

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD  
FOR  
Storm Cat Energy  
Ford Ranch POD**

**ENVIRONMENTAL ASSESSMENT –WY-070-07-106**

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Storm Cat Energy’s Ford Ranch, Coal Bed Natural Gas (CBNG) POD comprised of the following 31 Applications for Permit to Drill (APDs), as follows:

	<b>Well Name</b>	<b>Well #</b>	<b>QTR</b>	<b>Section</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease Number</b>
1	FORD RANCH	09CW-20	NESE	20	58N	75W	WYW146820
2	FORD RANCH FEDERAL	05CW-21	SWNW	21	58N	75W	WYW146820
3	FORD RANCH FEDERAL	07CW-21	SWNE	21	58N	75W	WYW146820
4	FORD RANCH	08CW-21	SENE	21	58N	75W	WYW146820
5	FORD RANCH	13CW-21	SWSW	21	58N	75W	WYW146820
6	FORD RANCH	14CW-21	SESW	21	58N	75W	WYW146820
7	FORD RANCH	16CW-21	SESE	21	58N	75W	WYW146820
8	FORD RANCH	05CW-22	SWNW	22	58N	75W	WYW146821
9	FORD RANCH	11CW-22	NESW	22	58N	75W	WYW146821
10	FORD RANCH	12CW-22	NWSW	22	58N	75W	WYW146821
11	FORD RANCH	15CW-22	SWSE	22	58N	75W	WYW146821
12	FORD RANCH	01CW-27	NENE	27	58N	75W	WYW146821
13	FORD RANCH	03CW-27	NENW	27	58N	75W	WYW146821
14	FORD RANCH	05CW-27	SWNW	27	58N	75W	WYW146821
15	FORD RANCH	07CW-27	SWNE	27	58N	75W	WYW146821
16	FORD RANCH	09CW-27	NESE	27	58N	75W	WYW146821
17	FORD RANCH	11CW-27	NESW	27	58N	75W	WYW146821
18	FORD RANCH	13CW-27	SWSW	27	58N	75W	WYW146821
19	FORD RANCH	15CW-27	SWSE	27	58N	75W	WYW146821
20	FORD RANCH	01CW-28	NENE	28	58N	75W	WYW146820
21	FORD RANCH	05CW-28	SWNW	28	58N	75W	WYW146820
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25	FORD RANCH	15CW-28	SWSE	28	58N	75W	WYW146820
26	FORD RANCH	01CW-29	NENE	29	58N	75W	WYW146820
27	FORD RANCH	15CW-29	SWSE	29	58N	75W	WYW146820
28	FORD RANCH	03CW-35	NENW	35	58N	75W	WYW146821
29	FORD RANCH	05CW-35	SWNW	35	58N	75W	WYW146821
30	FORD RANCH	11CW-35	NESW	35	58N	75W	WYW146821
31	FORD RANCH FEDERAL	13CW-35	SWSW	35	58N	75W	WYW146821

The following impoundments have been approved under this federal action:

	<b>IMPOUNDMENT Name / Number</b>	<b>Qtr/Qtr</b>	<b>Section</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease Number</b>
1	Bed Head	NESW	34	58	75	WYW146822
2	Blue Bird	NESW	34	58	75	WYW146822
3	Bull Snake	SENE	29	58	75	WYW146820

	<b>IMPOUNDMENT Name / Number</b>	<b>Qtr/Qtr</b>	<b>Section</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease Number</b>
4	Ford	NWSE	29	58	75	FEE
5	Ford Ranch Playa	SWNE	27	58	75	WYW146821
6	Ox Bow	NENE	29	58	75	WYW146820
7	River Bend	NWNE	29	58	75	FEE
8	Tip Top	NWNW	35	58	75	WYW146821
9	Beneterra SDI Surge Pond	NESW	29	58	75	FEE

Approved R-O-W Grant Information: There are 2 road and utility corridor rights-of-way associated with this POD as follows.

<u>R-0-W Grant #</u>	<u>Type</u>	<u>Sections</u>	<u>TWP/RNG</u>
<b>WYW 169766</b>	<u>Improved Roads-</u> 40' wide x 2,648' long, Disturbance = 2.4 acres <u>Two-track roads-</u> 20' wide x 16,238' long, Disturbance = 7.5 acres <u>Water pipeline-</u> 30' wide x 19,822' long, Disturbance = 13.7 acres Buried powerline- 20' wide x 19,199' long, Disturbance = 8.8 acres <b>Total Disturbance = 32.4</b>	29, 33, 34	T58N/75W
<b>WYW 169767</b>	<u>Gas pipeline</u> 30' wide x 19,822' long, Disturbance = 13.7 <b>Total Disturbance = 13.7</b>	29, 33, 34	T58N/75W

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

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

- 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.
- The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
- Alternative C will not result in any undue or unnecessary environmental degradation.
- 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  
Storm Cat Energy  
Ford Ranch POD  
PLAN OF DEVELOPMENT  
WY-070-07-106**

## **INTRODUCTION**

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

### **1. PURPOSE AND NEED**

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 2 valid federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

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

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

### **2. ALTERNATIVES INCLUDING THE PROPOSED ACTION**

#### **2.1. Alternative A - No Action**

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

#### **2.2. Alternative B Proposed Action**

Proposed Action Title/Type: Storm Cat Energy’s Ford Ranch POD Plan of Development (POD) for 33 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There were 33 wells proposed within this POD, as follows:

	<b>Well Name</b>	<b>Well #</b>	<b>QTR</b>	<b>Sec</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease</b>
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33	FORD RANCH FEDERAL	13-35	SWSW	35	58N	75W	WYW146821

The following impoundments have been proposed under this federal action:

	<b>IMPOUNDMENT Name / Number</b>	<b>Qtr/Qtr</b>	<b>Section</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease Number</b>
	<b>Primary Impoundments*</b>					
1	Bed Head	NESW	34	58	75	WYW146822
2	Blue Bird	NESW	34	58	75	WYW146822
3	Ford Ranch Playa	SWNE	27	58	75	WYW146821
4	Beneterra SDI Surge Pond	NESW	29	58	75	FEE
	<b>Secondary Impoundments</b>					
5	Bull Snake	SENE	29	58	75	WYW146820
6	Ox Bow	NENE	29	58	75	WYW146820

	<b>IMPOUNDMENT Name / Number</b>	<b>Qtr/Qtr</b>	<b>Section</b>	<b>TWP</b>	<b>RNG</b>	<b>Lease Number</b>
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8	Tip Top	NWNW	35	58	75	WYW146821
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Proposed R-O-W Grant Information: There are 2 road and utility corridor rights-of-way associated with this POD as follows.

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<b>WYW 169766</b>	<u>Improved Roads-</u> 40' wide x 2,648' long, Disturbance = 2.4 acres <u>Two-track roads-</u> 20' wide x 16,238' long, Disturbance = 7.5 acres <u>Water pipeline-</u> 30' wide x 19,822' long, Disturbance = 13.7 acres <u>Buried powerline-</u> 20' wide x 19,199' long, Disturbance = 8.8 acres <b>Total Disturbance = 32.4</b>	29, 33, 34	T58N/75W
<b>WYW 169767</b>	<u>Gas pipeline</u> 30' wide x 19,822' long, Disturbance = 13.7 <b>Total Disturbance = 13.7</b>	<u>29, 33, 34</u>	<u>T58N/75W</u>

County: Campbell

Applicant: Storm Cat Energy

Surface Owners: BLM, Ford Ranch

Project Description:

The proposed action involves the following:

- Drilling of 31, commingled (one well per location), federal CBM wells in the Cook, Canyon, Wall, and Pawnee coal zones to depths of approximately 362 to 834 feet. For more information on individual coal zone depths, etc. see the POD Drilling Plan and appendix A. Wells are vertical bores proposed on an 80 acre spacing pattern.
- An unimproved and improved road network.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 9 discharge points and 8 stock water reservoirs, 13 stock tanks (9 proposed and 3 existing) and 1 subsurface drip irrigation (SDI) surge pond and approximate 300-acre irrigation plot, within the Middle Powder River primary watershed.
- Utilization of 9 proposed and 7 existing shallow ground water compliance monitoring wells
- A buried gas, water and power line network, 1 compression facility and 3 staging areas.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and

WMP(WMP) in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

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

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

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. 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 reduce potential impacts to natural resources. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or reduce 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 POD are listed below under 2.3.1:

#### **2.3.1. Changes as a result of the on-sites**

1. Wells, Ford Ranch Federal 3CW-28 and 9CW-28 were dropped due to being located in rough, steep, erosive areas.
2. Ford Ranch Federal well 9CW-21 was moved out of a steep area, to a flatter location near a road. The well is now the 16CW-21.
3. Ford Ranch Federal 7CW-28 was moved to a flatter location to avoid building a pad.
4. Access road from the Federal 5CW-21 to the Federal 7CW-21 wells was changed from an improved road, to a 2 track road to reduce surface disturbance.
5. Dropped the spot upgrade to well Ford Ranch Federal 11CW-22 and Ford Ranch Federal 1CW-27, to reduce surface disturbance.
6. Rerouted access road to well Ford Ranch Federal 13CW-27, to reduce surface disturbance.
7. Moved Ford Ranch Federal 1CW-28 to a flatter location to reduce surface disturbance.

#### **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 had developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). This guidance document was revised and is superseded by the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. Approximately 1,106 new impoundments have been investigated to date (3/07) with 161 impoundments being regulated under 71 permits. Of these impoundments 7 have caused exceedance of the class of use of the receiving aquifer, of which only 1 has not returned to existing class of use of the shallow ground water beneath it.

#### **2.3.2.2. Surface Water**

1. Channel Crossings:
  - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
  - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
  - c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
  - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.
4. The operator will be required to provide a reclamation bond for impoundments over federal minerals in the amount specified by a qualified Professional Engineer for the impoundments to be used for the management of CBNG water. The bond amount will be submitted within 90 days after POD approval and will be approved by the BLM prior to commencing construction.
5. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.
6. The operator will supply a copy of the complete approved Underground Injection Control (UIC) Permit for a Class V injection facility (Class 5C5) for the subsurface drip irrigation (SDI) facility from the WDEQ.

#### **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. Wetland/Riparian**

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

#### **2.3.2.5. Wildlife**

1. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
2. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
3. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.
4. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.
5. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

#### **2.3.2.6. Threatened, Endangered, or Sensitive Species**

##### **2.3.2.6.1. Bald Eagle**

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the Sundry Notices.
2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
3. 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.

#### **2.3.2.6.2. Mountain Plover**

1. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of occupied mountain plover nesting habitat.
2. 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.
3. 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.
4. 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.
5. 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. Visual Resources**

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

#### **2.3.2.8. Noise**

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

#### **2.3.2.9. Air Quality**

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

#### **2.3.3. Site specific mitigation measures**

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

#### **Archaeological Resources**

Archeological Monitoring:

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 within alluvial deposits of the Powder River in T57R75 Section 20 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.

**Surface Plan COAs**

1. Well 5CW-27, keep pit soil off of the slope and protect trees not in the way of construction.
2. Well 9CW-27, minimize pad size while maintaining safety.
3. Well 1CW-28, maintain a 20’ vegetative buffer near draw. Minimize tree disturbance.
4. Well 5CW-28, use erosion control along the south and west side of draw.
5. Well 7CW-28, minimize tree disturbance.
6. Well 11CW-35 and 3CW-35, use a slotted pad, 15’x 90’.
7. Well 13CW-35, remove saplings only. Avoid larger trees.
8. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for the Ford Ranch POD is Covert Green 18-0617 TPX.
9. The approval of this project does not grant authority to use off lease federal lands. No surface disturbing activity, or use of off-lease federal lands, is allowed on affected leases until right-of-way grants become effective on the date in which the right-of-way grant is signed by the authorized officer of the BLM.
10. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

**Ponderosa Pine/Little Bluestem Ecological Site:** Use for wells and infrastructure for the following locations: 12-22, 5-27, 9-27, 13-35, 8-21, 11-28, 13-25

<b>Species</b>	<b>% in Mix</b>	<b>Lbs PLS*</b>
<i>Needleandthread</i> (Hesperostipa comata ssp. Comata) Or <i>Indian ricegrass</i> (Achnatherum hymenoides)	10	1.2
<i>Bluebunch Wheatgrass</i> (Pseudoroegneria spicata ssp. Spicata)	25	3.0
<i>Sideoats grama</i> (Bouteloua curtipendula )	20	2.4

Species	% in Mix	Lbs PLS*
<b>Thickspike Wheatgrass</b> ( <i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i> )	30	3.6
<b>Prairie coneflower</b> ( <i>Ratibida columnifera</i> )	5	0.6
<b>White or purple prairie clover</b> ( <i>Dalea candidum</i> , <i>purpureum</i> )	5	0.6
<b>American vetch</b> ( <i>Vicia Americana</i> )	5	0.6
<b>Totals</b>	<b>100%</b>	<b>12 lbs/acre</b>

**Loamy and Clayey Ecological Sites:** Use this seed mix for all other wells and infrastructures.

Species - Cultivar	% in Mix	Lbs PLS*
Thickspike Wheatgrass – <i>Critana</i> <b>OR</b>	25	3.0
Western Wheatgrass – <i>Rosana</i> Slender Wheatgrass- Pryor	10	1.4
Bluebunch Wheatgrass – <i>Secar</i> or <i>P-7</i>	15	2.1
Green needlegrass - <i>Lodorm</i>	25	3.0
American vetch, Rocky Mountain beeplant ( <i>Cleome serrulata</i> ) <b>OR</b>		
Cicer Milkvetch - <i>Lutana</i>	10	1.4
White – <i>Antelope</i> or Purple Prairie Clover - <i>Bismarck</i>	5	0.3
Lewis - <i>Appar</i> , Blue, or Scarlet flax	5	0.4
Winterfat – <i>Open Range</i> <b>OR</b>	2.5	0.4
Prairie coneflower ( <i>Ratibida columnifera</i> ) Fourwing saltbush - <i>Wytana</i>	2.5	0.4
<b>Chapter 2 Totals</b>	<b>100%</b>	<b>12.4 lbs/acre</b>

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.

**Wildlife:**

1. If any dead or injured sensitive species is located during construction or operation, the BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
2. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, “The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time”. The measure requires

companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Storm Cat Energy will coordinate with the BLM to determine if additional surveys will be required.

3. The following conditions will minimize impacts to roosting and nesting bald eagles;
  - a. Surveys for bald eagle winter roosts and nest sites are required annually until project completion throughout the project boundaries.
  - b. If a roost is identified a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimal disturbance buffer zone of 1-mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
  - c. If a nest is identified a minimal disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance-free buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).
  - d. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.

The following wells and associated infrastructure are under bald eagle nest and roost timing stipulations;

<b>Township/Range</b>	<b>Section</b>	<b>Wells and Infrastructure</b>
58/75	7	Gas line corridor.
58/75	21	5CW-21, 13CW-21, 14CW-21, the road corridor associated with the 7CW-21 well, culverts and low water crossings.
58/75	20	9CW-21, PR-005, and the Ox Bow Reservoir its associated temporary access, monitoring wells, and discharge points, culverts and low water crossings.
58/75	29	01CW-29, 15CW-29, PR-001, road corridor for the 05CW-28, PR-002, PR-003, PR-004, Bull Snake Reservoir its associated temporary access, monitoring wells, and discharge points, compressor station, staging area, Ford Reservoir its associated temporary access, monitoring wells, and discharge points, Benna Terra Site #1, culverts and low water crossings.
58/75	28	05CW-28, 13CW-28, 11CW-28, 05CW-28 wells, and culverts and low water crossings.
58/75	32	Road corridor from the 15CW-29 south into section 32, and culverts and low water crossings.

4. The following conditions will minimize impacts to raptors;
  - a. No 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;

<b>Township/Range</b>	<b>Section</b>	<b>Wells and Infrastructure</b>
58/75	20	Ox Bow Reservoir its associated temporary access, monitoring wells, and discharge points, PR-005, PR-001, 9CW-20, the road corridor for the 13CW-21, and culverts and low water crossings.

<b>Township/Range</b>	<b>Section</b>	<b>Wells and Infrastructure</b>
58/75	21	05CW-21, 06cw-21, road corridor for the 07CW-21, and culverts and low water crossings.
58/75	22	5CW-22, 11CW-22, 12CW-22, road corridor associated with the 6CW-21 wells, and culverts and low water crossings.
58/75	33	Utility corridor along the existing road in the SW of the section, Little Spring Reservoir, its associated temporary access, monitoring wells, and discharge points, and culverts and low water crossings.
58/75	5	Gas line corridor.

- 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 POD listed in the table below. The productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success/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.

<b>BLM ID</b>	<b>T:R:S</b>	<b>UTM E</b>	<b>UTM N</b>	<b>Species</b>	<b>2006 Activity</b>	<b>2007 Activity</b>
3373	58:75:33	428630	4864039	Unk	Inactive	Unk
3374	57:75:6	428246	4864633	Buteo/GHOW	Inactive	Active
4278	58:76:36	428421	4983414	RTHA	Active	Unk
4279	58:75:22	431018	4983321	RTHA	Active	Unk
4280	58:75:20	429030	4983121	UNK/RTHA	Inactive	Active
4281	58:75:20	427804	4982751	UNK	Inactive	Unk
4282	57:75:6	427246	4978423	RTHA	Active	Unk
New	57:75:29	426908	4980188	RTHA	Unk	Active
New	57:75:31	427663	4981668	RTHA	Unk	Active

- d. Routine maintenance should be scheduled outside the nesting season (Feb 1-July 31) for all active nests. Emergency activities should be reduced as much as possible and restricted between the hours of 9:00 am and 3:00 pm.
5. The following conditions will minimize impacts to sage-grouse:
  - a. Surveys for sage-grouse are required each year until project completion.
  - b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and disturbing activities will not be permitted until after the nesting season.
6. The following conditions will minimize impacts to sharp-tail-grouse:
  - a. If an active sharp-tail lek is identified during the sage-grouse 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.

- b. 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.

#### **2.4. Alternatives considered but not analyzed in detail**

##### **Direct Discharge**

Direct discharge to tributaries of, or directly to the Middle Powder River, is not feasible as a primary water management strategy because there are not a sufficient number of tributaries to contain the proposed water production volume prior to reaching the Middle Powder River as required by the WDEQ. Also the effluent discharge limit cannot be met by the raw produced water.

##### **Re-injection**

Re-injection of produced water within the Ford Ranch POD has also been considered. A review of the well logs on file with the Wyoming Oil and Gas Conservation Commission and available geologic information suggests that there are no aquifers within the immediate area that have sufficient storage capacity to accept the volume of CBNG water that would be produced within the Ford Ranch POD. Re-injection into deep saltwater aquifers would also render the relatively high quality produced water unsuitable for future use. Therefore, re-injection is not a reasonable solution for the disposal of produced water within the Ford Ranch POD.

##### **Land Application**

Land application of produced water within the Ford Ranch POD has also been considered. Land application would involve applying the water to cropland at agronomic rates through a surface irrigation system. Land application is at best a seasonal approach and would require the construction of several reservoirs to store produced water during the non-irrigation season. Due to the high construction and operating costs and lack of landowner interest for above-ground irrigation, land application was ruled out. However, subsurface drip irrigation (SDI) has been considered a viable alternative.

##### **Treatment of Produced Water**

Treatment of produced water from the Ford Ranch POD with subsequent discharge into the Middle Powder River has been researched to examine the full range of possibilities. The following potential treatment technologies were considered: Sulfur burners, constructed wetlands, rapid spray distillation, electrodialysis reversal, electronic water purification, reverse osmosis, ion exchange with resins, ion exchange with zeolites and cation exchange and cation removal. Sulfur burner technologies were rejected since they will not address sodium concentrations in the produced water. Use of constructed wetlands was determined to not be a reasonable alternative since they have limited utility in removing total dissolved solids and salts. Rapid spray distillation and electronic water purification are emerging technologies that are unproven and have not been demonstrated to effectively treat CBNG water. Electrodialysis reversal has not been cost effectively applied the treatment of CBNG water. Both electrodialysis reversal and reverse osmosis would generate a brine reject stream of up to 20 percent of the design flow of the treatment system. With ion exchange technologies, it is possible to substantially reduce the volume of brine reject water however the resulting reject stream would be more concentrated. The concentrated brine from these treatment systems would need to be appropriately managed to address potential environmental concerns. The brine waters could potentially be trucked off-site for disposal, which given the volumes associated with electrodialysis reversal and reverse osmosis, would render those options uneconomic. Other options for managing the brine reject streams include evaporation in a lined pit; or dilution to stock water standards and discharge to total containment reservoirs.

### 3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 7/21/2006. Field inspections of the proposed Ford Ranch POD CBNG project were conducted on 1/ 10, 11, 25/ 2007 and 2/28/2007 by Dale Bulkley- Landowner representative, Mike Jaeger, James Hanson, John Steire, Heavy Arnold, Bean Burgstrom, Rick Hendrick, Don Camino and Nick Harken-Company Representatives, Dan Sellers, Mike Mckinley, Leigh Grench, Arlene Kosic, Jenny Spagon and Dan Sellers- BLM representatives.

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.**

<b>Mandatory Item</b>	<b>Potentially Impacted</b>	<b>No Impact</b>	<b>Not Present On Site</b>	<b>BLM Evaluator</b>
Threatened and Endangered Species	X			Arlene Kosic
Floodplains	X			Dan Sellers, Mike McKinley
Wilderness Values			X	Dan Sellers
ACECs			X	Dan Sellers
Water Resources	X			Dan Sellers, 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	Dan Sellers, 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 encompasses approximately 16 square miles. Elevations range from approximately 3,400 to 4,060 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, 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" of precipitation annually, about 74% occurs between April and September. 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 is comprised of approximately 65% grasslands/pasturelands, 20% conifer woodlands, 12% sagebrush grasslands and 3% bare soil, rock, water etc. Vegetation includes, Cheatgrass, needle & thread, prairie junegrass, Indian ricegrass, bluebunch wheatgrass, crested wheatgrass, western wheatgrass, blue grama, threadleaf sedge, Wyoming big sagebrush, silver sage, 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 clay loam 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, Shallow Loamy, and Ponderosa/Little Bluestem. For more detailed soils information, see NRCS Soil Survey WY705.

**Loamy Soil 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 interbedded 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.

#### **3.2.1. Wetlands/Riparian**

No wetland or riparian areas were noted during the onsite. Drainages are intermittent with no defined bed or bank.

#### **3.2.2. Invasive Species**

Weeds of concern for this POD include, Leafy spurge, Canada thistle, salt cedar, diffuse knapweed Russian knapweed, spotted knapweed, black henbane, field bindweed, wild licorice, cocklebur and cheatgrass. State-listed noxious weeds and invasive/exotic plant infestations were discovered by Campbell County Weed and Pest, a search of inventory maps and during subsequent field investigation by the project proponent and the BLM. The company has developed an Integrated Pest Management Plan with Campbell County Weed and Pest to help control weeds in this POD.

### **3.3. Wildlife**

A habitat assessment and wildlife inventory surveys were performed by Thunderbird Jones & Stokes Inc. (Thunderbird). Thunderbird performed surveys for bald eagle, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, prairie dog colonies, and Ute ladies'-tresses orchid according to protocol in 2006. Preliminary surveys have also been conducted in 2007 for bald eagles, raptors, sage-grouse, sharp-tailed grouse, and mountain plovers.

A BLM Biologist conducted a field visits on January 10 and 25 of 2007. During this time, she reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

### **3.3.1. Big Game**

Big game species expected to be within the project area include pronghorn antelope and mule deer. 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.

The project area is part of the Gillette pronghorn antelope and Powder River mule deer herds. There was a 2004 population estimate of 19,985 pronghorn antelope and a population objective of 11,000. The 2004 population estimate for the Powder River mule deer herd was 55,560 and an objective of 52,000 (WGFD 2004).

### **3.3.2. 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.

### **3.3.3. Migratory Birds**

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

### **3.3.4. Raptors**

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, osprey, bald eagle, rough-legged hawk, merlin, and burrowing 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 Thunderbird identified 7 raptor nests within 0.5 miles of the Ford Ranch project area in 2006. Surveys conducted in 2007 identified 2 additional nests along the Powder River. Table 4 lists the species and activity status of these nests in 2006-2007.

**Table 3.3.4.1.** Documented raptor nests within the Ford Ranch project area in 2006-2007 (UTM Zone 13, NAD83).

<b>BLM ID</b>	<b>T:R:S</b>	<b>UTM E</b>	<b>UTM N</b>	<b>Species</b>	<b>2006 Activity</b>	<b>2007 Activity</b>
3373	58:75:33	428630	4864039	Unk	Inactive	Unk
3374	57:75:6	428246	4864633	Buteo/GHOW	Inactive	Active
4278	58:76:36	428421	4983414	RTHA	Active	Unk
4279	58:75:22	431018	4983321	RTHA	Active	Unk
4280	58:75:20	429030	4983121	UNK/RTHA	Inactive	Active
4281	58:75:20	427804	4982751	UNK	Inactive	Unk
4282	57:75:6	427246	4978423	RTHA	Active	Unk
New	57:75:29	426908	4980188	RTHA	Unk	Active
New	57:75:31	427663	4981668	RTHA	Unk	Active

### **3.3.5. Threatened and Endangered and Sensitive Species**

#### **3.3.5.1. Threatened and Endangered Species**

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

##### **3.3.5.1.1. Black-footed ferret**

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

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

Active reintroduction efforts of black-footed ferrets have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM BFO administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988). Today, 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).

Four active prairie dog colonies were identified within the project area. The colonies total approximately 300 acres.

##### **3.3.5.1.2. Bald eagle**

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000. A decision is expected in June 2007.

Bald eagle nesting habitat is generally found along lakes, rivers, and other areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey

source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles congregate in 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.

Several bald eagles have been observed less than 1 mile from the project area. Surveys conducted in 2006 and 2007 did not identify any bald eagle nests or roosts. However, bald eagle use was documented within the project area. One adult bald eagle was observed in section 6 in February of 2006 (Gregory 2006). Additionally, BLM winter roost surveys conducted in February of 2005 documented 2 adult bald eagles within 0.30 and 0.78 miles of the project area.

#### **3.3.5.1.3. 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. 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.

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. No natural springs exists within the project area.

#### **3.3.5.2. Sensitive Species**

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

##### **3.3.5.2.1. Black-tailed prairie dog**

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

including, habitat destruction, poisoning, and Sylvatic plague.

Four active prairie dog colonies were identified within the project area. The table below lists their location and size.

<i>Colony Id</i>	<i>Location (TRS)</i>	<i>Activity</i>	<i>Size (acres)</i>
1	58:75:36	Active	69.6
2	58:75:31	Active	98.5
3	58:75:34	Active	85.2
4	58:75:34 & 27	Active	42.4

#### **3.3.5.2.2. Greater sage-grouse**

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). 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. The larger denser stands of sagebrush could provide nesting and winter habitat and the upper draws and tributaries of the Powder River could provide adequate brood rearing and late summer habitat. However, BLM and Wyoming Game and Fish data do not identify sage-grouse lek sites within 2 miles of the project area. The nearest known lek is located 10.7 miles southeast 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.

#### **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 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.

#### **3.3.5.2.3. Mountain plover**

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

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

### 3.4. West Nile Virus

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

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

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

**Table 3.4 Historical West Nile Virus Information**

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

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

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

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNV mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-

to-bird transmission of WNV, such as *Culex tarsalis*, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

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

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

### **3.5. Water Resources**

The project area is within the 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 swails.

#### **3.5.1. Groundwater**

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

The PRB FEIS Record of Decision (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).

### **3.5.2. 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  $\mu\text{mhos/cm}$ ) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the 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).

The operator has identified 5 permitted natural springs within this POD boundary at T57N, R75W, Sec 2, and T58N, R75W, Secs 27, 33, and 34.. The estimated flows and water qualities of the springs that could be sampled are as follows: Little Spring has a flow determined to be 0.55 gpm with a water quality of 3,130  $\mu\text{mhos/cm}$  conductivity, 2,460 mg/l TDS and 5.2 SAR; Rubber Tire Spring has a flow determined to be 0.025 gpm with a water quality of 1,000  $\mu\text{mhos/cm}$  conductivity, 734 mg/l TDS and 0.6 SAR; Iron Spring has a flow determined to be 0.83 gpm with a water quality of 5,510  $\mu\text{mhos/cm}$  conductivity, 5,360 mg/l TDS and 5.1 SAR; Little Spring has a flow determined to be 0.55 gpm with a water quality of 3,130  $\mu\text{mhos/cm}$  conductivity, 2,460 mg/l TDS and 5.2 SAR.

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

### **3.6. Cultural Resources**

Class III cultural resource inventories were conducted for the Ford Ranch POD project area of potential effect prior to on-the-ground project work (BFO project no. 70070077). Quality Services, Inc. conducted

a ten acre 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 cultural resources are located in or near the area of potential effect.

**Table 3.5 Cultural Resources Inventory Results**

<b>Site Number</b>	<b>Site Type</b>	<b>Eligibility</b>
48CA1	Lithic Scatter	NE
48CA2	Multicomponent	Unevaluated
48CA5224	Road segment	NE
48CA6304	Lithic Scatter	NE
48CA6305	Historic Site	NE
48CA6306	Lithic scatter	Unevaluated
48CA6307	Lithic scatter	Eligible
48CA6308	Lithic scatter	NE
48CA6309	Prehistoric Structure	Eligible
48CA6310	Lithic Scatter	Eligible
48CA6311	Lithic Scatter	NE
48CA6312	Prehistoric Structure	NE
48CA6313	Historic Structure	NE
48CA6314	Lithic scatter	NE
48CA6315	Prehistoric cairn	NE
48CA6316	Lithic Scatter	NE
48CA6317	Historic Structures	NE

#### **4. ENVIRONMENTAL CONSEQUENCES**

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

##### **4.1. Vegetation & Soils Direct and Indirect Effects**

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Some Ponderosa pine tress will be removed during construction. Most of the trees removed will be seedlings and saplings. Less than 50 larger trees are estimated to be removed throughout the POD. The landowner will use these for firewood. No adverse effects are anticipated from removing these tress due to the fact that they are surrounded healthy Ponderosa pine

stands. Of the 31 proposed well locations, 1 is on an existing, partially reclaimed conventional well pad, 25 can be drilled without a well pad being constructed and 5 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 26 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 26 wells would be approximately 0.2 acre/well for 5.2 total acres. The other 5 wells requiring cut & fill pad construction would disturb approximately 0.304 acres/well pad for a total of 1.52 acres. The total estimated disturbance for all 31 wells would be 6.72 acres.

Approximately 2.85 miles of improved roads would be constructed to provide access to various well locations. Approximately 13.97 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 0.66 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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 effect the 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 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**

<b>Facility</b>	<b>Number or Miles</b>	<b>Factor</b>	<b>Acreage of Disturbance</b>	<b>Duration of Disturbance</b>
Nonconstructed Pad	26	0.2/acre	5.2	Long Term
Constructed Pad	5	0.304/acre	1.52	
Gather/Metering Facilities	0			Long Term
Screw Compressors	1	200' x 200'	0.92	Long Term
Monitor Wells	9	0.01/acre	0.09	Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Impoundments	9		31.72	Long Term
On-channel	7	Site Specific	12.82	
Off-channel	2	Site Specific	18.9	
Water Discharge Points	9	Site Specific or 0.01 ac/WDP	0.09	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	
Channel Modification		Site Specific	0.0	
Improved Roads	2.85			Long Term
No Corridor	0.06	20'	0.16	
With Corridor	2.69	40'	17.48	
2-Track Roads				Long Term
No Corridor	0.14	12' Width	0.21	
With Corridor	13.69	32' Width	44.4	
Pipelines	0.66		1.28	Short Term
No Corridor	1,852'	20' Width		
With Corridor	935'			
Buried Power Cable	0	12' Width or Site Specific	0	Short Term
No Corridor				
Overhead Powerlines	2.08	30' Width	7.58	Long Term
Additional Disturbance		Site Specific		
SDI(Subsurface Drip Irrigation) Surge Pond			5	Long Term
Sub-irrigated Field			300	
Staging Areas	3	300' x 300'	6.2	Long Term
Stock Tanks	9	20' Diameter	0.09	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

No wetland or riparian areas were noted during the onsite.

#### 4.1.2. Invasive Species

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

licorice, cocklebur and cheatgrass and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants. The company has developed an Integrated Pest Management Plan with Campbell County Weed and Pest to help control weeds in this POD.

#### **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 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 (Alternative C – Environmentally Preferred)**

##### **EFFECTS ANALYSIS**

During the environmental analysis process, the BLM identified project modifications resulting in an environmentally preferred alternative (Alternative C). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. In some cases, access roads were re-routed, well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from the project design in order to alleviate or minimize environmental impacts.

##### **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 will be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they may provide some habitat value as these areas are reclaimed and native vegetation becomes established. Although, when these reclaimed areas are located along road sides, vehicular collisions may increase.

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

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

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

#### **4.2.1.1. Cumulative effects**

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

#### **4.2.2. Aquatics Direct and Indirect Effects**

Produced CBNG water from the 31 proposed federal wells will be contained in 4 on-channel and 2 off-channel reservoirs, a playa, and piped to a drip irrigation system on private surface (CBM Associates 2006). CBNG water is not expected to reach any fish bearing drainages. Aquatic species should not be affected by implementation of the Ford Ranch POD.

#### **4.2.2.1. Cumulative effects**

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

#### **4.2.3. Migratory Birds Direct and Indirect Effects**

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

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

avoid predation. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

#### **4.2.3.1. Cumulative effects**

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

#### **4.2.4. Raptors Direct and Indirect Effects**

The 5CW-22-5875 well is proposed less than 0.25 miles from the # 4279 nest. However, due to topography and trees, the nest is not visible from the well. One of the newly discovered nests is located less than 0.25 miles from an existing improved road with a proposed utility corridor. The nest is located within line of sight of the road.

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

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.

Despite commitments such as telemetry metering to limit well visits, well visits during the nesting season will occur 2 to 3 times per week which may lead to nest failure through nest abandonment, displacement, and increased predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

#### **4.2.4.1. 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 are summarized in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

**4.2.5.1. Threatened and Endangered and Sensitive Species**

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

<b>Common Name (scientific name)</b>	<b>Habitat</b>	<b>Presence</b>	<b>Project Effects</b>	<b>Rationale</b>
<b>Endangered</b>				
Black-footed ferret ( <i>Mustela nigripes</i> )	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Four prairie dog colonies present, less than 1000 acres.
<b>Threatened</b>				
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Mature forest cover often within one mile of large water body.	K	LAA	Habitat present, overhead power proposed.
Ute ladies'-tresses orchid ( <i>Spiranthes diluvialis</i> )	Riparian areas with permanent water	NP	NE	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.

**Effect Determinations**

- LAA** Likely to adversely affect
- NE** No Effect.
- NLAA** May Affect, not likely to adversely effect individuals or habitat.

#### **4.2.5.1.1. Black-footed ferret**

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

#### **4.2.5.1.2. Bald eagle**

The proposed project is likely to affect bald eagles due to the presence of proposed and existing overhead powerlines. Storm Cat Energy proposes 2.1 miles of three phase overhead powerlines within the project boundaries and 2.2 miles outside the boundaries in order to connect to existing three phase line located south of the project.

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

Produced water will flow into 6 reservoirs, 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.

The proposed project is “likely to adversely affect” bald eagles due to the presence of proposed and existing overhead powerlines lines.

#### **4.2.5.1.3. Ute’s Ladies Tresses Orchid**

Suitable orchid habitat is not present within the Ford Ranch 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. Additionally, surveys conducted throughout the project area yielded negative results. Implementation of the proposed project should have “no effect” the Ute ladies’- tresses orchid as neither suitable habitat nor a seed source is present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

**Presence**

**K** Known, documented observation within project area.

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

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

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

**Project Effects**

**NI** No Impact.

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

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

**BI** Beneficial Impact

#### **4.2.5.2.1. Black-tailed prairie dog**

Four prairie dog colonies have been identified within the project area. Disturbance is proposed within the colonies in sections 27 and 34 of T58:R75. Utilities will be coridored along an existing road in the northern edge of the colony and an improved road is proposed on the southern portion of the colony. The southern portion of the colony 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.

#### **4.2.5.2.2. Greater sage-grouse**

Project activities will result in the direct loss of 127.5 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 powerlines). 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).

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

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

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

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

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

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km

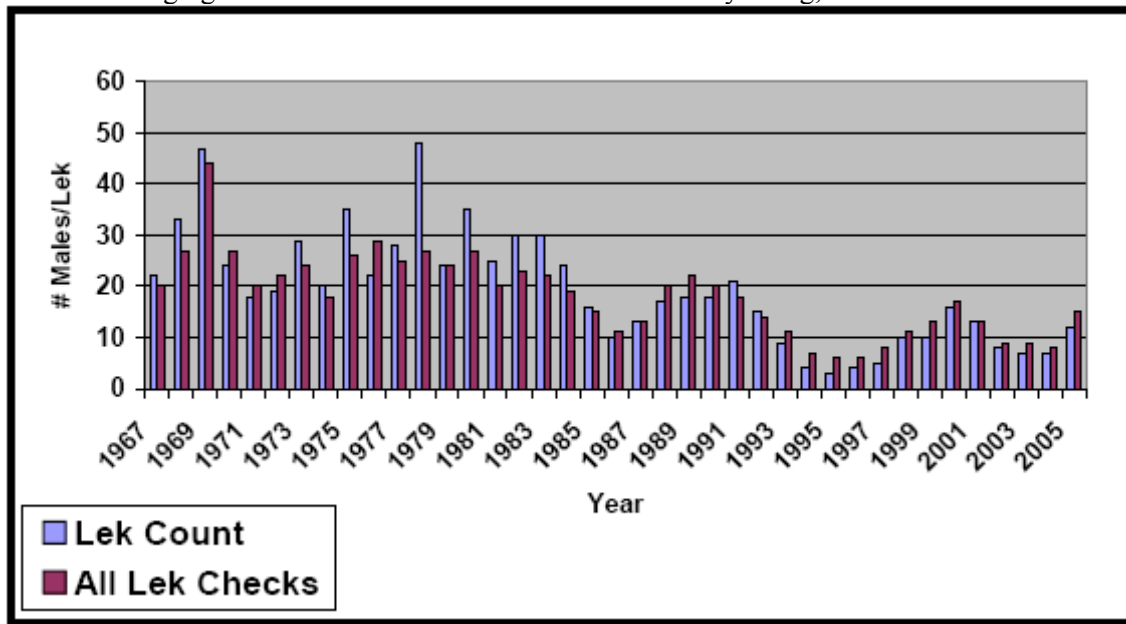
(1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

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

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

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

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



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

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

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

#### **4.2.5.2.3. Mountain plover**

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

#### **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**

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

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

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

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

#### **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. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should reduce project area and downstream potential impacts from proposed water management strategies.

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

The maximum water production is predicted to be 14.0 gpm per well or 434.0 gpm (0.97 cfs or 70 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 0.58% 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 160.6 gpm will infiltrate at or near the discharge points and impoundments (25.9 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 “...resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years.” (PRB FEIS page 4-38).

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

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004) which can be accessed on

their website. This guidance document became effective August 1, 2004, and is currently being revised as the “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which should be approved by June, 2006. Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an “Impoundment Monitoring Plan” to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1<sup>st</sup> 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 gaging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ’s WYPDES permit, 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		3.92	1,421
Historic Data Average at Minimum Flow		4.62	2,154
WDEQ Quality Standards for Wyoming			
Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
Predicted Produced Water Quality			
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 but subsurface drip irrigation is.

The co-mingled produced water quality for the Cook, Canyon, Wall, and Panwee target coal zones 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 to be produced from these 31 wells, for a total of 434.0 for the POD. See Table 4.5 .

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

There are 9 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 9 impoundments (189 acre feet of storage) would potentially be constructed within the project area. These impoundments will disturb approximately 31.72 acres including the dam structures. Of these water impoundments, 7 would be on-channel reservoirs disturbing 12.82 acres, and 2 would be off-channel ponds disturbing 18.9 acres. The off-channel impoundments would result in evaporation and infiltration of CBNG water. Criteria identified in "Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming" (WDEQ, 2002) will be used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

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 0.145 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 2006 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 31 wells is anticipated to be a total of 434.0 gpm or 0.97 cfs to impoundments. 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 drainages from this action (0.15 cfs) may add a maximum 0.12 cfs to the Middle Powder River flows, or 0.13% 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 (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 applied for a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

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

As stated previously, the operator has committed to offer water well agreements to properly permitted domestic and stock water wells within the circle of influence, ½ mile of the nearest proposed federal CBNG well.

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 spring.

In-channel downstream impacts are addressed in the WMP (page 6) for the Ford Ranch POD prepared by CBM Associates, Inc. for Stormcat Energy Corporation.

#### **4.4.2.1. Surface Water Cumulative Effects**

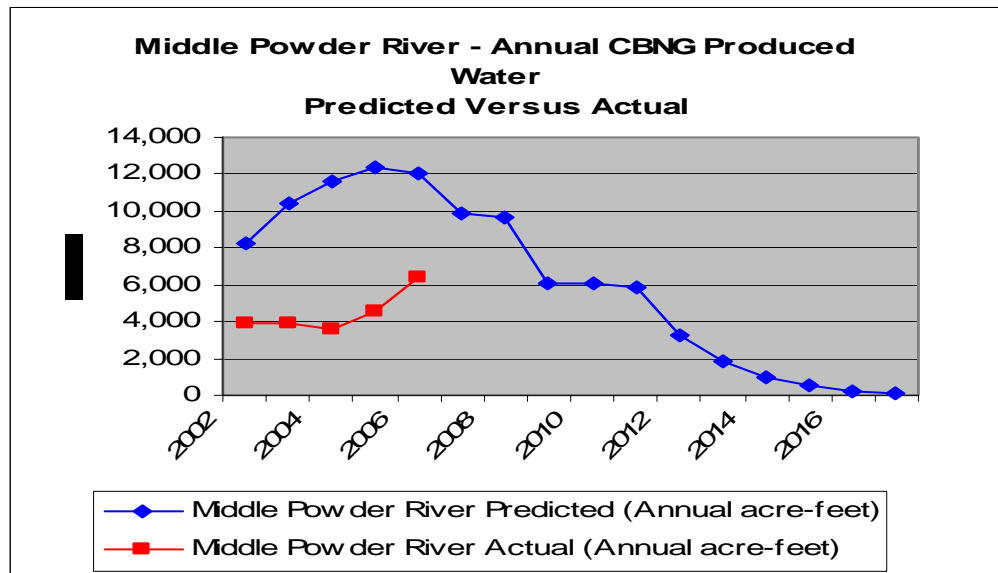
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Middle Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

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
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				
<b>Total</b>	<b>99,080</b>		<b>22,292</b>			

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

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

1. They are proportional to the actual amount of cumulatively produced water in the 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**

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
Brian Kelly	Field Supervisor	USFWS	No

**6. OTHER PERMITS REQUIRED**

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

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