

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

**Pinnacle Gas Resources, Inc.  
Cabin Creek Phase 1**

**ENVIRONMENTAL ASSESSMENT –WY-070- 07-057**

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Pinnacle Gas Resources, Inc.’s Cabin Creek Phase 1 Coal Bed Natural Gas (CBNG) POD comprised of the following 20 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	CABIN CREEK I CB	1CC-29	NENE	29	57N	76W	WYW141873
2	CABIN CREEK I CB	1WP-29	NENE	29	57N	76W	WYW141873
3	CABIN CREEK I CB	9CC-29	NESE	29	57N	76W	WYW141873
4	CABIN CREEK I CB	9WP-29	NESE	29	57N	76W	WYW141873
5	CABIN CREEK I CB	15CC-29	SWSE	29	57N	76W	WYW141873
6	CABIN CREEK I CB	15WP-29	SWSE	29	57N	76W	WYW141873
7	CABIN CREEK I CB	1CC-32	NENE	32	57N	76W	WYW141873
8	CABIN CREEK I CB	1WP-32	NENE	32	57N	76W	WYW141873
9	CABIN CREEK I CB	3CC-32	NENW	32	57N	76W	WYW172627
10	CABIN CREEK I CB	3WP-32	NENW	32	57N	76W	WYW172627
11	CABIN CREEK I CB	7CC-32	SWNE	32	57N	76W	WYW141873
12	CABIN CREEK I CB	7WP-32	SWNE	32	57N	76W	WYW141873
13	CABIN CREEK I CB	15WP-32	NWSE	32	57N	76W	WYW141873
14	CABIN CREEK I CB	5CC-32	SWNW	32	57N	76W	WYW141873
15	CABIN CREEK I CB	5WP-32	SWNW	32	57N	76W	WYW141873
16	CABIN CREEK I CB	10CC-32	SWSE	32	57N	76W	WYW141873
17	CABIN CREEK I CB	10WP-32	NWSE	32	57N	76W	WYW141873
18	CABIN CREEK I CB	15CC-32	NWSE	32	57N	76W	WYW141873
19	CABIN CREEK I CB	17CC-32	SESE	32	57N	76W	WYW151717
20	CABIN CREEK I CB	17WP-32	SESE	32	57N	76W	WYW151717

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

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

1. The Operator, in their POD, has committed to:
  - Comply with all applicable Federal, State and Local laws and regulations.
  - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality

- permits.
  - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well within the POD.
  - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
  3. Alternative C will not result in any undue or unnecessary environmental degradation.
  4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
  5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
  6. Alternative C is the environmentally-preferred Alternative.
  7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
  8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

**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  
Pinnacle Gas Resources, Inc.  
Cabin Creek Phase 1  
PLAN OF DEVELOPMENT  
EA # WY-070-07-057**

## **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 3 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: Pinnacle Gas Resources, Inc.’s Cabin Creek Phase 1 Plan of Development (POD) for 24 coal bed natural gas well APD’s, one EMIT water treatment facility, one compression facility and associated infrastructure.

Proposed Well Information: There were 24 wells proposed initially within this POD, as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	CABIN CREEK I CB	1CC-29	NENE	29	57N	76W	WYW141873
2	CABIN CREEK I CB	1WP-29	NENE	29	57N	76W	WYW141873
3	CABIN CREEK I CB	9CC-29	NESE	29	57N	76W	WYW141873
4	CABIN CREEK I CB	9WP-29	NESE	29	57N	76W	WYW141873
**5	CABIN CREEK I CB	13CC-29	SWSW	29	57N	76W	WYW141873
**6	CABIN CREEK I CB	13WP-29	SWSW	29	57N	76W	WYW141873
7	CABIN CREEK I CB	15CC-29	SWSE	29	57N	76W	WYW141873
8	CABIN CREEK I CB	15WP-29	SWSE	29	57N	76W	WYW141873
9	CABIN CREEK I CB	1CC-32	NENE	32	57N	76W	WYW141873
10	CABIN CREEK I CB	1WP-32	NENE	32	57N	76W	WYW141873
11	CABIN CREEK I CB	3CC-32	NENW	32	57N	76W	WYW172627
12	CABIN CREEK I CB	3WP-32	NENW	32	57N	76W	WYW172627
13	CABIN CREEK I CB	7CC-32	SWNE	32	57N	76W	WYW141873
14	CABIN CREEK I CB	7WP-32	SWNE	32	57N	76W	WYW141873
15	CABIN CREEK I CB	15WP-32	NWSE	32	57N	76W	WYW141873
16	CABIN CREEK I CB	5CC-32	SWNW	32	57N	76W	WYW141873
17	CABIN CREEK I CB	5WP-32	SWNW	32	57N	76W	WYW141873
18	CABIN CREEK I CB	10CC-32	NWSE	32	57N	76W	WYW141873
19	CABIN CREEK I CB	10WP-32	NWSE	32	57N	76W	WYW141873
20	CABIN CREEK I CB	15CC-32	NWSE	32	57N	76W	WYW141873
21	CABIN CREEK I CB	17CC-32	SESE	32	57N	76W	WYW151717
22	CABIN CREEK I CB	17WP-32	SESE	32	57N	76W	WYW151717
*23	CABIN CREEK I CB	18CC-32	SWSE	32	57N	76W	WYW1609077
*24	CABIN CREEK I CB	18WP-33	SWSE	32	57N	76W	WYW1609078

Note:

\*These APD's were withdrawn by the operator prior to the onsite inspection.

\*\*These APD's were withdrawn by the operator following the onsite inspection.

County: **Sheridan**

Applicant: **Pinnacle Gas Resources, Inc.**

Surface Owners: **BLM, Wyoma Sampson & the Pee Gee Ranch**

Project Description:

The proposed action was modified following onsite inspection and involves the development of the project, which includes the following:

- Drilling of 20 total federal CBM wells in **Canyon, Cook, Wall and Pawnee** coal zones to depths ranging from 414 to 908 feet. The Canyon/Cook wells will be commingled and the Wall/Pawnee wells will also be commingled. These wells are proposed on twin locations (two wells per site) for a total of 10 locations.
- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: one discharge point and **one 4.6 acre EMIT water treatment facility** within the **Middle Powder River** watershed. The operator's water management strategy for Cabin Creek Phase 1 POD is solely water treatment and discharge to the Middle Powder River. The specific water treatment process is the Higgins Loop developed by EMIT Water Discharge Technology. The facility includes a 2.2 acre lined off-channel pit that will store CBNG produced water prior to treatment.
- A buried gas, water and power line network and one 5 acre compression facility.

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

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

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well within 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 ensure that potential impacts to natural resources would be minimized. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to 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 or minimize environmental effects of the operator's proposal. The specific changes identified for the **Cabin Creek Phase 1** POD are listed below under 2.3.1:

#### **2.3.1. Changes as a result of the on-sites and subsequent review of submitted materials**

**Table 2.1 Changes agreed to by the operator.**

Lease	Well #	QTR	Sec	TWP	RNG	Comments/Changes
WYW141873	1CC/WP-29*	NENE	29	57N	76W	As per BLM recommendation, Pinnacle will extend the improved access beyond the LWC 29-9 to the east side of the drainage to the primitive access proposed east of the drainage; SU 29-1 will utilize surfacing only and no blading with the natural slope providing adequate drainage.
WYW141873	9CC/WP-29	NESE	29	57N	76W	The wells are staked on a ridge top at the base of a hill making access difficult with limited work space. As per BLM recommendation, Pinnacle moved the wells approximately 150' SW down slope to a more level location.
WYW141873	15CC/WP-29	SWSE	29	57N	76W	The 15-29 CC well will be moved approximately 20' to allow for more work space.
WYW141873	13CC/WP-29	SWSW	29	57N	76W	The operator withdrew these wells due to difficult access requiring engineering through highly erosive soils.
WYW141873	1CC/WP-32	NENE	32	57N	76W	The wells will be moved approximately 20' south and away from the trees to allow for increased work space. The immediate access will not be improved as proposed but will remain as existing primitive.
WYW172627	3CC/WP-32	NENW	32	57N	76W	The spot upgrade SU 33-3 will be crown/ditch/surfaced. Pinnacle will add culverts for drainage. As per BLM recommendation, Pinnacle shifted the well south to allow for more working room and accommodate truck turn around. A few juniper trees will need to be removed for the access and the well location.
WYW141873	5CC/WP-32	SWNW	32	57N	76W	The access is an existing primitive road proposed to be improved. As per BLM recommendation, Pinnacle access will remain primitive.

Lease	Well #	QTR	Sec	TWP	RNG	Comments/Changes
WYW141873	10CC/WP-32	SWSE	32	57N	76W	This is a tight location and the modification to the county road will likely not work with this location. The wells were moved approximately 75' south to the top of the hill. The access will begin off the county road, through a wire gate and follow the edge of the cultivated field.
WYW151717	17CC/WP-32	SESE	32	57N	76W	The wells were moved 750 feet NW to reduce the amount of access needed through heavy sage brush along a side slope where erosion measures would be needed. Reserve pits will need to be lined due to the deep draw located just north of the location.
WYW1609078	18CC/WP-32	SWSE	32	57N	76W	These wells were withdrawn by the operator prior to the onsite.
Fee	Compressor	SWSE	30	57N	76W	The original location was selected by the Pee Gee Ranch on their surface to hide it from the road and ranch houses. A new location providing a ½ mile buffer to Bald Eagle habitat along the Powder River was recommended. Pinnacle worked with the surface owners and a new location located at SWNW section 33, T57N/R76W on Wyoma Sampson's surface. The gas pipeline will corridor an existing access route that will be shared with the adjoining leaseholder.
Fee	EMITS facility	NWNE	29	57N	76W	The location is in a hay field; the access is existing and will not require additional improvement; surge pond is over fee mineral and will be bonded under WYOGCC. A new location providing a ½ mile buffer to Bald Eagle habitat along the Powder River was recommended. Pinnacle worked with the surface owner, PeeGee Ranch, to comply with this request. The new site location is NESE section 20, T76N/R76W.

### 2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

addition to stipulations applied at the time of lease issuance and any standard COA.

#### **2.3.2.1. Surface Water**

1. Channel Crossings:
  - a) 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 CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.
4. The operator will supply a copy of the complete approved Chapter 3 permit to construct associated with treatment facilities to BLM as they are issued by WDEQ.

#### **2.3.2.2. Soils**

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

#### **2.3.2.3. 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.

#### **2.3.2.4. Wildlife**

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. 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.
4. 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.
5. 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.
6. 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.

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

##### **2.3.2.5.1. Bald Eagle**

1. Site-specific project areas will be evaluated for suitable bald eagle nesting and roosting habitat prior to permit approval. Suitable nesting habitat is any mature stand of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes or any significant body of water. Suitable roosting habitat is defined as any mature stands of conifer or cottonwood trees.
2. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the APD/POD or Sundry Notices.
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.

##### **2.3.2.5.2. Black-footed Ferret**

1. Site-specific project areas will be evaluated for suitable black-footed ferret habitat prior to permit approval. Suitable habitat consists of a black-tailed prairie dog town or complex greater than 80 acres (USFWS 1989). A prairie dog town is a group of intact prairie dog holes whose density exceeds 8 burrows/acre; a complex consists of two or more neighboring prairie dog towns each less than 4.34 miles (7 kilometers) from the other (USFWS 1989).
2. Prairie dog colonies will be avoided wherever possible.
3. If any black-footed ferrets are located, the USFWS will be consulted. Absolutely no disturbance will be allowed within prairie dog colonies inhabited by black-footed ferrets.

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

#### **2.3.2.5.3. Mountain Plover**

1. Site-specific project areas will be evaluated for suitable mountain plover nesting habitat prior to permit approval. Flat areas of short-grass prairie or low shrubs with a prevalence of bare ground characterize suitable mountain plover nesting habitat. Typically the vegetation height is less than 4 inches, and bare ground is greater than 30 percent. In the event that a mountain plover is located during construction or operation, the USFWS' Wyoming Field Office (307-772-2374) and the USFWS' Law Enforcement Office (307-261-6365) will be notified within 24 hours.
2. A disturbance-free buffer zone of 0.25 mile will be established around all mountain plover nesting locations between March 15 and July 31.
3. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of known mountain plover nest sites.
4. 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.
5. Where possible, roads will be located outside of plover nesting areas.
6. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.
7. When above ground markers are used on capped and abandoned wells they will be identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.
8. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

#### **2.3.2.5.4. Ute Ladies'-tresses Orchid**

1. Site-specific project areas will be evaluated for suitable Ute ladies'-tresses orchid habitat prior to permit approval. Suitable habitat is characterized by moist soils near springs, lakes, or perennial streams; most occurrences are in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows in the floodplains of perennial streams (USFWS 1995).
2. Suitable habitat will be avoided wherever possible.
3. If suitable habitat for Ute ladies'-tresses cannot be avoided, surveys will be conducted in compliance with USFWS standards (USFWS 1995) by a BLM approved biologist or botanist. Surveys can only be conducted between July 20 and August 31.
4. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid the establishment of noxious weeds.

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

#### **2.3.2.6. Visual Resources**

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

#### **2.3.2.7. 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.

#### **2.3.2.8. 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.

1. All Pinnacle Gas Resources representatives and contractors will have a copy of the approved POD map and conditions of approval with them at all times while conducting activities within the Cabin Creek Phase 1 POD project area.
2. Any additional information concerning changes in treatment methodologies, chemical storage and use, disposal of brine, health and safety issues, or any significant change that differs from the submitted WMP will be provided to the BLM AO and may need prior approval.
3. The Cabin Creek 1 POD water treatment facilities will be fenced to exclude wildlife and cattle (prevent injury and/or death).
4. No construction or surface disturbing activities related to the Water Treatment Facility can take place before the operator has an approved Chapter 3 permit from the WDEQ. A copy of the approved Chapter 3 permit will be submitted to BLM within 30 days of approval.
5. No surface disturbance will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

6. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
 

Reclamation Standards:

  1. The reclaimed area shall be stable and exhibit none of the following characteristics:
    - a. Large rills or gullies.
    - b. Perceptible soil movement or head cutting in drainages.
    - c. Slope instability on, or adjacent to, the reclaimed area in question.
  2. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
  3. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
    - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
    - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
  4. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.
7. Provide 4" of aggregate where grades exceed 8%. Surfacing material must meet requirements set forth in Wyoming Supplement to BLM Road Manual 9113.
8. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:
 

Grade	Drainage Spacing
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-16%	150 ft
9. Top soil will be segregated for all excavation including the entire disturbance area for constructed pads and excavated areas for rig slots, reserve pits, constructed roads, spot upgrades, reservoir upgrades, outfalls and utility trenches. This requirement will be waved for trenches installed with wheel trenchers.
10. The roads proposed to be constructed for this project may impact multiple resource values on the Federal lands within the project area, such as access to previously inaccessible areas, recreational use and satisfaction levels, wildlife resources, wildlife viewing and hunting. Travel within the POD, on all new roads that will access Federal land, will be restricted to authorized company personnel. Signs will be installed. The signs will read "Road Closed. Not for public access". Signs must meet FHA standards as required in the latest edition of the Manual on Uniform Traffic Control Devices. Gates may be required to be installed if necessary to prevent unauthorized travel. The signs and gates will be provided and maintained by the operator.

11. 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 Cabin Creek Phase 1 POD is Culvert Green 18-0617 TPX.
12. 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:

<b>Shallow Loamy Ecological Site Seed Mix</b>		
<b>Species</b>	<b>% in Mix</b>	<b>Lbs PLS*</b>
<i>Thickspike Wheatgrass</i> (Elymus lanceolatus ssp. lanceolatus)	50	6.0
<i>Bluebunch wheatgrass</i> (Pseudoroegneria spicata ssp. Spicata)	35	4.2
<i>Prairie coneflower</i> (Ratibida columnifera)	5	0.6
<i>White or purple prairie clover</i> (Dalea candidum, purpureum)	5	0.6
<i>Rocky Mountain beeplant</i> (Cleome serrulata) /or <i>American vetch</i> (Vicia americana)	5	0.6
<b>Totals</b>	<b>100%</b>	<b>12 lbs/acre</b>

\*PLS = pure live seed

\*Northern Plains adapted species

\*Double this rate if broadcast seeding

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

#### **Wildlife**

1. If any dead or injured threatened, endangered, proposed, or candidate species is located during construction or operation, the U.S. Fish and Wildlife Service’s Wyoming Field Office (307-772-2374) and law enforcement office (307-261-6365) and BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours (T&C1).
2. Observations of any threatened, endangered, proposed, or candidate species within the project area shall be reported to the BLM Buffalo Field Office (307-684-1100).
3. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly re-vegetated if construction activities impact the vegetation in these areas. Re-vegetation will be designed to avoid the establishment of noxious weeds (CM 22).
4. Native seed mixes will be used to re-establish short grass prairie vegetation, where appropriate, during reclamation (T&C19).
5. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall be complied with.

6. 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.
7. 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” (M32). 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, Pinnacle Gas Resources will coordinate with the BLM to determine if additional resurvey will be required.
8. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
9. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
T57N, R76W	32	5CC and 5WP wells and access roads/pipeline

- a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
  - b. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
  - c. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
10. The following conditions will minimize the impacts to sage grouse: A sage grouse survey is required. The survey shall occur within the project area and will extend out 2 miles from the project boundaries within sagebrush shrublands, the operator is required to conduct surveys during established time frames (April 1-May 15). This condition will be implemented on an annual basis for the duration of surface disturbing activities.
  - a. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

- b. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
11. No surface disturbing activity shall occur within 0.67 miles of all sharp-tailed grouse leks from March 1 to June 15 annually, prior to a sharp-tailed grouse survey for the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.**
- a. If a new sharp-tailed grouse lek is identified during the survey, the 0.67 mile timing restriction (March 1 to 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 buffer until the following breeding season. The required survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
  - b. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse
12. No surface disturbing activity shall occur within 1 mile of bald eagle roosting habitat from November 1 through April, annually, prior to a bald eagle roost survey (CM9). No surface disturbing activity shall occur within 1 mile of bald eagle nesting habitat from February 1 through August 15 (CM8) prior to a bald eagle nest survey. **This condition will be implemented on annual basis for the duration of the surface disturbing activities. This timing limitation will affect the “Entire Project Area”.**
- a. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile and a seasonal (November 1 - April 1) minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites. 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.
  - b. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimal disturbance buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).
  - c. 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.
13. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) shall be complied with.

**Rights of Way(s):**

- 1. No surface disturbance will be authorized on federal surface prior to the approval of Right-of-Way(s) for the installation of water pipeline and electrical utilities and/or gas pipeline associated with the following wells: 1CC-29-57-75, 1WP-29-57-75, 17CC-57-76, 17WP-57-76, 1CC-31-57-75 and 1WP-31-57-75.
- 2. No access will be authorized through federal surface prior to the approval of Right-of-Way(s) for the following wells: 1CC-29-57-75, 1WP-29-57-75, 17CC-57-76, 17WP-57-76, 1CC-31-57-75 and 1WP-31-57-75.

Please contact Linda Reed, Reality Specialist, @ (307) 684-1156, Bureau of Land Management, Buffalo, if there are any questions concerning these Right-of-Way COAs.

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

Pinnacle Gas Resources Inc. considered two alternatives for managing CBNG produced water from the Cabin Creek Phase 1 POD, evaporation/infiltration impoundments and re-injection in addition to water treatment & discharge. Evaporation/infiltration impoundments were not perused due to the lack of suitable locations. The presence of clinker outcrops in the POD area could cause uncertain subsurface conditions for infiltration of water and potential resurfacing of the stored water. Pinnacle Gas Resources Inc. has had marginal success with re-injection of CBNG produced water in the Powder River Basin. For the operator, a centrally located water treatment facility will allow treatment and discharge of produced water from Cabin Creek Phase 1 POD as well as future developments.

**3. DESCRIPTION OF AFFECTED ENVIRONMENT**

Applications to drill were received on April 27, 2006. Field inspections of the proposed Cabin Creek Phase 1 CBM project were conducted on 10/24/2006 by the following personnel:

- BLM
  - Jim Verplancke, NRS
  - Mike McKinley, Hydrologist
  - Arnie Irwin, Soil Scientist
  - Guymen Easdale, Wildlife Biologist
  - Clint Crago, Archeologist
  - Al Sprague, Civil Engineer
- Pinnacle Gas Resources
  - Brian Johnston, Project Manager
  - Terry Webster, Water Administrator
  - Jim DeArman, Landman
  - Brent Marchant, Production Manager
  - Heidi Kaiser, ALL Consulting
  - Terry Olson, EMIT
- Landowners
  - Nancy Green, PeeGee Ranch
  - Kyle Sampson

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Guymen Easdale
Floodplains		X		Jim Verplancke, Mike McKinley
Wilderness Values			X	Jim Verplancke

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

### 3.1. Topographic Characteristics of Project Area

The Cabin Creek Phase 1 POD area is approximately 20 miles north of Arvada, Wyoming and is located on both the east and west of Lower Powder River Road within the Township 57N, Range 76W; Sections 20, 29, 30, 31 & 32 in Sheridan County, Wyoming.

The Cabin Creek Phase 1 POD is within the Powder River Basin (PRB) which lies within the Missouri Plateau of the northern Great Plains ecological region (Kuchler, 1964; Bailey, 1976). The dominant physiographic character of the uplands is one of a gently rolling prairie occasionally punctuated by prominent, non-eroded buttes and ridges. The entire project area is within the Big Remington Creek Watershed tributary of the Middle Powder River. The Big Remington watershed lies on east and west of the main stem Middle Powder River. Tributaries of the Big Remington watershed are immediately adjoined by steeply eroded "draws" and "breaks" (i.e., ridges and canyons) surrounding subordinate ephemeral or intermittent streams in the drainage bottoms for several miles distant from the main stem river. Typical of the Powder River Breaks, many slopes are steep ranging from 15% to more than 25%. Hillsides appear terraced, and hilltops are generally at uniform elevations. The Middle Powder River valley within this area has relatively wide (i.e., 1-2 miles), flat floors with terraced floodplains. Elevations within the project area range from 3,400 to 4,300 feet above sea level.

The regional climate is mid-latitude, interior continental, with relatively long, cold winters and relatively short, warm-hot summers and distinct spring and fall shoulder seasons. The summer growing season (frost free) typically ranges from 95-130 days (ave. = 120 days) between late May and mid-September, with considerable daily variation and occasional cool periods. On the plains, average daily temperatures typically range from 5-10 (low) and 30-35 (high) degrees Fahrenheit in mid-winter, and between 55-60 (low) and 80-85 (high) degrees Fahrenheit in mid-summer. The regional climate is considered semi-arid, and typically, total annual precipitation ranges from 10-14 inches, with most of that coming as rain between May and September. Snowfall varies from year-to-year, but it is common to have continuous snow cover for a period of 60 days or more in a "normal" winter. Annual prevailing winds are from the southwest, but local conditions vary. Arctic air masses with strong winds commonly occur during the winter months, and air masses from the Gulf of Mexico sometimes influence summer weather conditions.

### 3.2. Vegetation & Soils

The Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains indicates that the project area falls in the 10-14”

Northern Plains precipitation zone. The dominant landforms and the soils of this area are hill sides, ridges and escarpments with sandy to loamy soils and intermittent shale outcroppings. The predominant ecological site occurring within the proposed Cabin Creek Phase 1 POD is shallow loamy and the plant communities vary from mixed sagebrush and grass plant community along the south facing hill sides and draw bottoms to mixed sagebrush and grass with juniper and ponderosa overstory on north facing slopes and ridge tops.

### **3.2.1. Mixed Sagebrush/Grass Plant Community**

Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush control. 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, 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 Historical Climax Plant Community, 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.

### **3.2.2. General Soil Information:**

Landforms vary greatly composed of hill sides, ridges and escarpments in the uplands to flood plains along the Middle Powder River. The soils throughout the Cabin Creek Phase 1 project area vary from of this site are shallow (less than 20" to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin ineffectual layers of other textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

The main soil limitations include: depth to bedrock, low organic matter content, and soil droughtiness. The low annual precipitation should be considered when planning a seeding.

For more detailed soil information, see the NRCS Soil Survey WY633.

### **3.2.3. Invasive Species**

Three different state-listed noxious weeds were discovered by a search of inventory maps and/or databases provided by the Sheridan County Weed and Pest District. During subsequent field inspections by the operator and BLM, weed infestations were not observed. However, the onsite inspection was held in later October and after the growing season making it difficult to identify plant species. Pinnacle has submitted an Integrated Pest Management Plan to BLM with the POD to address monitoring for and

treatment of noxious weeds on federal lands. The operator has consulted with the Sheridan County Weed and Pest District for chemical mixture and application rates. Pinnacle will submit a Pesticide Use Proposal (PUP) form WY-04-9222-1 to the BLM for the chemical treatment of noxious weeds. A COA has been applied to this approval that no surface disturbance will be authorized on federal lands prior to the approval of a Pesticide Use Plan submitted by the operator to the Buffalo Field Office.

### **3.3. Wildlife**

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

A habitat assessment and wildlife inventory surveys were performed by All Consulting. All Consulting performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006. A habitat assessment for Ute ladies'-tresses orchid was conducted using the orchid habitat screen developed by the Fish and Wildlife Service. No formal survey was conducted for the Ute ladies'-tresses orchid.

A BLM biologist conducted field visits on October 24, 2006 and February 5, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

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

#### **3.3.1. Big Game**

Big game species expected to be within the Cabin Creek I project area include white-tailed deer, mule deer, and pronghorn antelope. The project area is part of the Powder River mule deer herd unit. The 2004 estimated Powder River herd population was 55,561 with a population objective of 52,000 (WGFD 2004). The project area is part of the Clearmont pronghorn antelope herd unit. The 2004 estimated Clearmont herd population was 4,549 with a population objective of 3,000 (WGFD 2004). The project area is part of the Powder River white-tailed deer herd unit. The 2004 estimated Powder River herd population was 12,716 with a population objective 8,000 (WGFD 2004).

The WGFD has designated 100% of the project area as winter yearlong range for mule deer, 90% of the project area as yearlong range for antelope and the riparian corridor along the Powder River as yearlong range for white-tailed deer.

Populations of mule deer, pronghorn antelope and white-tailed deer within their respective hunt areas are above WGFD objectives.

**Winter** use is when a population or portion of a population of animals uses the documented suitable habitat sites within this range annually, in substantial numbers only during the winter period. **Winter-Yearlong** use is when a population or a portion of a population of animals makes general use of the

documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. **Parturition Areas** are documented birthing areas commonly used by females. It includes calving areas, fawning areas, and lambing grounds. These areas may be used as nurseries by some big game species. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

### **3.3.2. Aquatics**

The project area is drained by ephemeral tributaries of the Powder River. The Powder River goes through the northwest portion of the Cabin Creek project area.

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

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

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

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

### **3.3.3. Migratory Birds**

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

### 3.3.4. Raptors

Two raptor nest sites were identified by ALL Consulting during the May 1, 8 and 15, 2006 raptor surveys and the BLM Buffalo Field Office database, the two nests are within 0.5 mile of the project area, both nests were inactive in 2006.

**Table 3.2.** Documented raptor nests within the Cabin Creek I project area in 2006.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
None	Unknown	417697E 4970805N	NENE Sec31 T57N, R76W	cottonwood live	poor	inactive
617	Unknown	417324E 4971144N	SE Sec.30 T57N,R76W	dead ponderosa pine	good	inactive

### 3.3.5. Threatened and Endangered and Sensitive Species

#### 3.3.5.1. Threatened and Endangered Species

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

##### 3.3.5.1.1. Black-footed ferret

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

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

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

No active black-tailed prairie dog colonies exist within one mile of the Cabin Creek I project area. Approximately 2.5 miles north of the Cabin Creek I project area exists a large prairie dog colony (approximately 1,100 acres in size) the colony is located in Township 57 North, Range 76 West, Sections 8 and 9, occupying most of both sections. Two inactive colonies exist approximately 0.5 miles north of the project area. The project area is located approximately 3.5 miles from Recluse, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the Cabin Creek I project area.

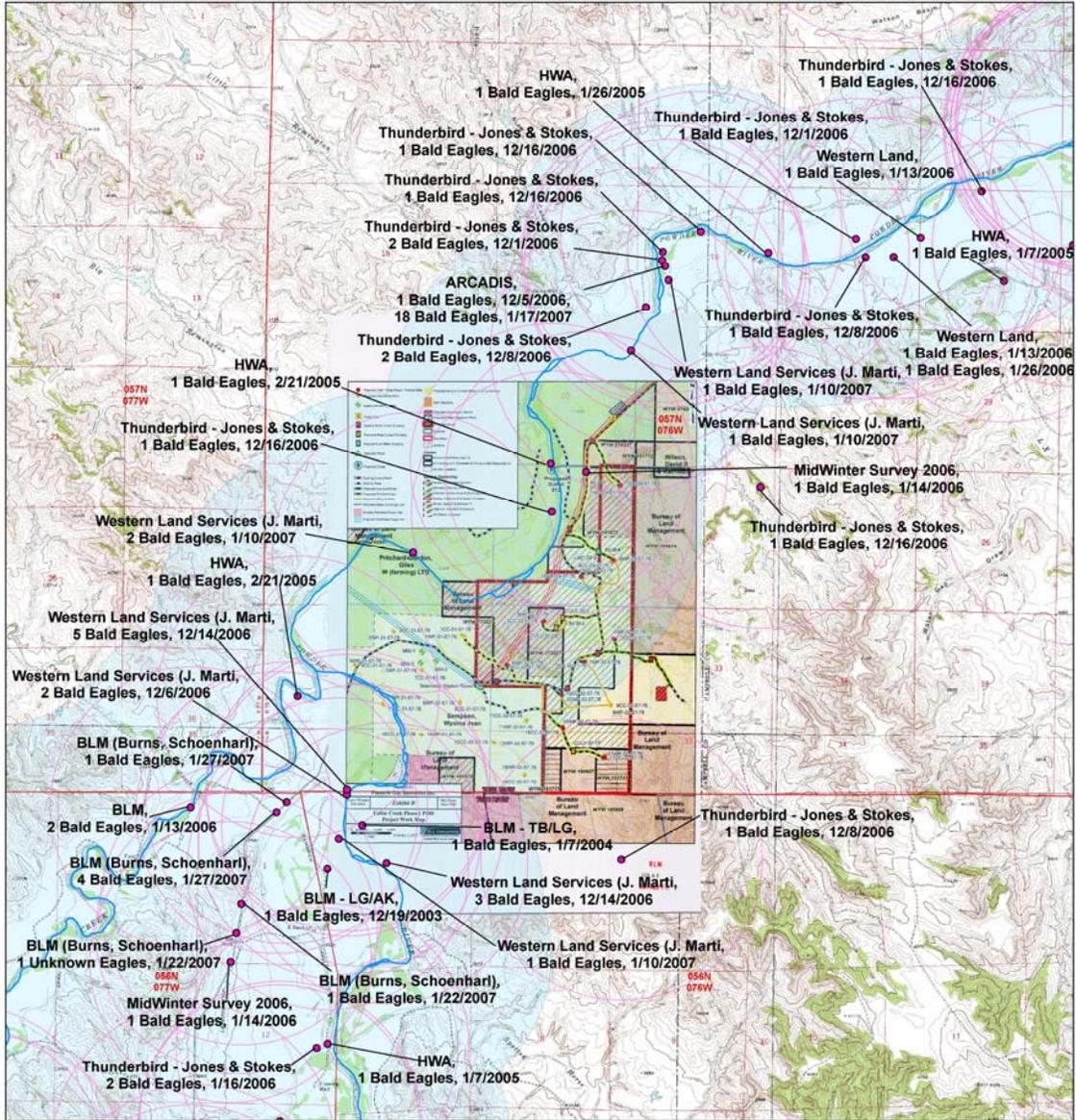
##### 3.3.5.1.2. Bald eagle

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

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

The Powder River runs through the northwestern portion of the project area. Large cottonwood galleries are found along the Powder River flood plain and are within 0.1 to 1.0 mile from the Cabin Creek I project area and large pockets of mature ponderosa pine are found within the project area. During the 2006-2007 bald eagle winter roost survey period, bald eagles were observed at 25 different locations. Bald eagles were observed within the Cabin Creek I project area and all along the Powder River. Within 1 mile of the project area 18 bald eagles were observed in one tree.

# Cabin Creek Bald Eagle Observations 2006/2007



**Legend**

- Eagle Observations
- 1-mile eagle buffers
- Major Streams
- ▭ 1-mile stream buffer
- ▭ Township



Map created 3/2/2007 by C. Schoenharl

#### **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 (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.

Suitable orchid habitat is not present within the Cabin Creek I project area. No springs occur within the project area and the vegetation within the Powder River flood plain is dry upland grasses. The drainages within the project area are ephemeral and flow only in response to a precipitation event or snow melt.

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

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

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

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

No active black-tailed prairie dog colonies exist within one mile of the Cabin Creek I project area. Approximately 2.5 miles north of the Cabin Creek I project area exists a large prairie dog colony (approximately 1,100 acres in size) the colony is located Township 57 North, Range 76 West, Sections 8 and 9 occupying most of both sections). Two inactive colonies exist approximately 0.5 miles north of the project area.

##### **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).

The Cabin Creek I project area contains poor sage-grouse habitat. The project area has a few small pockets (5 acres or less) of sagebrush, the sagebrush plants within these pockets are columnar in growth form and provide little protective cover and the plants average 15-18 inches tall. The grass cover within these pockets ranges from 10 to 50% cover. The terrain is relatively steep and rugged. Ponderosa pines and juniper trees occupy the ridges and draws. The areas which are flat to slight rolling have been converted to agriculture fields. No sage grouse leks occur within 7.6 miles of the Cabin Creek I project area.

### 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.

In general, suitable mountain plover habitat does not exist within the project area. No prairie dog colonies are present within the project area. Most of the project area is steep and rugged and the flat areas are cultivated fields. The Powder River flood plain and other flat areas within the project area that are being used for agriculture and grazing could become mountain plover habitat depending on what species gets planted and on agricultural and grazing practices. If prairie dog colonies become established and if the area is over grazed then the area may be come potential mountain plover habitat.

### 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. The land which is contained within the defined POD boundary is predominately characterized as Wyoming Big Sage Steep and Dry-Land Crops, with topographical elevations that range from 3,400 – 4,300 feet above sea level. In general, the topography of the Cabin Creek Phase 1 POD area consists of moderate to steep sloping ridges and draws, with infrequent ephemeral bottomlands of drainages rising to a flattop mesa. In many areas, including lands near the Middle Powder River, terrain is relatively rugged with medium to large sandstone rock and clinker outcrops and prominent ridges. The Middle Powder River flows through the project area which lies within the Big Remington Creek drainage (28,390 acres) including the following tributaries Little Remington Creek, North Cabin Creek, Cabin Creek, Squaw Creek, Buffalo Creek, Clear Creek, Spotted Horse Creek, Ivy Creek, Joe Creek and Little X Bar Creek, all within 10 miles of the project area. The climate in the area is semi-arid, averaging 12 inches of precipitation annually, more that 60% of which occurs between May and September.

### 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 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.

The operator completed a search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area and reported 15 registered stock and domestic water wells within the POD boundary with depths ranging from 27 to 800 feet (see WMP, Appendix A). For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

### 3.5.2. Surface Water

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

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

The operator did not identify any natural spring within the Cabin Creek Phase 1 POD boundary (T57N, R76W, Sections 29, 30, 31 and 32).

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 Cabin Creek Phase I project prior to on-the-ground project work (BFO project #s. 70060192, 70060192.A). Foothills Archaeological Consultants conducted Class III cultural resource inventories following the Archeology and Historic Preservation: Secretary of Interior’s Standards and Guidelines (48FR190) for the proposed project. A BLM archaeologist, reviewed the reports for technical adequacy and compliance with BLM standards, and determined them to be adequate. No cultural resources are located within the Area of Potential Effect (APE), however the following resources are located near the project area.

**Table 3.6 Cultural Resource Sites Identified Near the Cabin Creek I Project Area**

Site Number	Site Type	Eligibility
48SH173	Prehistoric open camp	Unevaluated
48SH174	Prehistoric open camp	Unevaluated
48SH175	Prehistoric open camp	Unevaluated
48SH194	Prehistoric open camp	Unevaluated
48SH195	Prehistoric lithic scatter	Unevaluated
48SH196	Prehistoric lithic source	Unevaluated
48SH197	Prehistoric lithic scatter	Unevaluated
48SH1244	Historic road	Not Eligible

## 4. ENVIRONMENTAL CONSEQUENCES

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

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

Overall impacts to vegetation and soils from surface disturbance will be reduced by adherence to the operator’s plans and BLM applied mitigation. These 20 wells will be drilled as twin well locations for a total of 10 locations. Of the 10 proposed well locations, none are on existing or reclaimed conventional well pads and all 20 can be drilled without a well pad being constructed. Surface disturbance will occur with the drilling of the 20 wells. This disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), 2 reserve pits excavated (estimated approximate size of 20 x 40 x 14 feet each), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 10 well locations would involve approximately 0.45 acre/location for 4.5 total acres. This would be a short-term, impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Facilities within the Cabin Creek Phase 1 POD include one 4.6 acre EMIT water treatment facility and one 5 acres compression station. (Prior to approval of the POD, Pinnacle disturbed a 5 acre area constructing a compressor station pad within the ½ mile bald eagle habitat buffer. An alternate location was selected for the facility.) An additional 1.41 miles of overhead power is proposed within the project area.

Approximately 1.54 miles of improved roads would be constructed to provide access to various well locations. Approximately 1.94 miles 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 0.26 miles of pipeline would be constructed outside of corridors as well as 6.16 miles of pipeline within common 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) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

**Table 4.1 - SUMMARY OF DISTURBANCE**

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Non-constructed Pad	10	Site Specific	4.50	Long Term
Constructed Pad	None		0.0	
Gather/Metering Facilities	0	Site Specific	0	Long Term
Screw Compressors	1	545’ x 400’	5.00	Long Term
Channel Disturbance				Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Culverts/Low Water Crossings	4	0.01	0.04	
Improved Roads				Long Term
No Corridor	0.14	30' Width	0.50	
With Corridor	1.40	50' Width	8.50	
2-Track Roads	All existing			Long Term
No Corridor	0	12' Width	0	
With Corridor	0	20' Width	0	
Pipelines				Short Term
No Corridor	0.26	30' Width	0.93	
With Corridor	1.63	30' Width	5.90	
& With Existing Roads	3.13	20' Width	7.59	
Buried Power Cable				Short Term
No Corridor	0.30	30' Width	1.10	
Overhead Powerlines	1.41	30' Width	5.13	Long Term
Telemetry Tower	1	50' x 50'	0.06	Long Term
Water Treatment Facility	1	300' x 670'	4.6	Long Term
Water Discharge Points	1	0.01	0.01	
*Screw Compressors Pad	1	Site specific	3.30	Long Term

\* Note: Prior to approval of the federal undertaking, the operator began construction of the compressor station at a location which was abandoned due to its proximity to Bald Eagle habitat adding 3.3 acres of disturbance to the project area.

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. 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 from surrounding CBNG development. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed. This includes but is not limited to the 3 state-listed noxious weeds were discovered by a search of inventory maps and/or databases provided by the Sheridan County Weed and Pest District; leafy spurge, Russian knapweed and salt cedar. However during subsequent field inspections by the operator and BLM during the fall of 2006, weed infestations were not observed. The operator has developed an Integrated Pest Management Plan in consultation with the Sheridan County Weed and Pest District. Mitigation as required by BLM applied COAs will ensure that potential impacts from noxious weeds and invasive plants will be minimal.

#### 4.1.2. Cumulative Effects

The PRB FEIS stated that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the Project Area. SAR in water in the sub-watersheds could be altered by saline soils

because disturbed soils with a conductivity of 16 mmhos/cm could release as much as 0.8 tons/acre/year of sodium (BLM 1999c). Soils in floodplains and streambeds may also be affected by produced water high in SAR and TDS. (PRB FEIS page 4-151).

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are anticipated to be within the analysis parameters of 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 37.3% 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 Middle Powder River.
- The WMP for the Cabin Creek Phase 1 POD proposes that produced water will likely contribute to flows downstream. The treated water discharged to the Middle Powder River is addressed by WYDEQ under Effluent Limitations and Monitoring Requirements of WYPDES permit WY0051934.

No additional mitigation measures are required.

## **4.2. Wildlife**

### **4.2.1. Big Game Direct and Indirect Effects**

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

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

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

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. In order to survive below the maintenance level, requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978)

further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

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

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

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

All water produced from coal bed natural gas development within Pinnacle's Cabin Creek I-IV project areas and Storm Cat's PEE GEE POD will be piped to a central water treatment facility, where the water will be treated and directly discharged into the Powder River. The water treatment facility within the Cabin Creek I project area is permitted to discharge a maximum of 4.2 million gallons of water per day (6.5 cubic feet per second).

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

#### **Change in Water Quality**

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

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

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage. This report indicated that CBNG discharges could affect native species in the drainage.

Ion exchange treatment facilities have demonstrated the ability to reduce sodium absorption ratios and electrical conductivities below standards established for the Powder River by the WDEQ. Bicarbonate and barium levels are also significantly reduced during the treatment process (CBM Associates 2005).

The water quality projected by Pinnacle Gas Resources to be discharged to the Powder River from this project is an EC of 2,500 $\mu$ mhos/cm from November 1 through February 28, with a SAR of 5.0 and EC of 2,000 $\mu$ mhos/cm from March 1 through October 31, with a SAR of 6.5.

The daily maximum at the outfall for dissolved iron must be less than 250 $\mu$ g/l (All Consulting 2006).

#### **Change in Water Quantity**

Native fauna in the Powder River drainage have evolved and adapted to a very dynamic hydrograph with

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

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately 6.5 cfs of project treated water to an average flow of 30 cfs into the Powder River may affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

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

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

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

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

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

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

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

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with

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

**4.2.3.1. Cumulative effects**

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

**4.2.4. Raptors Direct and Indirect Effects**

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

**Table 4.2. Wells within close proximity to documented raptor nests within the Cabin Creek I project area** (Timing limitations will apply to these wells).

<b>BLM ID#</b>	<b>UTM (NAD 83)</b>	<b>SPECIES</b>	<b>STATUS</b>	<b>WELL / PIT NUMBER</b>	<b>DISTANCE</b>
None	417697E 4970805N	unknown	inactive	13WP &13CC 5WP&5CC	0.2 miles 0.35 miles
617	417324E 4971144N	unknown	inactive	13WP &13CC	0.25 miles

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.

Due to topography wells 13WP and 13CC could not be located outside of the quarter mile. Moving the wells would cause considerable more surface disturbance.

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 were analyzed in a Biological Assessment and a summary is provided in Table 4.3. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

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

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<b>Endangered</b> Black-footed ferret ( <i>Mustela nigripes</i> )	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Habitat does not exist within the project area.
<b>Threatened</b> Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Mature forest cover often within one mile of large water body.	K	LAA	Project includes overhead power and roads.
Ute ladies'-tresses orchid ( <i>Spiranthes diluvialis</i> )	Riparian areas with permanent water	NP	NE	Powder River flood is dry upland grasses, no proposed development along river.

**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

The Cabin Creek I project area does not contain suitable habitat for black-footed ferrets. Implementation of the proposed development should have “**no effect**” on the black-footed ferret.

#### 4.2.5.1.2. Bald eagle

Bald eagle nesting and winter roosting habitat exists within the Cabin Creek project area. During the 2006-2007 bald eagle winter roost survey period, bald eagles were observed at 25 different locations. Bald eagles were observed within the Cabin Creek I project area and all along the Powder River. Within 1 mile of the project area 18 bald eagles were observed in one tree. The proposed project is “**likely to adversely affect**” bald eagles due to the presence of occupied habitat, existing and proposed roads, and overhead electric lines.

There is 1.0 mile of existing overhead three-phase distribution lines within the project area. The existing overhead powerlines may or may not be in compliance with the Avian Power Line Interaction Committee’s (1996) suggested practices and with the Service’s standards (USFWS 2002). Pinnacle Gas Resources is proposing an additional 1.41 miles of overhead three-phase distribution lines. There are currently 0.61 miles of two-track roads and 1.25 miles of improved roads within the project area, with 1.53 miles of proposed improved roads.

The presence of overhead power lines and the county road may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking, such as the **Cabin Creek I** project area. Twenty-two raptors including 16 golden eagles were electrocuted within Wyoming’s Powder River Basin in 2003; 12 electrocutions were on recently constructed lines which did not fully meet APLIC standards (Rogers pers. Comm.). 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.

Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. There are 1.8 miles of improved county road (County Road 341- The Powder River Road) running through the project area and the county road borders the project area to the southwest and to the north. The Powder River Road is the main access road into the region. Traffic volume and vehicle size along the Powder River Road has increased considerably since the development of natural gas within the region. As gas development continues to grow so will traffic volume and vehicle size. Based on personal observations and conversations with landowners and operators the average speed on the Powder River Road is 45-65 miles per hour (Easdale 2006-2007). Sheridan County is currently realigning the county road, the new road will eliminate many of the curves in the road which occur within the Cabin Creek I project area. Vehicle speed is likely to increase. Within the project area the Powder River Road ranges from 0.09 miles (475 feet) to 0.8 miles from the Powder River, with the county road so close to the Powder River the potential for big game mortality increases. Bald eagle mortalities may increase as they feed on big game carcasses along the Powder River Road. Also, bald eagle mortalities may increase due to vehicle collisions as bald eagles forage through prairie dog colonies adjacent to the project area.

Collision risk increases with vehicle size and travel speed. Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%).

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

Produced water will be treated and direct discharge into the Powder River. Suitable habitat is not present within the Cabin Creek I project area, the Powder River flood plain is dry upland grasses. No proposed development will occur along the Powder River. Implementation of the proposed development should have “**no effect**” on Ute ladies tresses orchid.

#### **4.2.5.2. Sensitive Species Direct and Indirect Effects**

**Table 4.4 Summary of Sensitive Species Habitat and Project Effects.**

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<b>Amphibians</b>				
Northern leopard frog ( <i>Rana pipiens</i> )	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will effect existing waterways. Prairie not mountain habitat.
Spotted frog ( <i>Ranus pretiosa</i> )	Ponds, sloughs, small streams	NP	NI	
<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 cucularia</i> )	Grasslands, basin-prairie shrub	NP	NI	No prairie dog colonies exist within the project area.
Ferruginous hawk ( <i>Buteo regalis</i> )	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sage brush/grass lands 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	NP	NI	Habitat not present.
Mountain plover ( <i>Charadrius montanus</i> )	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
Northern goshawk ( <i>Accipiter gentilis</i> )	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon ( <i>Falco peregrinus</i> )	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow ( <i>Amphispiza billneata</i> )	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher ( <i>Oreoscoptes montanus</i> )	Basin-prairie shrub, mountain-foothill shrub	S	NI	Sagebrush cover will be affected.
Trumpeter swan ( <i>Cygnus buccinator</i> )	Lakes, ponds, rivers	S	MIIH	Powder River runs through the area. Habitat will not be disturbed.
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	S	MIIH	Streamside habitat present. Construction and drilling activity may displace birds.
<b>Fish</b>				
Yellowstone cutthroat trout ( <i>Oncorhynchus clarki bouvieri</i> )	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
<b>Mammals</b>				
Black-tailed prairie dog ( <i>Cynomys ludovicianus</i> )	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	NP	NI	No prairie dog colonies are within the project area.
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 and sage brush habitat will be lost.
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
<b>Plants</b>				
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**

No active black-tailed prairie dog colonies exist within one mile of the Cabin Creek I project area.

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

The Cabin Creek I project area contains poor sage grouse habitat. No sage grouse leks occur within 7.6 miles of the Cabin Creek I project area.

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

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

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

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

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

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

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

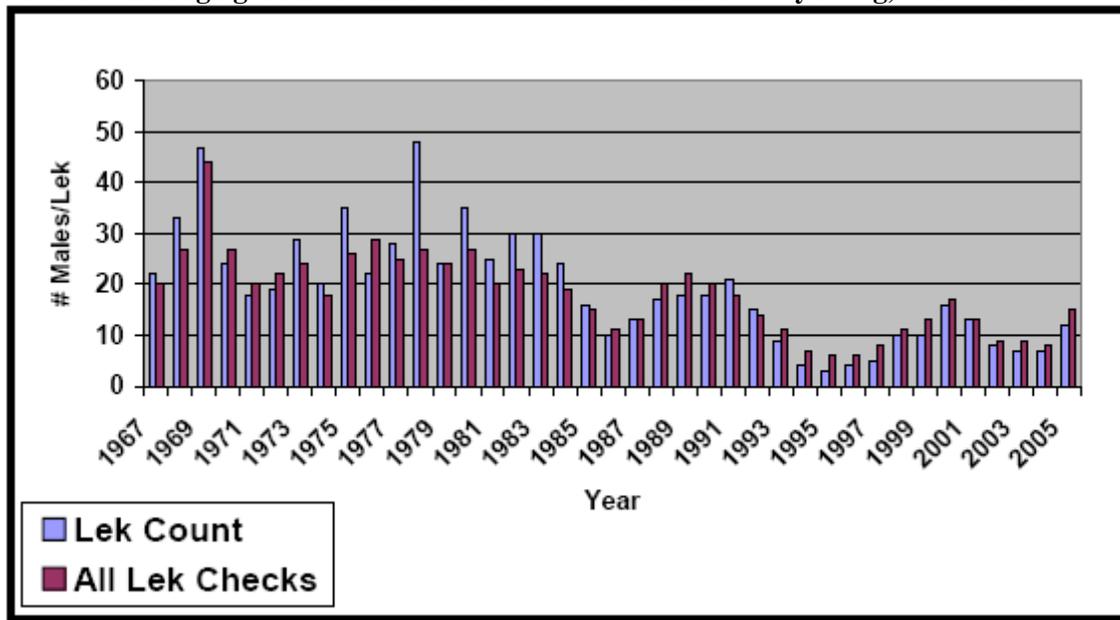
prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

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

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

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

**Figure 4.1. 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**

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines provide perch sites for raptors potentially

resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

Currently, suitable mountain plover habitat does not exist within the project area. The project should not affect mountain plovers.

#### **4.2.5.3. Cumulative effects**

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

#### **4.3. West Nile Virus**

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 minimize project area and downstream potential impacts from proposed water management strategies.

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

The maximum water production is predicted to be 20.0 gpm per well or 400.0 gpm (0.89 cfs or 645.1 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 12,328 acre-feet in 2006 (maximum production is estimated in 2006). As such, the volume of water resulting from the production of these wells is 5.2% of the total volume projected for 2006, which will result in an increase to the present volume of water produced from coal bed natural gas in the Powder River Basin. This volume of produced water is also within the predicted parameters of the PRB FEIS.

#### **4.4.1. Groundwater**

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 27 to 800 feet compared to the proposed CBNG wells within the Cabin Creek Phase 1 POD that range in depth from 414 to 908 feet. 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 (1/2 mile) of the proposed wells.

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

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

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

##### **4.4.1.1. Groundwater Cumulative Effects:**

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

Development of CBM through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water “...cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed

during reasonably foreseeable CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65). No additional mitigation is necessary.

#### 4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gaging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ’s WYPDES permit, 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 –		2.0	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Moorhead, MT Gauging station 06324500			
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		
WDEQ Water Quality Requirement for WYPDES Permit # WY0051934			
At discharge point 012			
November 1 to February 28 annually	5,000	5.0	2,500
March 1 to October 31 annually	5,000	6.5	2,000
Total Flow Limit 4.20 MGD (6.5 cfs)			
Predicted Produced Water Quality			
Cook/Canyon (commingled)	1,160	44.8	1,910
Wall/Pawnee (commingled)	1,500	57.4	2,370

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1,160mg/l TDS for Cook/Canyon (commingled) and 1,500mg/l TDS for Wall/Pawnee (commingled) which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the Canyon/Cook 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 20.0 gallons per minute (gpm) is projected is to be produced from these 10 wells, for a total of 200 gpm and 400.0 gpm for the POD. See Table 4.4.

The quality for the water produced from the **Wall/Pawnee** 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 **20.0** gpm is projected is to be produced from these **10** wells, for a total of **200.0** gpm and **400.0** gpm for the POD. See Table 4.4.

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

There is 1 discharge point proposed for this project, outfall 012. It has been appropriately sited and utilizes appropriate water erosion dissipation designs. The proposed EMIT water management facilities was evaluated for compliance with best management practices during the onsite.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in **2006** at a total contribution to the mainstem of the **Middle Powder River** of 86 cfs (PRB FEIS pg 4-102). The predicted maximum discharge rate from these 20 wells is anticipated to be a total of **400.0** gpm or 0.89 cfs. All CBNG produced water from the Cabin Creek Phase 1 POD will be piped to the EMIT facility and discharged directly to the Middle Powder River at outfall 012 (see WMP). This action will add a maximum **0.89** cfs to the **Middle Powder River** flows, or **1.03%** 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). The addition of the water produced from these wells may impact the water quantity in the mainstem of the **Middle Powder River**. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 3). Based on the area of the **Big Remington Creek** watershed above the POD (**44.4** sq mi) and an assumed density of **2** wells per location every **80** acres, the potential exists for the development of **355** wells which could produce a maximum flow rate of **7100** gpm (**15.8** cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 15.8 cfs, is much less than the volume of runoff estimated from the 2-year storm event for **Big Remington Creek (181.07 cfs)** of the drainage. Therefore, the estimated flow rate of water produced from the full development in the watershed above the project area is less than the natural runoff from the area.

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit WY0051934 for the discharge of water produced from this project from the WDEQ. The total flow limit at outfall 012 under this permit allows for 4.2 million gallons per day (6.5 cfs) to be discharged. The total CBNG produced water anticipated from the 20 wells within the Cabin Creek Phase 1 POD is 0.89 cfs.

Permit effluent limits were set at (WYPDES WY0051934 page 3-4):

pH	6.5 to 9.0 max
TDS	5000 mg/l max
Specific Conductance	
Nov. 1 to Feb. 28 annually	2500 mg/l max
March 1 to Oct. 31 annually	2000 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	250 µg/l max
Dissolved manganese	630 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	150 mg/l max

The WYPDES permit also addresses existing downstream concerns, such as irrigation use. The designated point of compliance identified for this permit is a **downstream Powder River monitoring station (below outfall 012)**.

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

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

In-channel downstream impacts are addressed in the WMP for the **Cabin Creek Phase 1** POD prepared by ALL Consulting for **Pinnacle Gas Resources, Inc.**

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

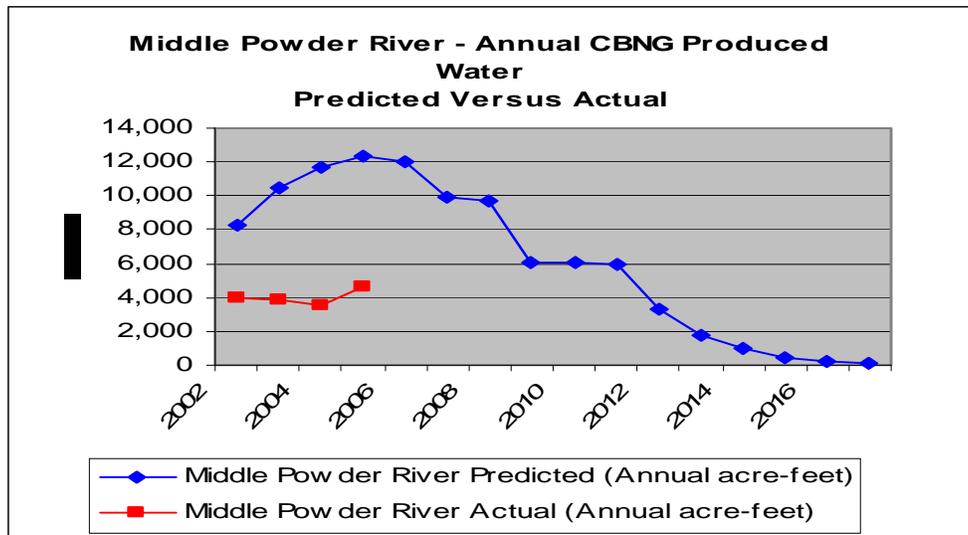
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the **Middle Powder River** watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2005, all producing CBNG wells in the **Middle Powder River** watershed have discharged a cumulative volume of 15,924 acre-ft of water compared to the predicted **42,646** 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 **37.3%** 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 *2005 Data Updated 4-5-06***

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				
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>11,336</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. Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The

water quality analysis in the PRB FEIS was conducted using produced water quality data, where available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

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

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are anticipated to be within the analysis parameters of 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 37.3% 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**

The Bureau of Land Management has determined that no historic properties are within the area of potential effect. On 1/10/07 the Bureau electronically notified the Wyoming State Historic Preservation Officer (SHPO) following section V(A)(2) of the Wyoming State Protocol that no historic properties were identified in the proposed project area.

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
Sara Needles	Wyoming SHPO	Wyoming SHPO	No
Brad Roger	Wildlife Biologist	US Fish & Wildlife Service	No

## 6. OTHER PERMITS REQUIRED

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

## 7. REFERENCES AND AUTHORITIES

All Consulting. 2006. Cabin Creek I Plan of Development Water Management Plan. All Consulting. Tulsa Oklahoma

All Consulting. 2006. Habitat Assessment and Wildlife Survey. All Consulting. Tulsa Oklahoma

All Consulting. 2006. Master Surface Use Plan for Coal Bed Methane Wells: Cabin Creek I. All Consulting. Tulsa Oklahoma

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

Aksamit, Jim. 2007. Bald Eagle Winter Roost Survey 2006-2007 Cabin Creek I (Pinnacle). Western Land Services. Sheridan, Wyoming

Avian Power Line Interaction Committee. 2006. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute. Washington, D.C. 125pp.

Bennet, Bob. 2004. Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval (COAs). BLM (State Director, Wyoming). Cheyenne, WY. 7pp.

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

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western north America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. Transactions of the North American Wildlife and Natural Resources Conference. 67: 337-349

Bruan, C.E. 1986. Changes in sage grouse lek counts with the advent of surface coal mining. Proceedings: issues and technology in the management of impacted western wildlife. 2: 227-231.

Bruan, C.E. 1998. Sage-grouse declines in the western North America: what are the problems? Western Association of Fish and Wildlife Agencies Proceedings 78: 139-156.

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

### Code of Federal Regulations (CFR)

1. 40 CFR All Parts and Sections inclusive Protection of Environment Revised as of July 1, 2004.
2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2006.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitat. Wildlife Society Bulletin 28: 967-985.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation assessment of greater sage-grouse and sage brush habitats. Western Association of Fish and Wildlife Agencies.

- Unpublished report. Cheyenne, Wyoming, USA. [http://sagemap.wr.usgs.gov/Docs/Greater\\_Sage-grouse\\_Conservation\\_Assessment\\_060404.pdf](http://sagemap.wr.usgs.gov/Docs/Greater_Sage-grouse_Conservation_Assessment_060404.pdf)
- Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17pp.
- Easdale, Guyman. 2006. Onsite Notes for Cabin Creek I. BLM Buffalo Field Office. Buffalo, WY.
- Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.
- Grenier, Martin. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp
- Hall, F., and E. Haney. 1997. Distribution and trend of sage-grouse (*Centrocercus ur ophasianus*) in relation to overhead transmission lines in northeast California. Draft document. California Department of Fish and Game.
- Hanf, J.M., P.A. Schmidt, E.B. Groshens. 1994. Sage grouse in the high desert of central Oregon: results of a study, 1988-1993. USDI Bureau of Land Management, Prineville, Oregon, USA.
- Hartzler, J.E. 1974. Predation and daily timing of sage-grouse leks. The Auk 91: 532-536.
- Hausleitner, D. 2003. Population dynamics, habitat use and movements of greater sage-grouse in Moffat County, Colorado. Thesis, University of Idaho, Moscow, Idaho, USA.
- Holloran, M.J., and S.H. Anderson. 2004. Sage-grouse response to natural gas field development in northwestern Wyoming. Page 16 in Proceedings of the 24<sup>th</sup> Meeting of the Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee. Wenatchee, Washington. USA.
- Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist 64:385-395
- Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.
- Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.
- Litzel, R. 2004. Personal communication [ January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.
- Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988
- Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67<sup>th</sup> North American Wildlife and Natural Resources Conference.
- Lyon, A.G. 2000. The potential effects of natural gas development on sage-grouse near Pinedale, Wyoming. Thesis, University of Wyoming, Laramie, USA.

- Lyon, A.G., and S.H. Anderson. 2003. Potential gas development impacts on sage grouse nest initiation and movement. Wildlife Society Bulletin 31:486-491.
- Lyon, Jack L., October. 1979. Habitat Effectiveness for Elk as Influenced By Roads and Cover. Journal
- Mackie, R.J., D.E. Pac, K.L. Hamlin, and G.L. Dusek. 1998. Ecology and Management of Mule Deer and White-tailed Deer in Montana. Montana Fish, Wildlife and Parks. Helena, Montana.
- Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: <http://www.cdc.gov/ncidod/vol9no7/03-0277.htm>.
- Martini, Jay. 2006. Wildlife Survey for the Carr Draw II Additions II Plan of Development. Western Land Services. Sheridan, WY. 6pp
- Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003
- Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.
- Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.
- O'gara, Bart W. and Jim D. Yoakum. 1992. Pronghorn Management Guidelines. U.S. Department of the Interior, Fish and Wildlife Service.
- Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (*Haliaeetus leucocephalus*) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.
- Remington, T.E., and C.E. Braun. 1991. How surface coal mining affects Sage Grouse, North Park, Colorado. Proceedings: issues and technology in the management of impacted western wildlife 5:128-132.
- Riddle, P., and C. Oakley. 1973. The Impact of Severe Winters and Fences on Antelope Mortality in South Central Wyoming. West. Association State Fish and Game Comm. Proc. 53.
- Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of Land Management Wildlife Biologist/Sage Grouse Coordinator.
- Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.
- Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah
- Rost, Gregory R. and James A. Bailey. 1979. Distribution of Mule Deer and Elk in Relation to Roads. Journal of Wildlife Management. 43.

- Ryder, T.J. and L.L. Irwin. 1987. Winter Habitat Relationships of Pronghorns in South Central Wyoming. Journal of Wildlife Management, 51.
- Sheldon, Daly and Fred Lindzey. 2003. "Movement and Dispersion of Pronghorn in Relation to Fences". In: Program and Abstracts for the Annual Meeting at the Inn in Lander, WY: Wildlife – Human Interactions: Disease, Recreation, and Development, Fragmentation and Urban Issues. The Wildlife Society Wyoming Chapter. Lander, WY. Nov. 18-21, 2003.
- Slovkin, J.M. 1982. Habitat Requirements and Evaluations. Elk of North America. Stackpole Books, Harrisburg, Pennsylvania.
- The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.
- U.S. Department of the Interior, Bureau of Land Management, Buffalo Field Office, Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.
- U.S. Department of the Interior, Bureau of Land Management, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.
- U.S. Department of the Interior, Bureau of Land Management, 2002. Oil and Gas Development on the Southern UTE EIS.
- U.S. Department of the Interior, Bureau of Land Management, 2003. Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans, Miles City, Montana.
- U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.
- U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.
- Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.
- Wardlow, R. and E. Krug 2006. Class III Cultural Resources Inventory for the Cabin Creek I Phase I Federal POD, Located in Sheridan County, Wyoming.
- Wardlow, R. 2007. Class III Cultural Resources Inventory for the Cabin Creek I Phase I Federal POD, (Additional Areas), Located in Sheridan County, Wyoming.
- WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments

Wyoming Game and Fish Department. 2002. Draft Wyoming Greater Sage Grouse- Grouse Conservation Plan. July 10, 2002. Located on the Internet at: <http://gf.state.wy.us/html/sagegrouse.htm>. Accessed August 2, 2002

## **8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS**

**Jim Verplancke**, Natural Resource Specialist  
Tom Bill, Environmental Coordinator  
**Randy Nordsven**, Supervisory Natural Resource Specialist  
**Mike McKinley**, Hydrologist  
Gerald Queen, Geologist  
**Dane Geyer**, Petroleum Engineer  
**Becky Wilkerson**, Legal Instruments Examiner  
Michele Lofgren, Legal Assistant  
**Clint Crago**, Archaeologist  
**Guymen Easdale**, Wildlife Biologist  
Gerald Queen, Geologist  
**Buddy Green**, Assistant Field Manager, Resources  
**Paul Beels**, Assistant Field Manager, Minerals & Lands  
**Chris E. Hanson**, Field Manager

Interdisciplinary Team Lead: **Jim Verplancke**