September 2003, the U.S. Fish and Wildlife Service withdrew their proposal to list the mountain plover. However, the mountain plover remains an agency-designated Sensitive Species within both the Bureau of Land Management and the Forest Service. According to the U.S. Geological Survey, prairie dogs currently exist on less than one percent of their former range, and their numbers have declined by 98 percent (Turbak 2004). Mountain plover numbers have declined, possibly from millions to only about 10,000 birds today (Turbak 2004).

Suitable mountain plover habitat is limited within the project area, although there are prairie dog colonies; the topography is greater than 5% and cheatgrass has encroached on the prairie dog towns. Vegetation and topography is limiting potential plover habitat in the POD. Surveys conducted by HWC in 2007 did not document plover presence in the POD (HWC, 2007).

3.4. West Nile Virus

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

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

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

Table 3.6 Historical West Nile Virus Information

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

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2005	12	4	6	3
2006	65	0	2	2
2007	155	22	Unk	0

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

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

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

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

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

3.5. Water Resources

The project area is within the **Upper Powder River** drainage system and the Powder River floodplain proper. Fortification Creek, tributary to the Upper Powder River, runs through the north/northeast portion of the POD. The confluence with the river is to the north of the POD boundary.

3.5.1. Groundwater

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 21 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 10 to 940 feet (average 460 feet). Two of these wells are flowing wells which the landowners uses for irrigation or stock watering. These wells are located as follows:

	Well name	Landowner	Permitted Depth, ft	QTR	Sec	TWP	RNG
1	East #1	Powder River Livestock	930	NESW	33	52N	77W
2	Ahern #4	S & B Holding Company	653	NESW	22	52N	77W

Water analysis results from a sample taken from the East #1 well were provided by the operator in the POD information. The estimated flow of the well has not been determined, however the water quality is 3030 µmhos/ cm conductivity, 2020 mg/l TDS, and 33.9 SAR.

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

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

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

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

For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Fortification Creek drainage which is tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank. Aside from the Powder River, there was no surface water present in the project area at the time of the onsite.

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 near Arvada, WY (PRB FEIS page 3-49).

The operator has not identified any natural springs within this POD boundary.

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

3.6. Cultural Resources

A Class III inventory was conducted for the Mitchell Draw 2 project prior to on-the-ground project work (BFO project # 70060173). Pronghorn Archaeology Inc., conducted the Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior’s Standards and Guidelines (48FR190) for the proposed project. Clint Crago, BFO archaeologist, reviewed the reports for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined them to be adequate. The following resources are located within the Area of Potential Effect (APE).

Table 3.7 Cultural Resource Sites Identified within the Mitchell Draw 2 Project Area

Site Number	Site Type	National Register Eligibility
48JO2585	Johnson County Road #195	Not Eligible
48JO3279	Historic Occupation Area	Not Eligible
48JO3282	Historic Dugout and Artifact Scatter	Not Eligible
48JO3284	Prehistoric Lithic Scatter	Unevaluated
48JO3285	Historic Homestead	Not Eligible
48JO3663	Historic Corrals and Artifact Scatter	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action which resulted in development of Alternative C as the preferred alternative have reduced the potential impact to the environment which will result from this action. The environmental consequences of Alternative C are described below. Under this alternative, 64 wells would be drilled at 16 locations to Federal minerals on 80 acre spacing. For the most part, the operator utilized existing two-track trails, or primitive roads as infrastructure for this POD. The wells have been sited so that construction will disturb a minimum area. There are some areas along the access routes that cross highly erosive soils and will require expedient or extraordinary stabilization to reduce erosion potential.

Due to the sensitive nature of this area, (Fortification Creek Area) the operator has included the following

mitigation measures in their plan:

- No compression facilities will be located within this POD area.
- Production will be monitored with telemetry to reduce human presence in the project area.
- With the exception of one span from the west to just across the Powder River located on private surface, all power will be buried.
- Access routes used existing roads and were centralized as much as possible.
- Because this POD is within the Mitchell Draw Unit, the operator was able to situate the proposed locations in areas to minimize surface disturbance of the locations and access routes.
- Water produced from these well will be transferred out of the FCA to a central treatment facility – no impoundments will be built in the project area.
- At the landowners request, several stock water tire tanks will be installed in the project area.

The Mitchell Draw II POD is not within the proposed Fortification Creek Area of Critical Environmental Concern. The project design and the above mitigation measures are consistent with past management decisions for sensitive resources within the Fortification Creek Area; therefore this POD is not subject to the BFO Resource Management Plan Amendment being conducted for the Fortification Creek Area.

4.1. Soils and Vegetation

Impacts to vegetation and soils from surface disturbance will be reduced by following the operator's plans and BLM applied mitigation. Of the 16 proposed locations (64 wells), none are on existing or reclaimed conventional well pads, 14 can be drilled without a well pad being constructed, 1 will require a slot for completion tanks and 1 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 56 wells at 14 locations without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 25 feet for each well), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 56 wells would involve approximately 0.62 acres/location for 8.68 total acres. The other 2 locations (8 wells) which require cut and fill pad construction would disturb approximately 0.83 acres/location for a total of 1.65 acres. The total estimated disturbance for all 64 wells would be 10.33 acres.

Approximately 4.77 miles of improved roads would be constructed to provide access to various well locations. Approximately 8.7 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 0.13 miles of pipeline would be constructed outside of access corridors, and 0.7 miles of individual pipeline installed outside of pipeline or access corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity is regained and stability is maximized.

Proposed stream crossings, including culverts and fords (low water crossings) are shown on the MSUP and the WMP maps (see the POD). Engineering designs have been provided for some of these crossings. The structures would be constructed in accordance with sound, engineering practices and BLM standards.

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

page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	58	Site Specific	8.68	Long Term
Constructed Pad	8		0.83	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre		Long Term
Impoundments	0		0.0	Long Term
On-channel	0	Site Specific	0.0	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	4	Site Specific	0.4	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads				Long Term
No Corridor	0	Site Specific	0	
With Corridor	4.77	40' Width	19.51	
2-Track Roads				Long Term
No Corridor	0.19	15' Width	0.34	
With Corridor	8.51	25' Width	19.25	
Pipelines				Short Term
No Corridor	0.13	20' Width	0.32	
With Corridor	0.7	20' Width	1.70	
Buried Power Cable				Short Term
No Corridor	0.0	12' Width	0.00	
Overhead Powerlines	0.62	30' Width	2.26	Long Term
Additional Disturbance				Long Term
	Water Treatment Facility	Site Specific	40.00	Short Term
	Staging Areas (2)	1.5 Acres Each	3.00	
TOTAL			96.29	Short Term
			91.27	Long Term

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

4.1.1. Soils

The effects to soils resulting from well pad, 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 dependant 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.

The proposed action was designed to avoid highly erosive areas which have a low potential for successful reclamation wherever possible. As stated previously, most of the well locations were situated in areas that did not require pad construction. However, the operator used existing disturbance (primitive roads) for access to the well locations and some of those roads are located the only place where access was possible through some very erosive sites. Disturbance within these areas may require extraordinary measures to insure that reclamation success is attained. The following roads and well locations are identified as areas requiring additional reclamation efforts beyond traditional methods.

- The access road in west quarter of Sec 22 to the 22-22 location.
- The access road in NWNW Sec27 to the 27-23 location.
- The Central road from SWNW Sec 33 to the SWSW Sec 28.
- The access road in north half Sec 28 to the 28-22 location.

The proposed action will affect areas of soils with a limited potential for successful reclamation. These areas are identified as having slope >15%, limiting the use of conventional farm machinery and farming practices or ecological sites susceptible to site degradation and increased soil erosion. Disturbances within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA.

Soil disturbances other than permanent facilities would be short term with expedient, successful interim reclamation and site stabilization. In locations of highly erosive soils, the operator will be required to stabilize disturbed surface within 30 days of the initial disturbance. Construction activities would be designed following Best Management Practices (BMPs).

Road sections D (SESW Sec 28) and E (N half of Sec 33) are the primary access to the POD. These sections have been designed to upgrade the existing primitive road to insure safe access for construction activities. The road traverses steep slopes (>15%) and shallow clayey soils on private surface. Reclamation success for this roadway is questionable. The landowner has stated that he intends to retain this road as access to his property after CBNG production. The operator will be required to provide a certification from the landowner that he has reviewed the design, examined the extent of disturbance

proposed, and intends to retain the road after the operator reclaims the well sites.

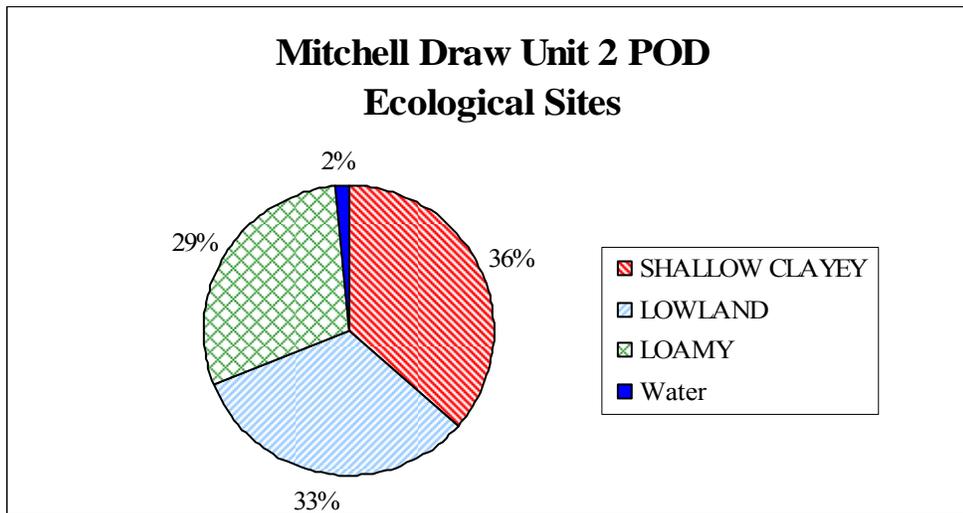
The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. “Government soil experts state that SAR values of 13 or more cause potentially irreversible changes to soil structure, especially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

4.1.2. Vegetation

The construction associated with this project will disturb a total of 96.29 acres in the short term construction phase. To insure expedient reclamation that conforms to the Wyoming Reclamation Plan objectives, native seed mixes are recommended for use on the different ecological sites. These seed mixes were determined based on soil types, the dominant ecological sites, onsite observations, and the potential for mixing of soil horizons in disturbed areas. The operator will be required to use these seed mixes on Federal surface and encouraged to use them on private surface if the landowner has no preference. These native species should adapt readily to each soil and ecological site in the POD area to ensure revegetation, with prompt and appropriate recontouring and reclamation. Seed mixes for each of the Ecological sites are included in the COAs.

The following figure depicts the ecological sites present within the project area. The operator will be provided with a map (Attachment 1) of the project area highlighted with the ecological sites in order to assist in the proper placement of seed mixes.

Figure 4.1 Ecological Sites in the Mitchell Draw Unit 2 Project Area



The construction of the access roads, pipelines and well locations will also disturb sagebrush. Wyoming big sagebrush has not been included in these mixes because direct seeding success has been marginal in the past. With expedient reclamation and respreading of the topsoil, sagebrush seed would be present in the seed base and should regenerate given proper environmental conditions

4.1.3. Wetland/Riparian

Because the water management strategy for this project is treatment and direct discharge to the Powder River, any impact to wetland or riparian areas resulting from water production should be minimal. The off-channel pits associated with the treatment facility will be lined and leak detection installed to monitor and prevent produced water and treatment brine from infiltration and resurfacing.

After the onsite, when it was determined that the “Boulder Road” was not a suitable access to the POD wells, the operator proposed an alternative road which follows the floodplain, through cottonwoods and willow stands. The proposed route will take out some trees, but the operator was very careful to avoid disturbing trees where possible. Road construction here uses matting to stabilize the road and potentially reduce additional disturbance during wet seasons.

“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).

The project includes several proposed low water crossing, where primitive roads cross the Fortification Creek and Powder River channels. These crossings will be constructed so that the adjacent and downstream channels are protected from impact.

4.1.4. Invasive Species

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

1. A prevention program in which the operator will minimize surface disturbance and treat areas of potential infestations with appropriate herbicides.
2. Control infestations by using certified weed free mulches for erosion control, weed free road surfacing material, cleaning vehicles after construction in infested areas, and expedient re-seeding with weed free seed mixes.
3. Educate employees and contractors in the identification and control of invasive species.

Petro-Canada Resources (USA), Inc. has co-operated with the Johnson County Weed and Pest board for salt cedar control along the Powder River with a donation to the treatment fund.

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

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

thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.5. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the **Upper Powder River** drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the Upper Powder.
- The WMP for the Mitchell Draw Unit 2 proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Big game in the area include; elk, mule deer, and pronghorn antelope. Under this alternative, Yearlong range for elk will be indirectly disturbed, and Winter/Yearlong range for mule deer and Yearlong ranges for pronghorn antelope will be directly disturbed with the construction of wells, pipelines, and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss. Short term disturbances may provide some habitat value as these areas are reclaimed and native vegetation becomes established.

Big game species can be expected to respond in a similar manner to the project. Differences are that deer and pronghorn do not move as easily as elk through deep snow, so winter disturbance could impact these smaller individuals more severely; and pronghorn are more tolerant of human activities than elk and mule deer. The most important difference between the elk herd and the deer or antelope herds is that the elk are an isolated herd, in effect an island population. The wells and infrastructure that are being analyzed in this alternative are outside all designated elk ranges. However, they are proposed less than 0.25 miles from Yearlong, and approximately 0.5 miles from winter/yearlong ranges.

CBNG development fragments habitats through placement of linear facilities such as roads and pipelines. The impacts from fragmentation can vary depending on the use of the feature. For example a road used daily would displace elk by reducing habitat effectiveness as well as fragmenting habitat. The placement of linear elements can also act as vectors for invasive plant species that can reduce the forage value of the area by out competing native plants and increase the potential for wildfire.

Big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). BLM's recently completed environmental report for the Fortification Creek elk

herd concludes that elk avoid well sites by 1.7 miles and roads by 0.5 miles (Roberts and Bills 2007). The WGFD feels a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not accepted the disturbance (Madison 2005). These studies apply to elk as well.

Indirect disturbance from human activity is probably the largest potential impact from the proposed action. The FEIS used “habitat effectiveness” (the degree to which habitat features fulfill specific habitat functions; the degree to which a species or population is able to continue using a habitat for a specific function) in an attempt to assess the effect of human disturbance. The BFO modeled effective big-game habitat based on 80 acre well distribution (8 wells/section) and 0.5 mile or line-of-sight displacement. Development at this scale resulted in no effective big-game habitat. The development proposed in Alternative C will displace elk and mule deer and may preclude their use of the Mitchell Draw II project area. Anecdotal observations within Fortification Creek suggest elk displacement from human activities is greater than one half-mile, possibly three-quarters of a mile or greater (Roberts, pers comm.). A desert elk study researching elk response to oil and gas development in the Jack Morrow Hills area of southwestern Wyoming, indicated elk avoided areas within 2 kilometers (1 1/4 miles) of active roads (Powell 2003). Alternative C will result in indirect loss of elk yearlong habitat, pronghorn winter/yearlong range, and mule deer winter and yearlong ranges.

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

Operation and maintenance activities within the POD will increase the traffic on road segments within the FCA and on existing roads near designated elk ranges.

The FEIS states that CBNG development in the Powder River Basin would cause a decrease in habitat effectiveness for elk, which may result in decreased population. This effect may be more severe when the population is near carrying capacity. The current Fortification elk herd is over the WGFD objective of 150. Elk may become more susceptible to hunting pressure from CBNG development. The project is located on private and public land. There is potential for industry personnel to see elk while working and harvest an elk, through legal or illegal means. Trespass and poaching from the general public is also likely to increase with additional road access into the Fortification Creek area.

4.2.1.1. Cumulative effects

The cumulative effects associated with Alternative C are not within the analysis parameters and impacts described in the PRB FEIS. The Buffalo Field Office is in the process of preparing further analysis of the impacts of CBNG development on elk.

4.2.2. Aquatics Direct and Indirect Effects

Petro Canada Energy Corporation expects that the initial discharge per well will be 40-90 gallons per minute (gpm) from the Wall, 20-40 gpm for the Canyon, the Lower Anderson and Cook formations, (Knapp 2007). Produced water will be piped to a treatment plant near the Powder River and discharged to the River. The Wyoming Game and Fish Department has identified three primary threats to the

Powder River ecosystem: 1) habitat alterations due to water produced during coalbed natural gas development, 2) water development in the headwaters of the watershed, and 3) introduction of exotic flora and fauna (WGFD 2006). Even relatively small amounts of CBNG water have the potential to alter the habitat in the Powder River, particularly during periods of low flow. It is not known at this time how these changes might impact native fishes.

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

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

Change in Water Quality

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

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

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their recently released report on the Powder River. This report indicated that CBNG discharges could affect native species in the drainage. The water quality projected to be discharged to the Powder River from this project is 2500 $\mu\text{mhos/cm}$ between November to March. From March to November, discharge water with a maximum specific conductance of 2000 $\mu\text{mhos/cm}$ is established. During August and September Petro Canada expects to discharge water with an SAR of 4.9 to 9.6, and an EC of 2000 $\mu\text{mhos/cm}$.

Change in Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a very dynamic hydrograph with high sediment loads. Changes in this flow regime (i.e., perennial flows) may seriously impact native fauna by altering their use of historical habitats for spawning, rearing, and reproduction. Alterations that impact channel morphology is an issue, and will have impacts to the aquatic biota due to changes in sediment loads, loss of habitat, and possible disruption of migration movements due to barriers created by culverts and/or head cuts. This is a monitoring and adaptive management issue for CBNG development.

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic

biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately (13.9 MGD per day) of project treated water to an average flow of 30 cfs into the Powder River is unlikely to affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

All monitoring reports as a result of Petro-Canada's application for WYPDES discharge to the Powder River will be made to Wyoming Department of Environmental Quality (WDEQ) and Wyoming Game and Fish Department. The WDEQ mandates additional information collected by Petro Canada to provide a better understanding of the dynamics of the aquatic system.

4.2.2.1. Cumulative effects

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

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

Table 4.2. Infrastructure within close proximity to documented raptor nests within the Mitchell Draw 2 project area (Timing limitations will apply to this infrastructure).

BLM ID# (HWA ID#)	UTM (NAD 83)	SPECIES	STATUS	WELL / PIT NUMBER	DISTANCE
3679 (1)	409026 4921046	Golden Eagle (GOEA)	Inactive (INAC)	32-14CA,CO ,LA,WA; Road and pipeline corridor	.25 mi.
3668 (2)	410721 4924563	Red-tailed Hawk (RTHA)	Active (ACT)	22-32CA,CO ,LA,WA and all road and pipeline corridors within .5 mi	.2-.5 mi.
3670 (5)	409040 4920998	GOEA	ACT	32-14CA,CO ,LA,WA; Road and pipeline corridor	.25 mi.
3671 (6)	408656 4922931	RTHA	INAC	Road and pipeline corridor	.1 mi
3672 (7)	408702 4922993	RTHA	ACT	Road and pipeline corridor	.1 mi
3674 (9)	412480 4923636	GOEA	INAC	22-44CA,CO, LA,WA; Road and pipeline corridor	.25 mi.
BLM	SWSE, 22, 5277	Long-eared owl (LEOW)	ACT	road and pipeline corridors within .5 mi	.1 mi.

Seven raptor nest sites were identified by HWC and one by BLM within the Mitchell Draw II project

area. Wells (4 wells/location), and access corridors/roads, were proposed in close proximity to nests, 1, 2, 5, 6, 7, 9; which were active in 2007. Nests inactive in 2007 may be active in 2008. Despite commitments such as telemetry metering, well visits during the nesting season would likely be necessary, which could lead to nest failure through nest abandonment or predation.

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

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Small isolated prairie dog colonies present.
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

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

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

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

Effect Determinations

LAA Likely to adversely affect

NE No Effect.

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

4.2.5.1.1. Black-footed ferret

Because the black-tailed prairie dog colony within the Mitchell Draw II project area is of insufficient size (47 acres) for supporting ferrets and is isolated from any prairie dog complexes, implementation of the proposed development should have “no effect” on the black-footed ferret. The closest potential reintroduction area is more than 10 miles north of the project area.

4.2.5.1.2. Ute’s Ladies Tresses Orchid

Produced water will be piped to a treatment facility then discharged to the Powder River. No natural springs have been identified. Implementation of the proposed coal bed natural gas project should have “no effect” on the Ute ladies’- tresses orchid as suitable habitat is not present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

Presence

K Known, documented observation within project area.

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

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

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

Project Effects

NI No Impact.

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

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

BI Beneficial Impact

4.2.5.2.1. Bald eagle

Although there are no documented nest sites or communal roosts within the Mitchell Draw 2 project area, suitable habitat is present and bald eagle use in the winter has been documented in the project vicinity. Bald eagle populations are recovering; new nests and roosts are being established every year. Three new nests have been documented within or near the Buffalo Field Office administrative area in 2006 (Rogers pers. Comm., Byer pers comm.). Two of these nests are located in a stand of just a few cottonwood trees and are not associated with a fish-bearing water body. Timing limitations for nesting and winter roosting will be applied to the Mitchell Draw 2 project as suitable habitat is present, bald eagle use has been documented, and eagles may initiate a new nest or roost site within the project area.

A proposed 0.6 mile powerline will cross the Powder River and may increase electrocution or collision of bald eagles with wires. One adult bald eagle was observed on two different surveys within 0.1 mile of the proposed powerline. There are 1.3 miles of existing overhead three-phase distribution lines within the project area.

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

There are currently no improved roads within the project area, 2.8 miles are proposed. Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%).

A water treatment plant is proposed within 0.25 miles of the Powder River and will consist of ponds and treatment facility which will occupy about 40 acres. The treatment ponds and river discharge could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Continual discharge to the Powder River could keep the river open when otherwise it might ice over. Continuous vehicle traffic is anticipated to the treatment plant. Eagle use of the Powder River should be reported to determine the need for any future management.

4.2.5.2.2. Black-tailed prairie dog

Wells and road corridors are planned within black-tailed prairie dog colonies on private surface, due to topographic restraints.

To prevent direct habitat loss, the well locations 28-44 and road and pipeline corridors were kept to a minimum on existing road. The well house may provide habitats for mammal and avian predators

increasing prairie dog predation. Mineral related traffic on the adjacent road may result in prairie dog road mortalities.

4.2.5.2.3. Grouse

4.2.5.2.3.1. Greater Sage Grouse

Suitable sage-grouse habitat is limited through out the Mitchell Draw II project area.

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

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

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

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

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

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

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

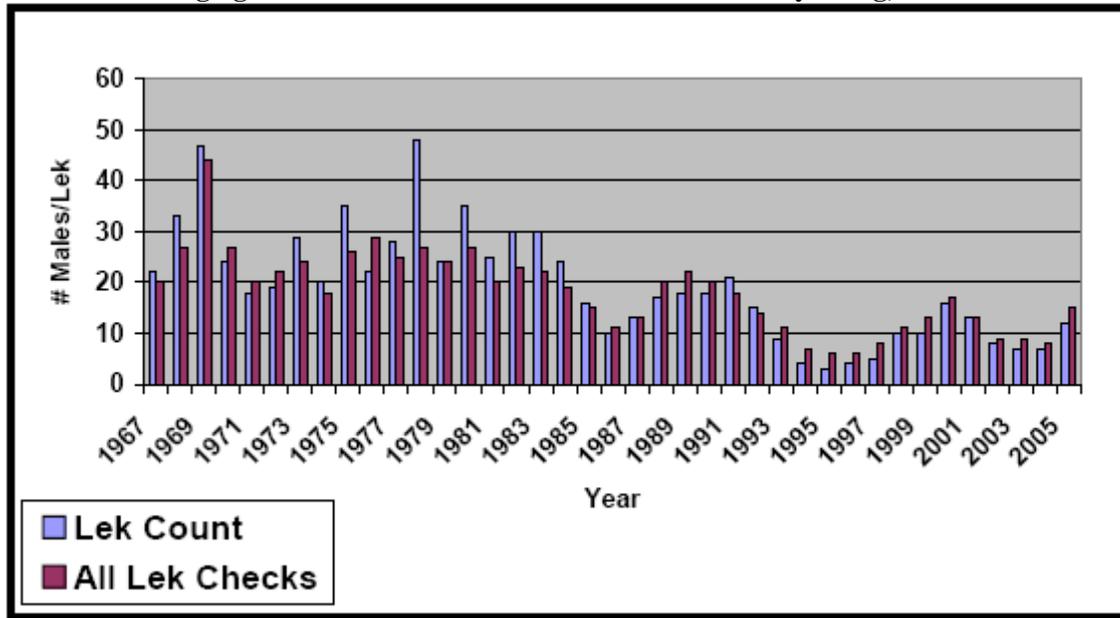
dominant shrub species (Moynahan et al. In press).

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

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

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

Figure 4.2. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



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

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

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

4.2.5.2.3.2. Sharp tailed Grouse

The Mitchell Draw II project area is suited for sharp-tailed grouse breeding, nesting, and wintering grounds. Habitats within the project include grasslands, sagebrush-grasslands, cottonwoods, junipers, and sumac, which have the potential to support sharp-tailed grouse throughout the year (HWC 2005). The

closest lek is 4 miles north east of the POD. Impacts should be similar to that of the sage grouse discussed above.

4.2.5.2.4. Mountain plover

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

Suitable mountain plover habitat is not present; there would be no impact to mountain plovers.

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

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

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

and permitting impoundments for the containment of surface waters of the state.

The water management strategy for this project is to collect the water produced from each well at a central treatment facility. This facility will, using electrolysis and reverse osmosis, reduce the TDS and SAR of the produced water to a quality level acceptable for discharge under a WYPDES permit. The water will then be discharged directly to the Powder River at four water discharge points.

The maximum water production is predicted to be 40.0 gpm per well for the Lower Anderson, Canyon and Cook coals and 90 gpm for the Wall coal or 3360 gpm (7.49 cfs or 5128.9 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 163,521 acre-feet in 2007 (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 **3.1%** of the total volume projected for 2007. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of **39%** to groundwater aquifers and coal zones in the **Upper Powder River** drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of **1310.4** gpm will infiltrate at or near the discharge points (2113.4 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 10 to 940 feet (average 460 feet) compared to **756** feet to the top of the Lower Anderson to **2145** to the bottom of the Wall coal. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

As stated in Section 3.4.1, there are two flowing wells in this project area which are used for stock watering purposes. These wells may be impacted by surrounding CBNG production. The operator will be required to monitor the flow rates and water quality of these wells twice per year. If an adverse trend develops, the operator will be required to mitigate the impacts.

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

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial

procedures in the event of casing failure, and utilizing proper cementing procedures will protect any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has designated reference wells within the POD as listed below:

Well Number	QtrQtr	Sec	T/R	Coal Zone	Average Depth, ft
28-24LA	SEnw	28	52/77	Lower Anderson	740
28-24CA	SEnw	28	52/77	Canyon	1040
28-24CO	SEnw	28	52/77	Cook	1300
28-24WA	SEnw	28	52/77	Wall	1570

The reference wells will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

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

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

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Primary Watershed at Arvada, WY Gauging station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # 0054780			
At discharge point			
November 1 through February 28 (Daily Max)	1,665	9.6*	2,500
November 1 - February 28 (Monthly Average)	1,665	6.3**	2,500
March 1 through October 31 (Daily Max)	1,665	7.3*	2,500
March 1 - October 31 (Monthly Average)	1,330	4.9**	2,000
Existing Groundwater Quality – East #1 Well			
NESW Sec 33 T52N R77W	2,020	33.9	3,030
Predicted Produced Water Quality			
Lower Anderson SENW Sec 32 T52N R77W	1,940	38.6	3,060
Canyon SENW Sec 32 T52N R77W	2,450	46.9	3,750
Cook SENW Sec 32 T52N R77W	1,930	35.4	3,040
Wall SENE Sec 29 T52N R77W	697	10.0	1,160

*Estimated from historic sodium concentrations determined at the USGS monitoring station at Moorhead, MT

** For more information, refer to the WYPDES Permit

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 produced water quality from the Lower Anderson, Cook and Wall coals would be within the WDEQ criteria for agricultural use (2000 mg/l TDS), except for the SAR. The Cook coal produced water would not be suitable for direct agricultural use. However, even though this water will be treated to acceptable concentrations, 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.

Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, the water treatment facility will be situated in the SWSE Sec 20 and NWNE Sec 29 T52N T77W. This treatment facility is located over fee minerals, therefore the WDEQ is the bonding entity for the impoundments and evaporation ponds associated with the facility. The entire

complex will disturb 40 acres of surface area. The operator will provide a copy of the Section 3 permit for treatment facilities as it becomes available from the WDEQ. This facility will be similar to the one constructed in the Wild Turkey POD which is located in T48N R76W just off Schoonover Road. The treatment facility and impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator. All water management facilities were evaluated for compliance with best management practices during the onsite.

There are 4 discharge points proposed for this project. They have been appropriately sited and will utilize appropriate water erosion dissipation designs. These discharge points are located along the Powder River channel. The PRB FEIS presents flow data from all the sub-watersheds in the Powder River Basin on page 3-41. These values were calculated from flow data taken from 1931 to 2001 for the Upper Powder River. In that time period, the Median Monthly Flow (cfs) was determined to be 216.0 cfs (Maximum Mean 752.2 and Minimum Mean 75.4 cfs). This project could add up to 7.49 cfs (or 3.5% increase to the Median Monthly Flow) to the Powder River at these discharge points.

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 63 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 64 wells is anticipated to be a total of 3360 gpm or 7.49 cfs. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) the produced water from this action may add a maximum 6.0 cfs to the Upper Powder River flows, or 9.5% of the predicted total CBNG produced water contribution. The WYPDES Permit written for this project allows a maximum discharge of 13.9 MGD (9652 gpm or 21.5 cfs). The predicted production rate is within the rates predicted in the PRB FEIS and within the WDEQ's permitted water discharge volume. 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 4). The PRB FEIS also predicted the resulting flow of each sub-watershed based on the different production scenarios. If the baseline flow for the Powder River is assumed to be the minimum mean flow (75.4 cfs), the addition of all CBNG water under Alternative 2B (the preferred alternative) would potentially raise that flow by 138 cfs. The BLM agrees 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, 138 cfs (7.5 for this project), is much less than the volume of runoff estimated from the 2-year storm event of 3,560 cfs for the drainage (PRBFEIS pg 3-42).

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ. The permit effluent limits were set at (WYPDES Permit #WY0054780 Part I page 2):

Parameter	Daily Maximum	Monthly Average
Chlorides	150 mg/l	
pH	6.5 to 9.0	
Total Barium	1800 µg/l	
Total Arsenic	7 µg/l	
TDS (March through October)	1330 mg/l	
TDS (November through February)	1665 mg/l	

Parameter	Daily Maximum	Monthly Average
Specific Conductance (March through October)	2500 mg/l	2000 mg/l
Specific Conductance (November through February)	2500 mg/l	2500 mg/l
Dissolved Sodium (March through October)	440 mg/l	270 mg/l
Dissolved Sodium (November through February)	610 mg/l	350 mg/l
Radium 226 + Total Radium 228	1 pCi/l	
Dissolved iron	299.7 µg/l	

The WYPDES permit also addresses existing downstream concerns, such as irrigation use. The operator is required to monitor flow and water quality at several locations upstream and downstream of the permitted outfalls. The designated points of compliance identified for this permit are identified in Part 1 on page 15.

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

In-channel downstream impacts are addressed in the WMP for the **Mitchell Draw Unit 2** POD prepared by Knapp Consulting Associates for Petro-Canada Resources (USA), Inc. on page 7.

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

4.4.2.1. Surface Water Cumulative Effects

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

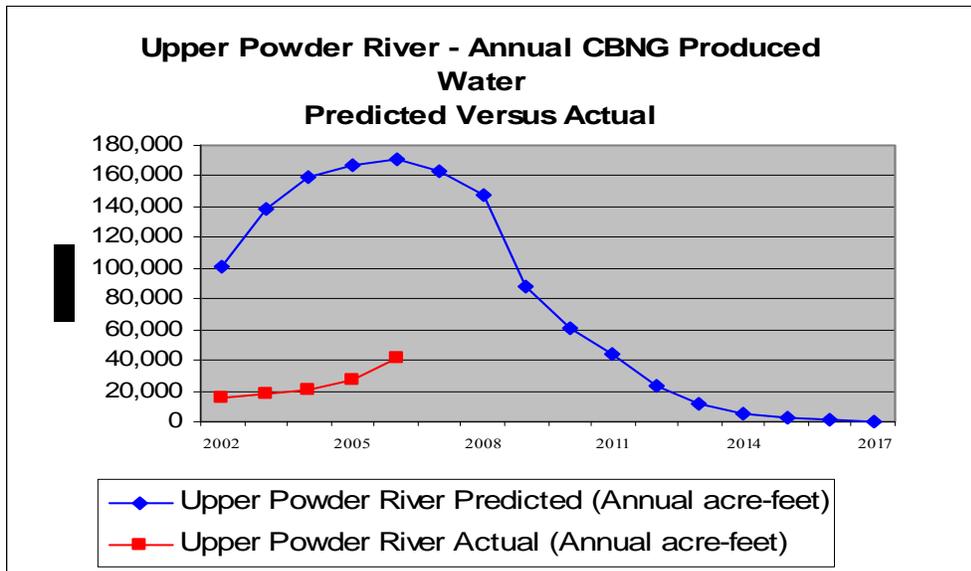
As of December 2006 all producing CBNG wells in the **Upper Powder River** watershed have discharged a cumulative volume of **45,412** acre-ft of water compared to the predicted **92,725** acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 49.0 % of the total predicted produced water analyzed in the PRB FEIS for the **Upper Powder River** watershed.

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

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

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
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		123,984			

Figure 4.3 Actual vs predicted water production in the Upper Powder River watershed



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

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states

continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

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

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

No additional mitigation measures are required.

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

4.5. Cultural Resources

The Bureau of Land Management has determined that no historic properties are within the area of potential effect. Site 48JO3284 is considered unevaluated to the NRHP, but it is outside of the area of potential effect. Sites 48JO3279 and 48JO3663 will be impacted by the project; however both are considered not eligible to the NRHP. No historic properties will be impacted by proposed construction. On 9/18/07, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO) following section VI(A)(1) of the Wyoming State Protocol of a finding of, no effect to historic properties, for the proposed project.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim WY SHPO	Wyoming SHPO	No
Grant Melvin	Contract Permitting Specialist	Petro-Canada Resources (USA), Inc.	Yes
Alan Vrooman	Permitting Director	Petro-Canada Resources (USA), Inc.	No
Loren Macilravie	Electrical Engineer	Petro-Canada Resources (USA), Inc.	Yes
Jan Kijarawa		Petro-Canada Resources (USA), Inc.	No
Eric Zwaagstra	Drilling Foreman	Petro-Canada Resources (USA), Inc.	Yes
David Gremel	Landman	Petro-Canada Resources (USA), Inc.	Yes
Rusty Rausch	Landman	Petro-Canada Resources (USA), Inc.	Yes
Greg Collins	Construction Foreman	Petro-Canada Resources (USA), Inc.	Yes
Ed Porter	Construction	Petro-Canada Resources (USA), Inc.	Yes
Roger Odekoven	Construction	Petro-Canada Resources (USA), Inc.	Yes
Aaron Grosch	Professional Surveyor	Grosch Construction Inc.	Yes
Carla Knapp	Hydrologist	Knapp Consulting Associates	Yes

Contact	Title	Organization	Present at Onsite
Frank Fisher	Landowner	Powder River Livestock	Yes
Kathleen Holcroft	Landowner	Holcroft and Company	Yes
Ken Burton	Landowner	S & B Holdings	Yes
Mr. Slagle	Landowner	S & B Holdings	Yes

6. OTHER PERMITS REQUIRED

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

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