FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
StormCat Enrgy Corp.
Ford Ranch ll
ENVIRONMENTAL ASSESSMENT –WY-070-08-066

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize StormCat Enrgy Corp.'s Ford Ranch II Coal Bed Natural Gas (CBNG) POD comprised of the following 23 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr	Sec	Twp	Rng	Lease #
1	FORD RANCH II FORD RANCH	13CW-30	SWSW	30	58N	75W	WYW133306
2	FORD RANCH II FEDERAL	09CW-32	NESE	32	58N	75W	WYW146822
3	FORD RANCH II FEDERAL	13CW-32	SWSW	32	58N	75W	WYW133306
4	FORD RANCH II FEDERAL	14CW-32	SESW	32	58N	75W	WYW146822
5	FORD RANCH II FEDERAL	15CW-32	SWSE	32	58N	75W	WYW146822
6	FORD RANCH II FORD RANCH	01CW-32	NENE	32	58N	75W	WYW146822
7	FORD RANCH II FORD RANCH	02CW-32	NWNE	32	58N	75W	WYW146822
8	FORD RANCH II FEDERAL	02CW-33	NWNE	33	58N	75W	WYW146822
9	FORD RANCH II FEDERAL	03CW-33	NENW	33	58N	75W	WYW146822
10	FORD RANCH II FEDERAL	09CW-33	NESE	33	58N	75W	WYW146822
11	FORD RANCH II FEDERAL	11CW-33	NESW	33	58N	75W	WYW146822
12	FORD RANCH II FEDERAL	15CW-33	SWSE	33	58N	75W	WYW146822
13	FORD RANCH II FORD RANCH	01CW-33	NENE	33	58N	75W	WYW146822
14	FORD RANCH II FORD RANCH	05CW-33	SWNW	33	58N	75W	WYW146822
15	FORD RANCH II FORD RANCH	13CW-33	SWSW	33	58N	75W	WYW146822
16	FORD RANCH II FEDERAL	05CW-34	SWNW	34	58N	75W	WYW146822
17	FORD RANCH II FEDERAL	07CW-34	SWNE	34	58N	75W	WYW146822
18	FORD RANCH II FEDERAL	09CW-34	NESE	34	58N	75W	WYW146822
19	FORD RANCH II FEDERAL	12CW-34	NWSW	34	58N	75W	WYW146822
20	FORD RANCH II FEDERAL	15CW-34	SWSE	34	58N	75W	WYW146822
21	FORD RANCH II FORD RANCH	01CW-34	NENE	34	58N	75W	WYW146822
22	FORD RANCH II FORD RANCH	03CW-34	NENW	34	58N	75W	WYW146822
23	FORD RANCH II FORD RANCH	11CW-34	NESW	34	58N	75W	WYW146822

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.

The following 5 wells were analyzed within Alternative C but are not being authorized at this time, as an access road consistent with management decisions of BFO RMP and PRB EIS was not identified and analyzed. If a potential access road is identified, then authorization of these wells will be revisited.

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	FORD RANCH II FEDERAL	13CW-19*	SWSW	19	58N	75W	WYW133306
2	FORD RANCH II FEDERAL	15CW-19	SWSE	19	58N	75W	WYW146820
3	FORD RANCH II FEDERAL	03CW-30	NENW	30	58N	75W	WYW133306

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
4	FORD RANCH II FEDERAL	05CW-30	SWNW	30	58N	75W	WYW133306
5	FORD RANCH II FEDERAL	11CW-30	NESW	30	58N	75W	WYW133306

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

1. The Operator, in their POD, has committed to:
    - Comply with all applicable Federal, State and Local laws and regulations.
    - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
    - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
    - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office April, 2001.

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

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

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

Field Manager: _____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
StormCat Enrgy Corp.
Ford Ranch ll
PLAN OF DEVELOPMENT
WY-070-08-066

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 3 federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: StormCat Energy Corp.'s, Ford Ranch II Plan of Development (POD) for 29 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 29 (one well was dropped) wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from 4 (Canyon, Wall, Cook, and Pawnee) coal seams. Proposed well house dimensions are 4 ft. wide x 4 ft. length x 4 ft. height. Well house color is Covert Green, selected to blend with the surrounding vegetation. Wells are located as follows:

	Well Name	Well #	Qtr	Sec	Twp	Rng	Lease #
1	FORD RANCH II FORD RANCH	13CW-30	SWSW	30	58N	75W	WYW133306
2	FORD RANCH II FEDERAL	09CW-32	NESE	32	58N	75W	WYW146822
3	FORD RANCH II FEDERAL	13CW-32	SWSW	32	58N	75W	WYW133306
4	FORD RANCH II FEDERAL	14CW-32	SESW	32	58N	75W	WYW146822
5	FORD RANCH II FEDERAL	15CW-32	SWSE	32	58N	75W	WYW146822
6	FORD RANCH II FORD RANCH	01CW-32	NENE	32	58N	75W	WYW146822
7	FORD RANCH II FEDERAL	04CW-32	NWNW	32	58N	75W	WYW133306
8	FORD RANCH II FORD RANCH	02CW-32	NWNE	32	58N	75W	WYW146822
9	FORD RANCH II FEDERAL	02CW-33	NWNE	33	58N	75W	WYW146822
10	FORD RANCH II FEDERAL	03CW-33	NENW	33	58N	75W	WYW146822
11	FORD RANCH II FEDERAL	09CW-33	NESE	33	58N	75W	WYW146822
12	FORD RANCH II FEDERAL	11CW-33	NESW	33	58N	75W	WYW146822
13	FORD RANCH II FEDERAL	15CW-33	SWSE	33	58N	75W	WYW146822
14	FORD RANCH II FORD RANCH	01CW-33	NENE	33	58N	75W	WYW146822
15	FORD RANCH II FORD RANCH	05CW-33	SWNW	33	58N	75W	WYW146822
16	FORD RANCH II FORD RANCH	13CW-33	SWSW	33	58N	75W	WYW146822
17	FORD RANCH II FEDERAL	05CW-34	SWNW	34	58N	75W	WYW146822
18	FORD RANCH II FEDERAL	07CW-34	SWNE	34	58N	75W	WYW146822
19	FORD RANCH II FEDERAL	09CW-34	NESE	34	58N	75W	WYW146822
20	FORD RANCH II FEDERAL	12CW-34	NWSW	34	58N	75W	WYW146822
21	FORD RANCH II FEDERAL	15CW-34	SWSE	34	58N	75W	WYW146822
22	FORD RANCH II FORD RANCH	01CW-34	NENE	34	58N	75W	WYW146822
23	FORD RANCH II FORD RANCH	03CW-34	NENW	34	58N	75W	WYW146822
24	FORD RANCH II FORD RANCH	11CW-34	NESW	34	58N	75W	WYW146822

County: Campbell

Applicant: StormCat Energy Corp.

Surface Owners: Ford Ranch and BLM

Project Description:
The proposed action involves the following:

- Drilling of 29 total federal CBM wells in the Canyon, Cook,Wall, and Pawnee coal zones to depths of approximately 382 feet to 825 feet. Multiple seams will be produced concurrently by co-mingling production (a single well per location cable of producing from multiple coal seams). The drilling is anticipated to start in the spring of 2008. This POD will be tied into the existing and proposed Ford Ranch Phase I POD.

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

- Well metering shall be accomplished by the following, telemetry/central metering facility/well visitation. Metering would entail approximately12 visits per month to each well/central metering

facility.

- A Water Management Plan (WMP) that involves use of the following infrastructure approved in the Ford Ranch POD Phase I (EA# WY-070-07-106): 7 discharge points and 7 full-containment stock water reservoirs, 13 stock tanks and 1subsurface drip irrigation (SDI) surge pond and approximate 300-acre irrigation plot, within the Middle Powder River watershed.

- An unimproved and improved road network.

- Temporary diesel generators shall be placed at 9 power drops in the Ford Ranch I (existing POD) and this proposed Ford Ranch II POD. A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 6 months. Fuel deliveries are anticipated to be one time per week. Noise level is expected to be 50 decibels at 150 yards distance. If sensitive areas (near homes, wildlife nesting areas, etc.) occur or are encountered, "Quiet Packs" will be used. Noise level is rated at 63 to 73 db at 23' away.

- A buried gas, water and power line network.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-

approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the Ford Ranch II POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. Moved wells 15-19, 1-32, 2-32, 11-33, 15-33 and 12-34 to reduce disturbance.
2. Dropped access corridor in Section 30, due to excessive disturbance and aesthetics.
3. Dropped well 4-32 due to excessive disturbance and in an un-approvable location.
4. Corrected well number on well 13-19. It was labeled 13-30.
5. Access to well 12-34 was moved to follow contour of hill.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

2.3.2.2. Surface Water

2. 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. Drainages will be crossed perpendicular to flow, where possible, and all drainage 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.
3. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

2.3.2.3. Soils

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

2.3.2.4. Vegetation

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

2.3.2.5. Wetland/Riparian

1. 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.

2.3.2.6. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.

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

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

2.3.2.7. Threatened, Endangered, or Sensitive Species

2.3.2.7.1. Bald Eagle

1. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.

2. 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).

3. 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.

4. Within 1 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).

5. 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.

2.3.2.7.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2. If any black-footed ferrets are located, the USFWS will be consulted. Absolutely no disturbance will be allowed within prairie dog colonies inhabited by black-footed ferrets.

3. Additional mitigation measure may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to black-footed ferrets or their habitat. In the event that a mountain plover is located during construction or operation, the USFWS' Wyoming Field Office (307-772-2374) and the USFWS' Law Enforcement Office (307-261-6365) will be notified within 24 hours.

2.3.2.7.3. Mountain Plover

1. A disturbance-free buffer zone of 0.25 mile will be established around all occupied mountain plover nesting habitat between March 15 and July 31.

2. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within 1/2 mile of occupied mountain plover nesting habitat.

3. Construction of ancillary facilities (for example, compressor stations, processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.

4. Where possible, roads will be located outside of plover nesting areas.

5. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.

6. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.

7. When above ground markers are used on capped and abandoned wells they will identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.

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

2.3.2.7.4. Ute Ladies'-tresses Orchid

1. Suitable habitat will be avoided wherever possible.

2. If suitable habitat for Ute ladies'-tresses cannot be avoided, surveys will be conducted in compliance with USFWS standards (USFWS 1995) by a BLM approved biologist or botanist. Surveys can only be conducted between July 20 and August 31.

3. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid

the establishment of noxious weeds.

4. Companies operating in areas identified with weed infestations or suitable Ute ladies'- tresses orchid habitat will be required to submit an integrated pest management plan prior to APD approval. Mitigation will be determined on a site-specific basis and may include such measures as spraying herbicides prior to entering areas and washing vehicles before leaving infested areas. Infestation areas of noxious weeds have been identified through the county Weed and Pest Districts and are available at the Buffalo BLM office.

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

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

General

1. Redistribute topsoil *immediately*, after dirt work is complete.

Surface Use

1. Wells 13-30, 2-32, 14-32, 2-33- maintain 20', undisturbed, vegetative buffer near drainage. Keep fill out of drainage.
2. Line pit at well 2-33.
3. Well 11-33- keep dirt on north side of access road.
4. Well slot 5-34, control runoff from slot pad.
5. For those proposed disturbance areas identified below, there are lands with limited reclamation potential that shall be stabilized in a manner which eliminates accelerated erosion until a self – perpetuating, non-native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.
    - Road & Pipeline corridor in Section 32 due to steep topography and close to a drainage.
6. River crossing in Section 31, which is covered by a CORP of Engineer Nation Wide Permit, will be maintained to provide safety and protect resource values.
7. 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

8. 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 BLM authorized officer.
9. 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 seed mix desired by the surface owner, use the following:

Loamy and Clayey Ecological Sites: Use for wells and infrastructure for the following locations: 13-19, 3-30, 5-30, 13-30, 1-32, 2-32, 9-32, 1-33, 3-33, 5-33 and 9-33.

Species - *Cultivar*	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass – *Critana* **OR** Western Wheatgrass – *Rosana*	25	3.0
Slender Wheatgrass- Pryor	10	1.4
Bluebunch Wheatgrass – *Secar or P-7*	15	2.1
Green needlegrass - *Lodorm*	25	3.0
American vetch, Rocky Mountain beeplant (Cleome serrulata) **OR** Cicer Milkvetch - *Lutana*	10	1.4
White – *Antelope* or Purple Prairie Clover - *Bismarck*	5	0.3
Lewis - *Appar*, Blue, or Scarlet flax	5	0.4
Winterfat – *Open Range* OR	2.5	0.4
Prairie coneflower (Ratibida columnifera) Fourwing saltbush - Wytana	2.5	0.4
Totals	**100%**	**12.4 lbs/acre**

Sandy Ecological Site: For corridors & wells for 15-32, 3-34 and 7-34

Species - *Cultivar*	% in Mix	Lbs PLS*
Thickspike Wheatgrass – *Critana* **OR** Western Wheatgrass - *Rosana*	20	1.2
Prairie sandreed – *Goshen*	30	1.2
Indian ricegrass – *Paloma or Rimrock*	20	1.2
Needleandthread	15	.90

American vetch **OR** Cicer Milkvetch - *Lutana*	10	.70
Lewis - *Appar*, Blue, or Scarlet flax	5	.20
Totals	**100%**	**5.4 lbs/acre**

Ponderosa Pine/Little Bluestem Ecological Site: Use this seed mix for all other wells and infrastructures.

Species	**% in Mix**	**Lbs PLS***
Needleandthread (Hesperostipa comata ssp. Comata) Or ***Indian ricegrass*** (Achnatherum hymenoides)	10	1.2
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	25	3.0
Sideoats grama (Bouteloua curtipendula)	20	2.4
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	30	3.6
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
American vetch(Vicia Americana)	5	0.6
Totals	**100%**	**12 lbs/acre**

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

Low Land Ecological Site (for corridor crossing the Powder River, connecting the POD): use a pasture mix desired by landowner.

Wildlife Protective Measures

1. The following conditions will minimize impacts to roosting and nesting bald eagles;
   a. No project related actions shall occur within one mile of bald eagle habitat (one mile radius of the Powder River) annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1 through August 15 (CM8) prior to a nesting survey. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
58/75	20	**All** proposed subsurface drip irrigation facilities within the **Entire section**.
58/75	30	**Well(s):** and 13CW-30 **ALL** proposed road/corridor installation and staging area(s) and

Township/Range	Section	Wells and Infrastructure
		stock tank(s) within the **Entire section.**
58/75	31	**ALL** proposed road/corridor installation and staging area(s) within the **East ½ of this section**
58/75	32	**Wells(s):** 02CW-32, 13CW-32, 14CW-32 and 15CW-32 **ALL** proposed road/corridor installation and staging area(s) and stock tank(s) within the SW, SWSE, NWSE, NWSESE, NWNE, NWNENE of this section.

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 (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 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.

2. Burrowing owl nest surveys will be completed annually by a biologist following BLM protocol April 15 to June 15 each year for the duration of surface disturbing activities within the three identified prairie dog towns. If a survey identifies an active burrowing owl nests, a 0.25 mile timing buffer will be implemented April 15 through August 31, annually, for surface disturbing activities. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year.

3. The following conditions will minimize impacts to raptors;
   a. No surface disturbing activities shall occur within ½ mile of all identified nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This affects the following;

Township/Range	Section	Wells and Infrastructure
58/75	20	**All** proposed subsurface drip irrigation facilities within the **Entire section**.
58/75	30	**Well(s):** 03CW-30, 11CW-30 and 13CW-30 **ALL** proposed road/corridor installation and staging area(s) and stock tank(s) within the **Entire section except the NENW, NWNW and SWNW.**
58/75	31	**ALL** proposed road/corridor installation within the: **NE, NNWSE, NNESE**
58/75	32	**Wells(s):** 13CW-32 **ALL** proposed road/corridor installation within the: SWSWSW

   b. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
   c. Nest productivity checks shall be completed for all raptor nests within the Ford Ranch II POD listed in table the table below. The occupancy checks shall be completed for the first five years following project completion. The occupancy checks shall be conducted

no earlier than June 1 or later than June 30 and any evidence of nesting success/production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year.

BLM ID	LEGAL LOCATION	UTM (NAD 83)	Species	2006 Activity	2007 Activity
3374	SENE sec. 6, T57N/R75W	428246E/4864633N	Buteo/ GHOW	Inactive	Inactive
4278	SWSE sec. 36, T58N/R75W	428421E/4983414N	RTHA	Active	Active
4280	NENE sec. 20, T58N/R75W	429030E/4983121N	UNK	Inactive	Inactive
4281	NWSW sec. 6, T58N/R75W	427804E/4982751N	UNK	Inactive	Inactive
4282	SENE sec.20, T57N/R75W	427246E/4978423N	RTHA	Active	Active, 2 chicks
4880	NWNW sec.21 T58N/R75W	429161E/4983188N	UNK	NA	Inactive
4881	SWNW sec.29, T58N/R75W	427585E/4981706N	RTHA	NA	Active, 3 chicks
4882	SESW sec.31, T58N/R75W	426423E/4979146N	UNK	NA	Active, 2 chicks
3373	SWSW sec. 33, T58N/R75W	428630E/4864039N	UNK	Inactive	Inactive
New	SWNE sec. 30, T58N/R75W	427021E/4981489N	PRFA	NA	Active, 2+ chicks
New	SESW sec. 30, T58N/R75W	426507E/4980543N	UNK	NA	Inactive
New	NWNE sec. 31, T58N/R75W	427011E/4980347N	RTHA	NA	Active, 2 chicks

4. The following conditions will minimize impacts to sage-grouse:
    a. Surveys for sage-grouse are required each year for the duration of the surface disturbing activities.
    b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season.

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

6. Sturgeon Chub

a. Surface occupancy of use within the river channel/riparian corridor of the Powder River located SW section 31, T58N/R75W will be restricted or prohibited in order to protect sturgeon chub habitat.

Cultural

Archeological Monitoring Stipulation:

1. All earth moving activity in the following areas will be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits (areas containing deep alluvial deposits).

    a. All earth moving activities associated with construction of the buried utility corridor and access road servicing the wells in T58N R75W Sections 30 and 31 that cross the Powder River and that are in the alluvial deposits in the river floodplain. (The Section 31 segment commences at the County Road heading west then crossing the Powder River and heading north to the proposed staging area in section 30. The Section 30 segment commences at the terminus of a utility corridor and water well on the west side of the middle agricultural field in the Ford Ranch Phase I POD and heads west, crossing the Powder River, ending at the same proposed staging area of the section 31 corridor.)

    b. All earth moving activities within alluvial deposits of the Powder River in T58R75 Sections 20, 29, 30, 31, and 32, and T57R75 section 6 that pertain to the SDI development. The determination of the exact monitoring areas is based on the discretion of the archeological monitor, although, all alluvial deposits within the floodplain must be monitored.

2. The archeologist shall notify the BLM, Buffalo Field Office of date they intend to inspect the aforementioned areas, no less than three days in advance. The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of work.

3. In the event previously unidentified archaeological materials are identified within the project area the standard stipulations apply for documentation of archaeological deposits.

Water Management

Eight existing springs within ½ mile of the proposed development in Ford Ranch and Ford Ranch II PODs have been inventoried. Initial flow rates were measured, and a water quality sample was collected, where possible, to be analyzed for the same list of constituents required by WDEQ's NPDES general permit application. The eight springs will be re-sampled every spring and fall to monitor any changes in the quantity or quality as a result of CBNG development.

2.4. Alternatives considered but not analyzed in detail

- **Injection-** Injection of CBNG water into an aquifer was considered. The benefit of injection is that it avoids the costs and time delays associated with applying for and maintaining WYPDES discharge permits. However, injection of CBNG water for this project was not chosen for several reasons: Lack of existing injection wells in the immediate facility; Lack of aquifers with low pressures; High risk associated with a well drilled explicitly for injecting CBNG water that soon plugs due to high formation pressures; High cost and surface disturbance associated with installing and maintaining an injection well, pipelines, and tank batteries and poor use of water

that could otherwise be beneficially used by livestock.

- **Artificial Wetlands-** The construction and use of artificial wetlands was considered. Artificial wetlands are inexpensive to construct and easy to maintain while providing efficient outlets and treatment for CBNG water. Artificial wetlands are also highly beneficial to wildlife and livestock. However, this alternative was deemed unfeasible due to the following reasons: Constructed wetlands do not effectively reduce phosphorus, dissolved solids, and sodium levels in CBNG water; Construction of artificial wetlands is highly reliant on landscape and soil conditions and evolving environmental regulations may impose unforeseen limitations and requirements on artificial wetlands.
- **Direct Discharge-** Direct discharge without containment was evaluated as a water management alternative and was considered a favorable alternative because of the flexible allowable discharge rate. Other benefits of direct discharge include cost effectiveness and potential use of CBNG water as livestock and wildlife water supplies. However, direct discharge was not selected for this project due to the following reasons: Direct discharge is not widely permitted in the Powder River Basin due to constraints imposed on SAR and specific conductance. Direct discharge of large volumes of produced water can transform an ephemeral drainage into a perennial system; potential increased in erosion, and subsequent deposition may lead to over-banking and changes in surface water quality may decrease soil permeability.
- **Water Treatment-**Several water treatment applications including Counter Current Ion Exchange, Reverse Osmosis, Capacitive Ion Removal, and Freeze-Thaw technologies were evaluated for this project. However, water treatment for subsequent direct discharge was not selected due to the following reasons: With current technologies available, costs were prohibitive for this project, and/or sufficient water treatment capacity could not be economically established with the particular technology; Treatment methods which produce a waste stream require disposal of the waste stream in a commercial injection well or further treatment by evaporation on site. These additional costs and/or disturbance detracted from their viability for this project.

2.5. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposal (Alternative C) are presented in Table 2.5.

Table 2.5 Summary of the Alternatives

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Total CBNG Wells			
Total Locations	0	29	28
Non-constructed Pads		21	19
Slotted Pads		8	8
Constructed Pads		1	1
Conventional Wells	0	0	0
Gather/Metering Facilities	0	0	0

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Compressors	0	0	0
Monitor Wells	0	0	0
Impoundments Off-channel Water Discharge Points	 2 2	0	0
Treatment Facilities	0	0	0
Improved Roads No Corridor With Corridor	2.92 0.42 2.5	2.4 0.27 2.13	6.33
2-Track Roads No Corridor With Corridor	3.1 3.1	4.78 0.28 4.4	5.1 0.06 4.5
Buried Utilities No Corridor With Corridor	1.1	0.9 0 0.9	 0.03 0
Overhead Powerlines	0	0.5	0
Communication Sites	0	0	1
Staging/Storage Areas	1	4	4
Stock Tanks	0	4	7
Power Generators	0	0	9
Power Drop/Distribution feeders	5	0	0
Acres of Disturbance	43.8	53.9	91.7

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on April 4, 2007. Field inspections of the proposed Ford Ranch II CBNG project were conducted on 7/31/2007, 8/1/2007 and 12/3/2007 by Dale and Jean Bulkley-Landowner reps., Mike Jaeger, Boa Bergstrom, Don Camino, James Hanson, John Steir, Ace Arrmann-Company reps., Dan Sellers, Jim Verplanke and Leigh Grench-BLM reps. .

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			Jim Verplancke
Floodplains	X			Dan Sellers, Mike McKinley
Wilderness Values			X	Dan Sellers
ACECs			X	Dan Sellers
Water Resources	X			Mike McKinley
Air Quality		X		Dan Sellers
Cultural or Historical Values		X		Leigh Grench
Prime or Unique Farmlands		X		Dan Sellers
Wild & Scenic Rivers			X	Dan Sellers
Wetland/Riparian	X			Mike McKinley
Native American Religious Concerns			X	Leigh Grench
Hazardous Wastes or Solids			X	Dan Sellers
Invasive, Nonnative Species	X			Dan Sellers
Environmental Justice		X		Dan Sellers

3.1. Topographic Characteristics of Project Area

The project area is divided by the Powder River and lies at the Montana-Wyoming State Line. Elevations range from approximately 3,400 to 4,000 feet above sea level. The Powder River is the main drainage in the area. Other major drainages in the area include Bitter Creek, Williams Creek, Short Creek and Bear Gulch. Topography is generally rough, but ranges from the flat, open Powder River valley to steep, rugged draws and exposed scoria hilltops. A series of extensive, wide plateaus in the central region of the project are prevailing among the rugged hills and draws. The climate is semi-arid, and averaging about 14 to 19 inches of precipitation annually, about 74% occurs between April and September. The portion of the POD that lies on the west side of the Powder River and on top of the bluff in sections 30 and 19 had a "hot fire" burn over that area in 2002 or 2003, leaving mostly a grassland with scattered pine and juniper trees. Major land uses in the area include hay production, livestock grazing, hunting and conventional oil and CBNG development.

3.2. Vegetation & Soils

The project area vegetations includes: cheatgrass, needle & thread, prairie junegrass, Indian ricegrass, bluebunch wheatgrass, green needlegrass, mustard species, little bluestem, crested wheatgrass, western wheatgrass, blue grama, threadleaf sedge, Wyoming big sagebrush, silver sagebrush, Great Plains yucca, chokecherry, gooseberry, skunkbush sumac, cottonwoods, boxelder, willow spp., ponderosa pine and juniper trees. Differences in dominant species within the project area vary with soil type, aspect and topography.

The soils vary from clay and gravelly to primarily sandy and silty clay loams throughout the project area. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 1 to 2 inches on ridges to 12 inches plus in the bottomland. Erosion potential varies from high to low depending on the soil type, vegetative cover, and slope. Reclamation potential of soils also varies throughout the project area. Successful reclamation is expected with time, adequate moisture and the implementation of reclamation standards and policies included in the POD and required by BLM.

Ecological Site descriptions are nationally recognized site specific classifications developed by the National Resource Conservation Service (NRCS) which are supported and used by the BLM and other Federal and state management agencies. The Ecological Site description uses soils and vegetation

information which is used for resource identification and management recommendations. To determine the appropriate ecological sites for this proposed action, BLM specialists incorporated data from onsite field reconnaissance and soil survey information. The main Ecological Sites are Loamy, Sandy, Lowland and Ponderosa/Little Bluestem. For more detailed soils information, see NRCS Soil Survey WY705.

ECOLOGICAL SITE:
Loamy/Clayey Site: The plant community consists of Mixed Sagebrush/Grass. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush management. Big sagebrush is a significant component of this plant community. A mix of warm and cool-season grasses make up the majority of the understory with the balance made up of annual cool-season grasses, and miscellaneous forbs.

Dominant grasses include needleandthread, western wheatgrass, little bluestem and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear can also occur.

When compared to the Historic Climax Plant Community (HCPC), sagebrush and blue grama have increased. Production of cool-season grasses, particularly green needlegrass, has been reduced.

Ponderosa Pine/Little Bluestem: This site occurs on moderately steep and steep slopes on upland ridges, escarpments and badlands. The soils of this site are shallow (less than 20”to bedrock) well-drained soils formed in moderately fine to moderately coarse loamy alluvium over residuum or residuum. Bedrock consists of interbeded shale, scoria, and sandstone. These soils have moderate permeability and may occur on all slopes. The main soil limitations include the depth to bedrock and low organic matter content.

The present plant community is a Ponderosa pine/Little Bluestem. The potential native understory vegetation is composed of perennial grasses approximately 80%, perennial forbs approximately 15%. Shrubs are 5%.

Dominant grasses identified include: wheat grasses, blue gramma, prairie sandreed, smooth brome, cheatgrass, sedges, needlegrass, fringed sagewort, prairie junegrass, little bluestem, sideoats gramma. Forbs identified include: scarlet globemallow, yarrow, winterfat. Other vegetative species identified at onsite: juniper and yucca.

Mixed Sagebrush/Grass Plant Community
Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush control. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, little bluestem, sideoats grama, and blue grama. Grasses of secondary importance include little bluestem, prairie junegrass, and Sandberg bluegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Big sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur.

When compared to the HCPC, big sagebrush and blue grama have increased. Bluebunch wheatgrass has

decreased, often occurring only where protected from grazing by the 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.

The state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward blue grama, sagebrush, and/or cheatgrass. The watershed is usually functioning. However, it can become at risk when canopy cover of sagebrush, blue grama sod, and/or bare ground increases.

Sandy Site:
This site occurs on nearly level to 50% slopes. Landform: Alluvial fans, hillsides, plateau, ridges & stream terraces.

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

The main soil limitations include: low water holding capacity and high wind erosion potential.
For more detailed soil information, see the NRCS Soil Survey WY633.

Needleandthread/ Threadleaf sedge/Fringed sage Plant Community
This plant community is the result of moderate season long grazing. The understory of grass includes needleandthread, threadleaf sedge, and prairie junegrass. Fringed sagewort has increased. When compared to the Historic Climax Plant Community, prairie sandreed, and Indian ricegrass have decreased. Threadleaf sedge, needleandthread, and fringed sagewort have increased. This community is well suited to grazing by both domestic livestock and wildlife, during the spring, summer and fall.

The community's soil, biotic integrity and watershed are intact. Although more than normal runoff may occur due to the sod forming vegetation.

Lowland Site:
This site is located on nearly level land adjacent to streams that run water at least during the major part of the growing season. Landform: alluvial fans, drainage ways & stream terraces.

The soils of this site are deep and very deep well drained soils formed in mixed alluvium. These soils have moderate permeability. The surface soil will be highly variable and vary from 2 to 8 inches in thickness. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The surface soil will be one or more of the following textures: very fine sandy loam, fine sandy loam, sandy loam, loam, silt loam, clay loam, clay, or silty clay. A fluctuating water table occurs in these areas and ranges from 1 to 5 feet but is usually deeper than 3 feet. For more detailed soil information, see the NRCS Soil Survey WY633.

Mature Cottonwoods/Cheatgrass Plant Community
This plant community is the result of long-term grazing or disturbed for hay pasture use. This site is dominated by crested wheatgrass, cheatgrass. Mature cottonwoods make up the overstory. It may be invaded by noxious weeds such as Canada thistle, leafy spurge and American licorice
When compared to the Historic Climax Plant Community rhizomatous wheatgrasses and green

needlegrass have decreased. Cottonwoods have not reproduced.
The soil of this site is protected. The watershed is functioning but may produce excessive runoff. The biotic integrity is threatened by invasive species.

3.2.1. Wetlands/Riparian

Riparian areas have developed along the Middle Powder River, but not as a result of treated or non-treated CBNG-produced water being direct-discharged to tributaries or the main stem, i.e. full-containment reservoirs. The channels within the project area are well vegetated grassy swales of dry land species, generally without defined bed and bank and therefore are not indicative of a riparian environment. There is an existing river crossing in Section 31, which is covered by a USACE's Nation Wide Permit, and will be maintained to provide safety and protect resource values.

3.2.2. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info), field investigation and consultation with Campbell County Weed and Pest:

- Leafy Spurge
- Canada Thistle
- Saltcedar
- Diffuse Knapweed
- Rusian Knapweed
- Spotted Knapweed
- Black Henbane
- Field Bindweed
- Buffalobur
- Wild Licorice
- Cocklebur

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

3.2.3. Wildlife

A habitat assessment and wildlife inventory surveys were performed by Jones & Stokes. Jones & Stokes performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, prairie dog colonies, and Ute ladies'-tresses orchid according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in 2006. Wildlife surveys with the project area have been conducted for the 2007-2008 survey season for bald eagles, raptors, sage-grouse, sharp-tailed grouse, and mountain plovers by Jones & Stokes. PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM Biologist conducted a field visits on July 31 and August 1 of 2007. During this time, he 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 FEIS and Proposed Plan Amendment for the PRB 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.

3.2.3.1. Big Game

Big game species expected to be within the project area include pronghorn antelope, mule deer and elk. The WGFD is not managing for an elk population in this area. Populations of pronghorn antelope and mule deer within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD. The WGFD has determined the project area to be, Spring, Summer and Fall ranges for pronghorn antelope and Winter Yearlong range for mule deer.

Spring, Summer and Fall use is when a population or portion of a population of animals uses the documented habitats within this range annually from the end of the previous winter to the onset of persistent winter conditions. **Winter/Yearlong** use is when a population of animals makes general use of suitable habitat sites within a 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. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.2.3.2. Aquatics

The project area is located within Williams Creek, Bear Gulch, Bitter Creek and other unnamed tributaries of the Powder River. Williams Creek, Bear Gulch, Bitter Creek and its affected tributaries are all ephemeral drainages, which flow mostly in response to precipitation and snowmelt. There are four natural springs, Short Creek Spring (P157054W), Little Spring (P157050W) Iron Spring (P157049W) and Delos Spring (P157158W) that exist within a half mile circle of influence of the project. A total of eight natural springs have been identified with the two projects Ford Ranch I & II. Refer the WMP for locations of the natural springs.

The Powder River is one of the last free-flowing prairie streams left in the United States, with existing flows, turbidity, and water quality within historic ranges. The Powder River supports an intact native fish community including several rare or declining species. These species have evolved life history strategies that allow them to survive in extreme conditions (Hubert 1993). Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carpsucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, white sucker and others. Six of these are designated by the 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.

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

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

Sturgeon chub habitat has been identified in the Powder River segment located SW section 31, T58N, R75W within the project area. Sturgeon chub are found in turbid water with moderate to strong current over bottoms ranging from rocks and gravel to coarse sand. In the Powder River, sturgeon chub were taken most frequently at sites with depths less than 51 centimeters and depth velocities of less than 90 centimeters per second at 0.6 depth (Holton, G. D. 2003).

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. These may include four turtle species, nine lizard species, and fourteen snake species known to occur throughout the state of Wyoming.

3.2.3.3. 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. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.2.3.3.1. Raptors

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper's hawk, northern goshawk , long-eared owl and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities (PRB FEIS 3-145-148).

The BLM database and Jones & Stokes identified 9 raptor nests within 0.5 mile of the Ford Ranch II project area in 2006. Surveys conducted in 2007 by Jones & Stokes identified 3 additional nests along the Powder River. Table 3.2 lists the species and activity status of these nests in 2006-2007.

Table 3.2. Documented raptor nests within 0.5 mile of the Ford Ranch II project area in 2007.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	2006 NEST STATUS	2007 NEST STATUS
3374	Buteo/ Great-horned owl	428246E/4864633N	SENE sec. 6, T57N/R75W	Box elder, live	Good	Inactive	Inactive
4278	Red-tailed hawk	428421E/4983414N	SWSE sec. 36, T58N/R75W	Cottonwood, live	Good	Active	Active
4280	Unkown	429030E/4983121N	NENE sec. 20, T58N/R75W	Ponderosa pine, live	Poor	Inactive	Inactive
4281	Unknown	427804E/4982751N	NWSW sec. 6, T58N/R75W	Willow, live	Poor	Inactive	Inactive
4282	Red-tailed hawk	427246E/4978423N	SENE sec.20, T57N/R75W	Cottonwood, live	Good	Active	Active, 2 chicks
4880	Unknown	429161E/4983188N	NWNW sec.21 T58N/R75W	Ponderosa pine, live	Fair	NA	Inactive
4881	Red-tailed hawk	427585E/4981706N	SWNW sec.29, T58N/R75W	Cottonwood, live	Good	NA	Active, 3 chicks
4882	Red-tailed hawk	426423E/4979146N	SESW sec.31, T58N/R75W	Cottonwood, live	Good	NA	Active, 2 chicks
3373	Unknown	428630E/4864039N	SWSW sec. 33, T58N/R75W	Ponderosa pine, live	Poor	Inactive	Inactive

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	2006 NEST STATUS	2007 NEST STATUS
New	Prairie falcon	427021E/4981489N	SWNE sec. 30, T58N/R75W	Cliff, hillside	Good	NA	Active, 2+ chicks
New	Unknown	426507E/4980543N	SESW sec. 30, T58N/R75W	Ponderosa pine, live	Fair	NA	Inactive
New	Red-tailed hawk	427011E/4980347N	NWNE sec. 31, T58N/R75W	Cottonwood, live	Good	NA	Active, 2 chicks

3.2.3.4. Threatened and Endangered and Sensitive Species

3.2.3.4.1. Threatened and Endangered Species

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

3.2.3.4.2. Black-footed ferret

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

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

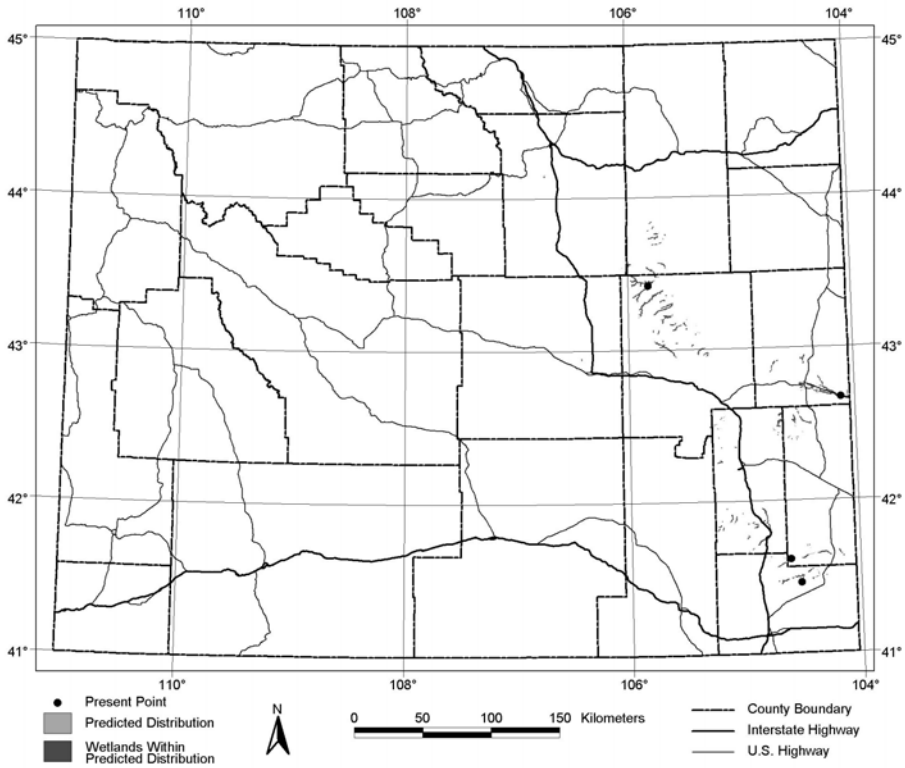
The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn Mountains (Grenier 2003). The USFWS has also concluded that black-tailed prairie dog colonies within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

Three active prairie dog colonies were identified within the project area during site visits by Jones & Stokes. The colonies total approximately 300 acres. See section 3.2.3.5.4, table 3.3 below for locations. The project area is located approximately 17 miles from the Recluse complex, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the Ford Ranch II project area.

3.2.3.4.3. 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. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties.

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



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

The project area is located within Williams Creek, Bear Gulch, Bitter Creek and other unnamed tributaries of the Powder River. Williams Creek, Bear Gulch, Bitter Creek and its affected tributaries are all ephemeral drainages which flow mostly in response to precipitation and snowmelt.

Although four natural springs exist within the Ford Ranch II project area, the drainages associated with each provide unsuitable habitat for the Ute ladies'-tresses orchid. The drainages below these springs were dry during the spring of 2006 and 2007. Vegetation within the drainages consisted of dense upland sagebrush-grassland habitats or juniper and ponderosa overstory. Suitable habitat does exist in NWNE Section 31, T.58N, R.76W, along an existing crossing of the Powder River but no Ute ladies'-tresses orchids were documented at of near the crossing, and no known seed source exists within the vicinity (Jones & Stokes 2007). .

Despite the presence of suitable habitat, no Ute ladies'-tresses orchids were documented at or near the crossing, and no known seed source for the Ute ladies'-tresses orchid exists within the vicinity. At the crossing, both sides of the river has a moist meadow zone approximately 5-6 feet wide, which hosts sedges, rushes, foxtail barley, and prairie cordgrass. On both sides of the river, there are also abrupt slope and transition to upland vegetation. Dominant upland species at the crossing include wheatgrasses, sweet

clover and leafy spurge. Patches of cottonwood and willow saplings were also evident in the general area, and tall dense cottonwoods are present along portions of the river floodplain (Jones & Stokes 2007).

The Powder River floodplain in sections 30 and31 is primarily flat and open, with gradual banks of 1 to 4 feet in most places. Soil samples collected at the survey locations were primarily composed of fine silty loams, but sandbars of cobble substrate were also present along portions of the riverbed. A faint alkaline crust was observed along the exposed stretches of the soil and rocks at the high water mark (Jones & Stokes 2007).

Although habitats within the Ford Ranch II project area do have the potential to support the Ute ladies' tresses orchid, no orchids were observed during Jones & Stokes 2007 survey.

3.2.3.5. 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.

3.2.3.5.1. Prairie dog colony obligates

Prairie dog 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 Reading1989) 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*).

3.2.3.5.2. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs; in other words, species that require sagebrush for some part of their lifecycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, sage thrasher, loggerhead shrike, and sage sparrow. Sage sparrows, Brewer's sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrublands and short grasslands(Page and Ritter 1999). Other sagebrush obligate species include sagebrush vole, pronghorn antelope, and sagebrush lizard. Jones & Stokes observed one loggerhead shrike perched on a fence line in SENW Section 29. No other sensitive species mentioned above were observed by the consultant or BLM during field visits.

3.2.3.5.3. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald

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

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

The Ford Ranch project area is highly suitable for bald eagle roosting and nesting. Bald eagle habitat exists within large, dense stands of mature cottonwoods along the Powder River throughout Sections 20, 29, 30, 31, and 36. Stands of ponderosa pine and pine snags exist throughout the project area, with dense stands in Sections 21, 22, 33, and 34.

Prey species are readily available to bald eagles throughout the Ford Ranch project area in the form of fish, water fowl and small mammals such as prairie dogs, lagomorphs, etc.

Bald eagles have been observed within 1 mile of the project area. Surveys conducted in 2006 and 2007 did not identify bald eagle nests or roosts. However, bald eagle use has been documented within the project area. One bald eagle was observed perched in a cottonwood tree along the Powder River in Section 29 on December 3, 2007 within one mile of the Powder River (Jones & Stokes 2007). One adult bald eagle was observed in Section 6 in February of 2006 (Jones & Stokes 2006) and another in Section 31 on January 10, 2007 (Martini 2007). Additionally, BLM winter roost surveys conducted in February of 2005 documented one adult bald eagle within 0.30 and another 0.78 mile of the project area.

3.2.3.5.4. Black-tailed prairie dog

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

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

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

and/or control efforts (Grenier 2005).

Three active prairie dog colonies were identified within the project area. Table 5 below lists their location and size.

Table 3.3. Black-tailed Prairie Dog Colony Locations

Legal location	***Activity***	***Size (acres)***
Sec. 31; T58N/R75W	Active	98.5
Sec. 27 & 34; T58N/R75W	Partially-Active	42.4
Sec. 34; T58N/R75W	Active	85.2
Total		226.1

3.2.3.5.5. Burrowing owl

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

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

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

The Ford Ranch II project area has suitable burrowing owl nesting habitat however the WYGF survey data and the survey information provided by Jones & Stokes indicate that no burrowing owl nest locations have been identified within the project area or within 0.25 mile of the Ford Ranch II project area in 2007.

3.2.3.5.6. Grouse

3.2.3.5.6.1. Greater sage-grouse

Sage-grouse are 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. A judge in Idaho

ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). 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).

The Ford Ranch project area contains limited nesting and winter grounds for sage-grouse. Larger, denser stands of sagebrush within the project area could provide nesting and winter habitat. The upper draws and tributaries of the Powder River could provide adequate brood-rearing and late summer habitat. The nearest known lek, the 41-Remintgon lek, is located 8.0 miles northwest of the project area. Additionally, no sage-grouse, leks, or other sign were documented within the project area during surveys conducted in 2006 or 2007.

3.2.3.5.6.2. Sharp-tailed grouse

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

The Ford Ranch II project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter. There are no documented sharp-tailed lek sites within the project and surveys did not identify sharp-tailed grouse individuals.

3.2.3.5.7. Mountain plover

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

Suitable mountain plover habitat is marginal within the project area. The majority of the project area consisted of negative habitat images such as uneven and steep terrain and mixed grass scrublands containing vegetative structure greater than four inches. Positive plover nesting habitat features were found within the project area mainly in the form of the three active black-tailed prairie dog colonies ranging in size from 42.4 to 98.5 acres (see section 3.2.3.5.4, table 3.3). Within the two smaller colonies, bare ground was present but not abundant (<30%) with short vegetative height (<6 inches in height). The larger colony, along the Powder River in Section 31, was covered with tall (16-20 inches), dense vegetation. These colonies were surveyed for plover during optimum observation hours on April 30 and May 14, 2007. Breeding or nesting plovers were not observed in 2007 (Jones & Stokes 2007). The only potential breeding habitats encountered during the 2007 surveys were the two smaller prairie dog colonies and they are surrounded by rough terrain. The BLM-BFO mountain plover habitat suitability model and field observations correspond with the of the consultant's survey results.

Mountain plover habitat is present but marginal within the prairie dog colonies and small patches of grasslands along the Powder River. However, no mountain plovers were identified within 0.25 mile of the project area during surveys conducted in 2006 & 2007.

3.3. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007*	155	22	Unk	1

*Wyoming Department of Health Records September 12, 2007.

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

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

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNv mosquito vectors

were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNv, such as *Culex tarsalis*, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicide 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.

3.4. Water Resources

The project area is within the Middle Powder River drainage system. Williams Creek, Bear Gulch and Bitter Creek are ephemeral streams which flow mostly in response to precipitation events and snow melt. Generally, stream channels are well defined, grassy swales.

3.4.1. Groundwater

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

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

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

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

The BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout

the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

The on-going shallow groundwater impoundment monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two of these other sites also are showing an increasing TDS level as water infiltrates while two other sites are not.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 4 registered stock and domestic water wells within 1 mile of the POD boundary with depths of 100 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.4.2. Surface Water

The project area is within Williams Creek, Bear Gulch and Bitter Creek drainages, which are tributaries to the Middle Powder River. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Middle Powder River, the EC ranges from 1,421 at Maximum monthly flow to 2,154 at Low monthly flow and the SAR ranges from 3.92 at Maximum monthly flow to 4.62 at Low monthly flow. These values were determined at the USGS station located at Moorhead, Montana (PRB FEIS page 3-49).

In the Ford Ranch POD the operator has identified 5 permitted natural springs within this POD boundary which are included in the following table:

DATE	Permit #	Well Name	QtrQtr	SEC	TWN	RNG	Use	Owner	Sample	Flow
5/4/2006	P157049W	Iron Spring	NWNW	34	58	75	STO	Ford Ranch	Y	.83 gpm
7/5/2007	P157049W	Iron Spring	NWNW	34	58	75	STO	Ford Ranch	Y	.65 gpm
5/4/2006	P157050W	Little Spring	SENW	33	58	75	STO	Ford Ranch	Y	.55 gpm
7/5/2007	P157050W	Little Spring	SENW	33	58	75	STO	Ford Ranch	Y	.25 gpm
5/4/2006	P157052W	Rubber Tire Spring	SWNE	27	58	75	STO	Ford Ranch	Y	.025 gpm

DATE	Permit #	Well Name	QtrQtr	SEC	TWN	RNG	Use	Owner	Sample	Flow
8/8/2007	P157052W	Rubber Tire Spring	SWNE	27	58	75	STO	Ford Ranch	N	
7/20/2006	P157053W	Big Spring	SWNW	2	57	75	STO	Ford Ranch	Y	
N/A	P157055W	Corner Spring	SENE	2	57	75	STO			

In the Ford Ranch II POD the operator has identified 3 additional permitted natural springs within the POD boundary which are included in the following table:

DATE	Permit #	Well Name	QtrQtr	SEC	TWN	RNG	Use	Owner	Sample	Flow
7/9/2007	P157058W	Delos Spring	SESW	32	58	75	STO	Ford Ranch	Y	1 gpm
8/8/2007	P157058W	Delos Spring	SESW	32	58	75	STO	Ford Ranch	Y	
7/20/2006	P157051W	Williams Draw Spring	SWNW	3	57	75	STO	Ford Ranch	Y	.31 gpm
7/5/2007	P157051W	Williams Draw Spring	SWNW	3	57	75	STO	Ford Ranch	Y	.30 gpm
8/8/2007	P157054W	Short Creek Spring	NESE	25	58	76	STO	Ford Ranch	Y	.75 gpm

Additional spring information is included in Appendix 4F of the WMP. Eight existing springs within ½ mile of the proposed development have been inventoried. Initial flow rates were measured, and a water quality sample was collected, where possible, to be analyzed for the same list of constituents required by WDEQ's NPDES general permit application. The eight springs will be re-sampled every spring and fall to monitor any changes in the quantity or quality as a result of CBNG development.

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

3.5. Cultural Resources

Class III cultural resource inventories were conducted for the Ford Ranch II project prior to on-the-ground project work (BFO Inventory No. 70070117). Quality Services, Inc. conducted a block and linear Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project.

Leigh Grench, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located within the project area.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48CA5224	Historic Road	Not Eligible
48CA6307	Prehistoric Site	Eligible
48CA6312	Prehistoric Site	Not Eligible
48CA6371	Historic Structure	Not Eligible
48CA6563	Prehistoric Site	Not Eligible

Site Number	Site Type	National Register Eligibility
48CA6564	Prehistoric Site	Not Eligible
48CA6568	Prehistoric Site	Not eligible
48CA6767	Prehistoric Site	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 28 proposed well locations, 2 are on reclaimed conventional well pads, 18 can be drilled without a well pad being constructed, and 9 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 18 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 24 x 12 x 8 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 18 wells would involve approximately 0.2 acre/well for 3.6 total acres. The other 9 wells requiring cut & fill pad construction would disturb approximately 2.32 total acres. The total estimated disturbance for all 28 wells would be 5.92 acres.

Approximately 0.96 miles of improved roads would be constructed to provide access to various well locations. Approximately 5.1 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. No pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., water-bars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

A subsurface drip irrigation (SDI) system is being installed on a private hay field along the east side of the Powder River. The purpose of this system is to increase alfalfa and grass production, to benefit the ranches hay and cattle production. Water monitor wells, will be installed to ensure that water does not reach the Powder River. No impacts are anticipated to affect the Middle Powder River.

The SDI system will be monitored by the Bene Tara Company to ensure that no SDI water reaches the soil surface and that subsurface soil and vegetative health and productivity is maintained. For more information on this SDI system, please see the Ford Ranch POD Book.

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

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Non-constructed Pad Constructed Pad	19 9	0.2/acre Site Specific	6.1 2.32	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments On-channel Off-channel Water Discharge Points	0 0 0	 Site Specific Site Specific Site Specific or 0.01 ac/WDP	0.0 0.0 0.0 0.0	Long Term
Channel Disturbance Headcut Mitigation* Channel Modification	0	 Site Specific Site Specific	0 0.0 0.0	
Improved Roads With Corridor	0.96	50' Width or Site Specific	6.33	Long Term
2-Track Roads No Corridor With Corridor	5.1 0.06 4.5	 12' wide 40' Width	19.54	Long Term
Pipelines No Corridor With Corridor	0	20' Width or Site Specific	0	Short Term
Buried Power Cable No Corridor	0.03	20' Width	0.06	Short Term
Overhead Powerlines	0.0	15' Width	0	Long Term
Additional Disturbance: Staging Areas	 4	 200'x 200'	 3.67	 Long Term
Stock Tanks	7	20' x 20'	0.06	Long Term
Power Generator	9	20' x 40'	0.17	Short Term
SCADA Tower	1	4' x 4'	0.01	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. Wetland/Riparian

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

4.1.2. Invasive Species

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

1. Weed control would be done by a commercial applicator of chemical herbicides, following label and information and recommendations by Campbell County Weed and Pest Office.
2. Preventive practices include reclamation, inspection of project area for weeds, seed and mulch will be "weed free" and consultation with landowner about areas of infestation.
3. The operator will educate its employees and contractors concerning weeds and preventative measures.

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 at this time.

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

4.1.3. Cumulative Effects

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

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and

vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage, which is approximately 40.8% 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 Williams Creek, Bear Gulch and Bitter Creek drainages and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Middle Powder River Watershed.
- The WMP for the Ford Ranch II POD proposes that produced water will not contribute significantly to flows downstream due to full-containment reservoirs and subsurface drip irrigation.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Spring, Summer and Fall ranges for pronghorn antelope and Winter Yearlong range for mule deer and elk will be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Wyoming Game & Fish Dept. has set management objectives for the pronghorn antelope and mule deer population in the area but not for elk. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

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

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced CBNG water from the 28 proposed federal wells will be contained in 7 on-channel reservoirs, 1 playa and 1 off-channel reservoir/surge pond associated with a drip irrigation system on private surface (CBM Associates 2006). CBNG water is not expected to reach any of the drainages within the project area. Aquatic species should not be affected by implementation of the Ford Ranch II POD.

The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses. The Wyoming DEQ is the regulatory authority over Storm Water Prevention Plans (SWPP) to control erosion of surface disturbance at industrial sites.

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).

The most significant immediate threat to native aquatic species in grassland watersheds is energy development, particularly coalbed natural gas (CBNG) activities. The potential exists (and has already begun) for CBNG activities to significantly alter the flow regime and natural water quality in impacted watersheds. For example, the Powder River Basin is one of the last free-flowing prairie stream ecosystems left in the United States, and it still supports an intact native aquatic community. Fish species of greatest conservation need inhabiting the Powder include sauger (*Sander canadensis*), shovelnose sturgeon, goldeye, plains minnow (*Hybognathus placitus*), flathead chub (*Platygobio gracilis*), sturgeon chub and western silvery minnow (*Hybognathus argyritis*) (WYGF 2008).

Throughout the Missouri River drainage in Kansas, Nebraska, North and South Dakota, Montana and Wyoming the sturgeon chub is considered imperiled because of extreme rarity making it vulnerable to extinction. In Wyoming it is of special concern because its presence is extremely isolated and habitats are declining or vulnerable. Dewatering and habitat degradation are the most serious threats to the sturgeon chub (Weitzel, D. L., 2002).

Sturgeon chub habitat has been identified in the Powder River segment located SW section 31, T58N, R75W within the project area. This type of ripple habitat with shallow depths and solid gravel bottom is attractive as a river crossing. Although no surface disturbance is proposed for this location, a stipulation of the lease applies as a condition of approval to restrict or prohibit the surface use/occupancy of the Powder River along this segment in order to protect the sturgeon chub habitat that exists there.

4.2.2.1. Change in Water Quality

Fish and amphibian species have evolved and adapted to existing conditions. Construction of

impoundments to store discharge water in ephemeral drainages and related surface disturbance and potential erosion may have detrimental impacts on the native aquatic fauna as these factor can affect water quality downstream during precipitation events. Major information gaps for these species include feeding habits, reproduction, specific habitat preference (pools, riffles, runs, backwaters, side channels, or a combination), and seasonal habitat use, therefore, it is difficult to fully understand how changes in water quality may affect native aquatic fauna.

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 establish 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.

4.2.2.2. Aquatics 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 4-247. 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 con-specifics (BLM 2003).

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

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

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).

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

4.2.3.1. Migratory Birds Cumulative effects

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

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. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation.

The presence of overhead power lines may impact raptors. 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 power lines (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. 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 Ford Ranch II project area (Timing limitations will apply to this infrastructure).

BLM ID#	INFRASTRUCTURE	DISTANCE
3373	09CW-32 58-75	0.20
	13CW-33 58-75	0.10
	15CW-32 58-75	0.44
3374	13CW-32 58-75	0.45
4278	Subsurface Drip Irrigation facility	0.06
4280	Subsurface Drip Irrigation facility	0.27
4281	Subsurface Drip Irrigation facility	0.10
4282	13CW-32 58-75	0.45
4880	Subsurface Drip Irrigation facility	0.37
4882	13CW-30 58-75 access road	0.42
New	03CW-30 58-75	0.46
New	11CW-30 58-75	0.42
	05CW-30 58-75 access road	0.42

BLM ID#	INFRASTRUCTURE	DISTANCE
	13CW-30 58-75	0.34
New	13CW-30 58-75 access/corridor	0.20

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. Although the 09CW-32 and 13CW-33 well locations are proposed within the 0.25 miles of nest BLM ID#3373, surveys of the nest have shown the nest to be inactive 2003 to present.

4.2.4.1. Raptors Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment and a summary is provided in Table 4.3. 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

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Three prairie dog colonies present, less than 1000 acres.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NS	NLAA	Historically perennial water present, habitat not suitable.

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

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

4.2.5.3. Black-footed ferret Direct and Indirect Effects

Three prairie dog colonies are present within the Ford Ranch project area. However, due to the lack of sufficient suitable habitat within the project area, implementation of the proposed development will have "***no effect***" on the black-footed ferrets.

4.2.5.4. Ute's Ladies Tresses Orchid Direct and Indirect Effects

The Ute ladies'-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbances (flooding, grazing, mowing), may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007).

Suitable orchid habitat is present within the Ford Ranch II project area. Reservoir seepage and direct discharge may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Suitable habitat does exist, NWNE Section 31, T.58N, R.76W, along an existing crossing of the Powder River. Implementation of the proposed project may affect, but not likely to adversely affect individuals or habitat on the Ute ladies'-tresses orchid as suitable habitat has been identified but a seed source has not observed. Since Ute ladies'-tresses orchid can only be reliably found and identified when it is flowering (typically from mid-July through mid September) and that orchids do not bloom every year, the recommendation is to require annual surveys within the Ford Ranch II project area.

4.2.5.5. Sensitive Species Direct and Indirect Effects

4.2.5.5.1. Prairie dog colony obligates

Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem.

4.2.5.5.2. Sagebrush obligates

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

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as a remnant surrounded by unusable environment (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988) because of lower reproduction and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of shrub-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995).

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

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

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

4.2.5.5.1. Bald Eagles

According to surveys conducted in 2006 and 2007 by Jones and Stokes suitable habitat exists for bald eagle nesting and bald eagle winter roosts within the Ford Ranch II project area.

The proposed project may affect bald eagle nesting or winter roosting.

There are approximately 2.1 miles of existing and an additional 2.5 miles of overhead three-phase distribution lines planned for construction within the project area. The wire spacing is required to be in compliance with the Avian Power Line Interaction Committee's (2006) suggested practices and with the Service's standards (USFWS 2002); however other existing features may not be in compliance. Storm Cat is proposing to bury high-voltage distribution lines crossing the Powder River.

To reduce the risk of decreased productivity or nest failure, BLM BFO requires a 0.5 mile no disturbance radius and a one mile radius timing limitation of all activity during the breeding season around active bald eagle nests. To reduce the risk of disruption to the winter roosting activities of bald eagles, the BLM BFO requires a 0.5 mile no surface occupancy radius and a one mile radius timing limitation of all winter roosts (either communal or consistent use). To allow time for bald eagle nesting and roosting activity to occur, the BLM BFO requires a timing limitation within 1 mile of suitable habitat.

The proposed project is likely to affect bald eagles due to the presence of proposed and existing overhead power lines. Storm Cat Energy plans to construct 2.5 miles of three phase overhead power lines within the project boundaries to be designed and installed by PRE CORP in order to connect to existing three phase lines. This portion of the project was initially analyzed under the Ford Ranch I POD but has not yet been constructed.

The presence of overhead power lines may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with power lines (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.

Produced water will flow into nine impoundments, which may attract eagles if a reliable prey base is present. The effect of reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.5.2. Black-tailed prairie dog

Three prairie dog colonies have been identified within the project area. Disturbance is proposed within colonies located in Sections 27, 31 and 34 of T58N, R75W. Utilities will corridor existing roads that will be improved through the colonies located in Sections 31 and 34. An overhead power line is proposed through the colony located within Sections 27 and 34. The southern portion of the colony located entirely within Section 34 was identified as having low to non-existent prairie dog activity and abandoned, grown-over mounds were identified. Prairie dogs may be displaced during construction of the improved road and utilities. Mortalities may also occur due to vehicular collisions.

During construction of these facilities, there is the possibility that prairie dogs within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and will cause an increase in prairie dog mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover.

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

Unlike roads and pipelines, the construction and operation of reservoirs will permanently remove habitat. By the time the reservoirs are no longer needed, the reservoirs may become hard-pan, soil that has hardened due to mineral deposits and evaporation. Prairie dogs may be unable to burrow in this type of soil compaction. The presence of a reservoir will limit colony expansion. Well houses and power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog road mortalities.

4.2.5.5.3. Burrowing owl

Although suitable habitat exists within the project area, no burrowing owls were observed by Jones & Stokes or BLM during field visits. There are documented nests in the BLM database.

4.2.5.5.4. Grouse

4.2.5.5.4.1. Greater sage-grouse

Project activities will result in the direct loss of approximately 215.6 acres of potential year-round sage-grouse habitat. The proposal would also create extensive habitat fragmentation due to the introduction of new linear features (roads, pipelines, and overhead power lines). Sage-grouse avoidance of these facilities produces even greater indirect habitat loss. Sage-grouse use of previously suitable habitat may decline. 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).

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).

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

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

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

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

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

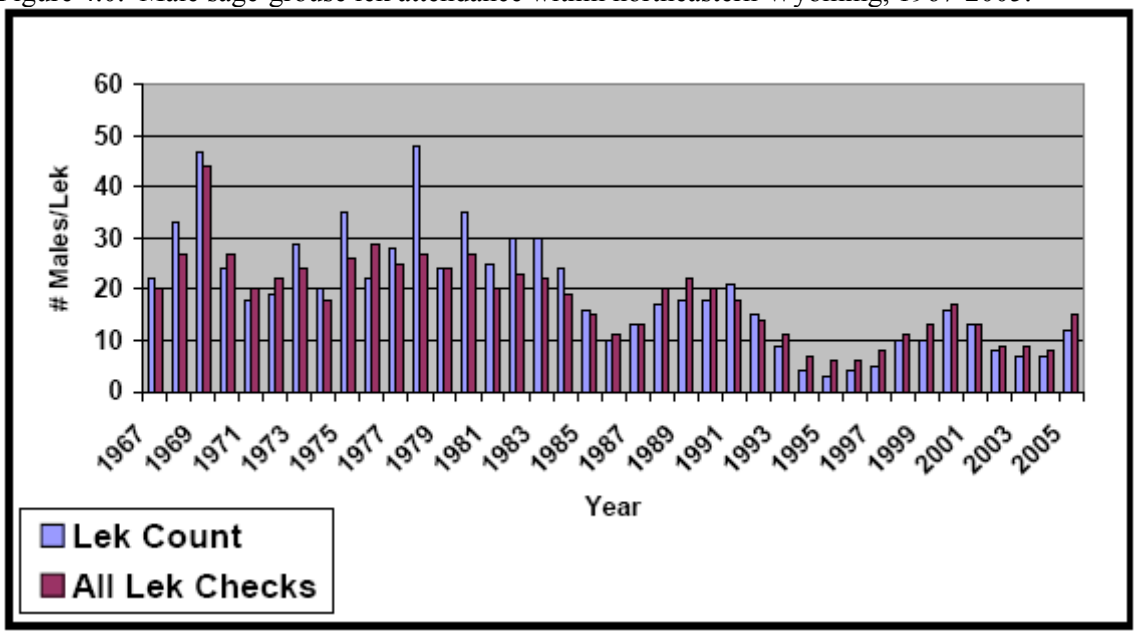
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently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

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Hollaran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres; meanwhile Powder River Basin sagebrush coverage was estimated to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding WAFWA revised their sage grouse management guidelines (Connelly et. al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where

habitats are not distributed uniformly such as the Powder River Basin.

The sage grouse population within northeast Wyoming is exhibiting a steady long term downward trend (Figure 4.0) (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 4.0. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



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

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

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

population while surrounding areas exhibited decreasing populations (Danvir 2002).

4.2.5.5.4.2. Sharp-tailed grouse

Effects will be similar to effects to sage-grouse.

4.2.5.5.5. Mountain plover

Suitable mountain plover habitat is present within the three prairie dog colonies identified. Surveys conducted within the project area in 2006 and 2007 have not identified mountain plovers.

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

Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. Overhead power lines provide perch sites for raptors that could result in increased mountain plover predation. CBNG infrastructure such as well houses, roads, pipeline corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

Mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat when loss or alteration of their natural breeding habitat (predominately prairie dog colonies) occurs, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there, lay eggs and hatch chicks; however, the young may not reach fledging age due to the poor quality of the habitat. Recent analysis of the USWFS Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf 1995). 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).

4.2.5.6. Sensitive Species Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Middle 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.

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

The maximum water production is predicted to be 14.0 gpm per well or 392.0 gpm (0.87 cfs or 632 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 Middle Powder River drainage, the projected volume produced within the watershed area was 12,044 acre-feet in 2006 (maximum production is estimated in 2005 at 12,328 acre-feet). As such, the volume of water resulting from the production of these wells is 5.2% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 37% to groundwater aquifers and coal zones in the Middle Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 145gpm will infiltrate at or near the discharge points and impoundments (234 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 4 permitted water wells produce from depths of 100 feet compared to depths ranging from 447 to 927 feet to the Cook, Canyon, Wall, and Pawnee. 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).

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

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

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

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

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

4.4.1.1. Groundwater Cumulative Effects:

As stated in the PRB FEIS, "The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the

discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation." (PRB FEIS page 4-64).

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

4.4.2. Surface Water

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

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Moorhead, MT Gauging station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 3.92 4.62	 1,421 2,154
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
Predicted Produced Water Quality Co-mingled Coal Zones from Canyon, Cook, Wall, and Pawnee	 1,220	 35.7	 1,980

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1220.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). Direct land application is not included in this proposal, however subsurface drip irrigation is.

The quality for the water produced from the Cook, Canyon,Wall, and Panwee target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 14.0 gallons per minute (gpm) is projected is to be produced from these 28 wells, for a total of 392.0 gpm for the POD. See Table 4.5.

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

There are no additional discharge points proposed for this project. They previously approved locations have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities/locations, were evaluated for compliance with best management

practices during the onsite.

To manage the produced water no additional impoundments will be constructed within the project area. All existing water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.13 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2005 at a total contribution to the mainstem of the Middle Powder River of 86 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 28 wells is anticipated to be a total of 392.0 gpm or 0.87 cfs to impoundments and SDI. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in Williams Creek, Bear Gulch and Bitter Creek from this action (0.13 cfs) may add a maximum 0.1 cfs to the Middle Powder River flows, or 0.12% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Middle Powder River Watershed (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

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

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit (WY00549924) for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES, Appendix G):

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Total Recoverable Radium 226	1 pCi/l max
Dissolved Iron*	300 µg/l max
Total Recoverable Barium	1800 µg/l max
Total Recoverable Arsenic	7 µg/l max
Chlorides	150 mg/l
Total Flow MGD	0.37

* Dissolved iron effluent limit for outfalls 001-005 is 300 µg/l, while the effluent limit for outfalls 006-007 is 1,000 µg/l.

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance identified for this permit is TRIB1, downstream of the facility and near the Montana state line.

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

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

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

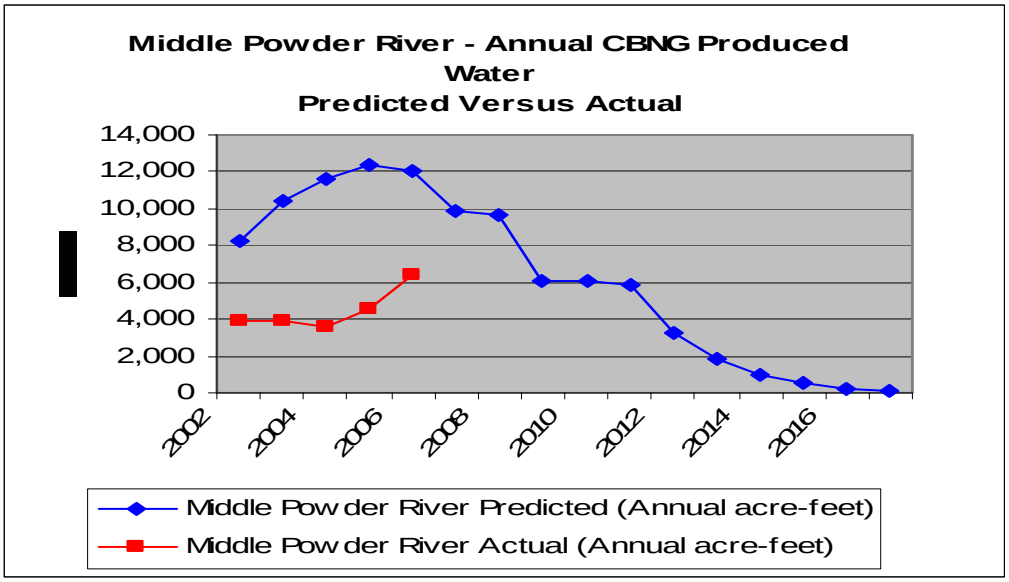
As of March 2007, all producing CBNG wells in the Middle Powder River watershed have discharged a cumulative volume of 22,292 acre-ft of water compared to the predicted 54,690 acre-ft disclosed in the PRB FEIS (Table 2-8 page, 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 40.8% of the total predicted produced water analyzed in the PRB FEIS for the Middle Powder River watershed.

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

Year	Middle Powder River Predicted (Annual acre-feet)	Middle Powder River Predicted (Cumulative acre-feet from 2002)	Middle Powder River Actual (Annual acre-feet)		Middle Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	8,257	8,257	3,929	47.6	3,929	47.6
2003	10,421	18,678	3,860	37.0	7,789	41.7
2004	11,640	30,318	3,547	30.5	11,336	37.4
2005	12,328	42,646	4,588	37.2	15,924	37.3

Year	Middle Powder River Predicted (Annual acre-feet)	Middle Powder River Predicted (Cumulative acre-feet from 2002)	Middle Powder River Actual (Annual acre-feet)		Middle Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2006	12,044	54,690	6,368	52.9	22,292	40.8
2007	9,897	64,587				
2008	9,689	74,276				
2009	6,030	80,306				
2010	6,030	86,336				
2011	5,899	92,235				
2012	3,276	95,511				
2013	1,797	97,308				
2014	964	98,272				
2015	495	98,767				
2016	231	98,998				
2017	82	99,080				
Total	**99,080**		**22,292**			

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



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

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming

DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Middle Powder River drainage, which is approximately 40.8 % 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 Middle Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

Non eligible sites 48CA5224, 48CA6371, 48CA6563, 48CA6564, 48CA6767, may be impacted by the proposed project. Non eligible sites 48CA6312 and 48CA6568 will not be affected by this project. Eligible site 48CA6307 will not be impacted by this project as planned.

Monitoring will be required as a condition of approval for two road/utility corridors and the SDI development associated with this project during construction activities because of the potential for buried sites. The specific areas are listed in the site specific COA section. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 2/27/08 that no historic properties exist within the APE.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim SHPO	SHPO	No

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

Agnew, W. D. 1983. Flora and Fauna Associated with Prairie Dog Ecosystems. Unpublished thesis.

Colorado State University, Fort Collins. 47pp.

Agnew, W. D. 1988. Arthropod Consumption by Small Mammals on Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Eighth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM 154. pgs. 81-87.

Agnew, W., D. W. Uresk. and R. M. Mansen. 1986. Flora and Fauna Associated with Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Journal of Range Management 39, pgs 135-139

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

American Fisheries Society (AFS), Montana Chapter Website. 2008.
http://fieldguide.mt.gov/detail_AFCJB53020.aspx

Apa, A. D. 1985. Efficiency of Two Black-tailed Prairie Dog Rodenticides and Their Impacts on Non-target Bird Species. Unpublished thesis, South Dakota State University Brookings. 71pp.

Avian Power Line Interaction Committee (APLIC) 2006. **R. Harness,** contributing author to: Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006. 207pp.

Bennett, Robert A. 2004. Instruction Memorandum No. WY-2005-057: Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

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

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western north America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. In: Transactions of the 67th North American Wildlife and Natural Resources Conference. pp337-349.

Byer, Timothy. 2006. Personal Communication. Wildlife Biologist. Thunder Basin National Grasslands. USDA Forest Service, Douglas, WY.

Campbell, Thomas and Tim Clark. 1981. Colony Characteristics and Vertebrate Associates of White-tailed and Black-tailed Prairie Dogs. American Midland Naturalist, Vol. 105, No. 2 (April 1981). pgs 269-276.

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

Clark, T. W., T. M. Campbell, D. G. Socha, and D. E. Casey. 1982. Prairie Dog Colony attributes and Associated Vertebrate Species. Great Basin Naturalist 42: 572-582.

Code of Federal Regulations (CFR)

1. 40 CFR All Parts and Sections inclusive Protection of Environment. Revised as of July 1, 2004.

2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2006.

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

Cornish, Todd. Personal Communication. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.

Danvir, Rick E. 2002. Sage Grouse Ecology and Management in Northern Utah Sagebrush-Steppe: A Deseret Land and Livestock Wildlife Research Report. Deseret Land and Livestock Ranch and the Utah Foundation for Quality Resource Management. Woodruff, UT.

Deisch, M. S., D. W. Uresk, and R. L. Lindor. 1989. Effects of Two Prairie Dog Rodenticides on Ground Dwelling Invertebrates in Western South Dakota. Ninth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM. Pgs 171-181.

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

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

Heidel, Bonnie. Botanist. Wyoming Natural Diversity Database. University of Wyoming. Laramie, WY

Holloran, Matthew J.; Brian J. Heath; Alison G. Lyon; Steven J. Slater; Jarren L. Kuppiers; and Stanley H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. J. Wildl. Manage. 69(2):638-649.

Holton, G. D. 2003. A field guide to Montana fishes. Mont. Dept. Fish, Wildl. Parks, 95 pp.

Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist 64:385-395

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

Jellison, Bert. 2005. Sage-Grouse Restoration Project: Lake DeSmet Conservation District. Wyoming Game and Fish Department. Sheridan, WY.

Jessica Gregory, Jones & Stokes, Ford Ranch Phase II POD Wildlife Surveys. 2006.

Jessica Gregory, Jones & Stokes, Ford Ranch Phase II POD Wildlife Surveys. 2007.

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

King, J. A. 1955. Social Behavior, Social Organization and Population Dynamics in a Black-tailed Prairie Dog Town in the Black Hills of South Dakota. Contr. Lab. Vert. Biol., University of Michigan.

67pp.

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

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

Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.

Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: http://www.cdc.gov/ncidod/vol9no7/03-0277.htm.

McCraken, J. G., D. W. Uresk and R. M. Mansen. 1985. Burrowing Owl Foods in Conata Basin, South Dakota. Great Basin Naturalist 45: 287-290.

Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003

Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.

Moynahan, Brendan J.; Mark S. Lindberg; Jay J. Rotella; and Jack Ward Thomas. In Press. Factors Affecting Nest Survival of Greater Sage-Grouse in Northcentral Montana. J. Wildl. Manage.

Moynahan, Brendan J. and Mark S. Lindberg. 2004. Nest Locations of Greater Sage-Grouse in Relation to Leks in North-Central Montana. *Presented at* Montana Sage-Grouse Workshop, Montana Chapter of The Wildlife Society, Billings.

Murkin, James W. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Naugle, David E.; Brett L. Walker; and Kevin E. Doherty. 2006. Sage Grouse Population Response to Coal-bed Natural Gas Development in the Powder River Basin: Interim Progress Report on Region-wide Lek Analyses. May 26, 2006. University of Montana. Missoula, MT. 10pp.

Naugle, David E.; Cameron L. Aldridge; Brett L. Walker; Todd E. Cornish; Brendan J. Moynahan; Matt J. Holloran; Kimberly Brown; Gregory D. Johnson; Edward T. Schmidtmann; Richard T. Mayer; Cecilia Y. Kato; Marc R. Matchett; Thomas J. Christiansen; Walter E. Cook; Terry Creekmore; Roxanne D. Falise; E. Thomas Rinkes; and Mark S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. Ecology Letters. 7:704-713.

Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.

Oedekoven, Olin O. 2004. Sheridan Region Wyoming Game and Fish Department: Annual Sage-Grouse Completion Report for 2004. Wyoming Game and Fish Department. Gillette, WY.

Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (Haliaeetus leucocephalus) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.

Reading, R. P., S. R. Beissinger, J. J. Grensten, and T. W. Clark. 1989. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. pgs 13-28.

Reading, R., and Randy Matchet. 1997. Attributes of Black-tailed Prairie Dog Colonies in Northcentral Montana. Journal of Wildlife Management 61(3): 664-673.

Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of land Management Wildlife Biologist/Sage Grouse Coordinator.

Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.

Rom, Lance. November 2007. Class III Cultural Resource Inventory of the Storm Cat Energy Corporation Ford Ranch II coal Bed methane Project, Campbell County. Quality Services Project # WY0702

Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah

Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.

The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

Thiele, Dan. 2005. Northeast Wyoming Local Working Group Area: Annual Sage-Grouse Completion Report for 2005. Wyoming Game and Fish Department. Buffalo, WY. 42pp.

Uresk, D. W. and J. C. Sharps. 1986. Denning Habitat and Diet of the Swift Fox in Western South Dakota. Great Basin Naturalist 46: 249-253.

U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

U.S. Department of the Interior 2001, Bureau of Land Management, Buffalo Field Office. Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.

U.S. Department of the Interior 2003, Bureau of Land Management. Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.

U.S. Department of the Interior 2007, US Fish and Wildlife Service. Reinitiation of Formal Consultation for Powder River Oil and Gas Project. March 23, 2007

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

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

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

Weitzel, D. L., 2002. Conservation and Status Assessments for the Sturgeon Chub (*Macrhybopsis gelida*), Western Silvery Minnow (*Hybognathus argyritis*), and Goldeye 530, (*Hiodon alsosides*): Rare Fish Species of the Upper Missouri River Drainage, Wyoming. Wyoming Game and Fish Department, Cheyenne. 38pp.

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

Wyoming Game and Fish Department (WGFD). 2004. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY

WGFD. 2003. Wyoming Greater Sage-Grouse Conservation Plan. WGFD. Cheyenne, WY

Wyoming Game and Fish Department (WYGF) web page. 2008.
http://gf.state.wy.us/wildlife/nongame/LIP/PrairieStreamsWatersheds/index.asp

8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

Dan Sellers, Natural Resource Specialist
Casey Freise, Supervisory Natural Resource Specialist
Mike McKinley, Hydrologist
Mike Worden, Petroleum Engineer
Karen Klaahsen, Legal Instruments Examiner
Leigh Grench, Archaeologist
Jim Verplancke, Wildlife Biologist
Gerald Queen, Geologist
Buddy Green, Assistant Field Manager, Resources
Paul Beels, Associate Field Manager, Minerals & Lands
Chris E. Hanson, Field Manager

Interdisciplinary Team Lead: Dan Sellers