

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

Devon Energy Production Company  
**Golden Eagle Plan of Development**  
Juniper Draw CBNG Field

ENVIRONMENTAL ASSESSMENT –WY-070-EA07-111

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Devon Energy’s Juniper Draw Golden Eagle Coal Bed Natural Gas (CBNG) POD comprised of the following 48 Applications for Permit to Drill (APDs):

	Well Name	Well #	QTR/QTR	Section	TWP	RNG	Lease
1	GOLDEN EAGLE JDFU	14G-298*	SWSW	2	49N	78W	WYW140813
2	GOLDEN EAGLE JDFU	14M-298	SWSW	2	49N	78W	WYW140813
3	GOLDEN EAGLE JDFU	34G-298	SWSE	2	49N	78W	WYW146909
4	GOLDEN EAGLE JDFU	34M-298	SWSE	2	49N	78W	WYW146909
5	GOLDEN EAGLE JDFU	23G-298	NESW	2	49N	78W	WYW140813
6	GOLDEN EAGLE JDFU	23M-298	NESW	2	49N	78W	WYW140813
7	GOLDEN EAGLE JDFU	33G-298	NWSE	2	49N	78W	WYW146909
8	GOLDEN EAGLE JDFU	33M-298	NWSE	2	49N	78W	WYW146909
9	GOLDEN EAGLE JDFU	14G-398	SWSW	3	49N	78W	WYW145628
10	GOLDEN EAGLE JDFU	14M-398	SWSW	3	49N	78W	WYW145628
11	GOLDEN EAGLE JDFU	34G-998	SWSE	9	49N	78W	WYW141663
12	GOLDEN EAGLE JDFU	34M-998	SWSE	9	49N	78W	WYW141663
13	GOLDEN EAGLE JDFU	41G-998	NENE	9	49N	78W	WYW141239
14	GOLDEN EAGLE JDFU	41M-998	NENE	9	49N	78W	WYW141239
15	GOLDEN EAGLE JDFU	43G-998	NESE	9	49N	78W	WYW141663
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31	GOLDEN EAGLE JDFU	33G-1098	NWSE	10	49N	78W	WYW69912
32	GOLDEN EAGLE JDFU	33M-1098	NWSE	10	49N	78W	WYW69912
33	GOLDEN EAGLE JDFU	12G-1098	SWNW	10	49N	78W	WYW69912
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35	GOLDEN EAGLE JDFU	42G-1098	SENE	10	49N	78W	WYW69912
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44	GOLDEN EAGLE JDFU	32M-1198	SWNE	11	49N	78W	WYW146909
45	GOLDEN EAGLE JDFU	43G-1198	NESE	11	49N	78W	WYW146909
46	GOLDEN EAGLE JDFU	43M-1198	NESE	11	49N	78W	WYW146909
47	GOLDEN EAGLE JDFU	31G-1198	NWNE	11	49N	78W	WYW146909
48	GOLDEN EAGLE JDFU	31M-1198	NWNE	11	49N	78W	WYW146909

In addition to the listed APDs, it is my decision to approve the following three right-of-way grants:

ROW Grant	Type	Sections	TWP/RNG
WYW-169712	Access Road, Water Pipeline	6, 7, 12, and 13	T49N, R77W T49N, R78W
WYW-169863	Gas Pipeline	4	T49N, R78W
WYW-169864	Access Road, Water Pipeline, Buried Powerline	4, 7, 9, and 32 32	T49N, R78W T50N, R77W

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

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

- The Operator, in their POD, has committed to:
  - Comply with all applicable Federal, State and Local laws and regulations.
  - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
  - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
  - Provide water analysis from a designated reference well in each coal zone.
- The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
- Alternative C will not result in any undue or unnecessary environmental degradation.
- It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
- Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
- Alternative C is the environmentally-preferred Alternative.
- 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.
- 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  
Devon Energy Production Company  
Golden Eagle Plan of Development  
Juniper Draw CBNG Field  
WY-070-EA07-111**

## **INTRODUCTION**

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

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

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 7 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: Devon Energy’s Golden Eagle Plan of Development (POD) for 48 coal bed natural gas well APD’s and associated infrastructure. A water management plan was developed and submitted as part of this POD to handle the produced water from all the project area wells.

Proposed Well Information: There are 48 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 2 wells per location. Each well will produce from two coal seams. Proposed well house dimensions are 4 ft wide x 4 ft length x 4 ft height. Well house color is

Carlsbad Canyon, selected to blend with the surrounding vegetation. Wells are located as follows:

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48	GOLDEN EAGLE JDFU	31M-1198	NWNE	11	49N	78W	WYW146909

County: Johnson

Applicant: Devon Energy Production Company

Surface Owners: Tear Drop Cattle Company, John Christian, Bureau of Land Management

Project Description:

The proposed action involves the following:

- Drilling of 48 total federal CBM wells in Upper Big George, and Lower Big George coal zones to depths of approximately 1415 feet. The two coal seams will be produced by co-locating wells at a single location each targeting a single formation.

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

- Well metering shall be accomplished by telemetry and well visitation. Metering would entail 20 visits per month to each well/central metering facility.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 1 discharge point and 1 EMIT produced water treatment facility (under EMIT's WYPDES permit # WY0051934) within the Upper Powder River watershed. Existing infrastructure and impoundments from approved PODs (Kestrel, Juniper Draw) will utilized as part of this strategy.
- An unimproved and improved road network.
- An above ground power line network to be constructed by a contractor. The proposed route has not been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via right-of-way application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 13 power drops.

A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 1 to 1 ½ years. Fuel deliveries are anticipated to be 2 times per week. Decibel ratings on the commonly used generators will be consulted prior to generator installments. Any generator exceeding stated COA decibel levels will have noise dampeners installed, enclosed with in a generator building or sound attenuated models will be used.

- A buried gas, water and power line network.
- A Right-of-Way (R/W), WYW-169712 granted under the Federal Land Policy and Management

Act (FLPMA), on Federal surface for an access road and water pipeline.

The right-of-way area granted herein contains:

Access road – 30 feet wide, 13,877 feet long, and contains 9.557 acres, more or less;

Water pipeline – 40 feet wide, 9,636 feet long, and contains 8.848 acres, more or less;

Located T. 49 N., R. 77 W.,

Sec. 6: Lots 2, 3, 7, SENW, E2SW,

Sec. 7: Lot 1, NENW,

T. 49 N., R. 78 W.,

Sec. 12: E2NE, SWNE,

Sec. 13: W2NW.

- A Right-of-Way (R/W), WYW-169863 granted under the Mineral Leasing Act (MLA), on Federal surface for a 6" gas pipeline.  
The right-of-way area granted herein contains:  
Gas pipeline – 45 feet wide, 2,166 feet long, and contains 2.238 acres, more or less;  
Located T. 49 N., R. 78 W., Sec. 4: S2SE.
  
- A Right-of-Way (R/W), WYW-169864 granted under the Federal Land Policy and Management Act (FLPMA), on Federal surface for access roads, water pipeline, and buried powerline.  
The right-of-way area granted herein contains:  
Improved road – 40 feet wide, 7,283 feet long, and contains 6.688 acres, more or less;  
Two-track road – 30 feet wide, 5,114 feet long, and contains 3.522 acres, more or less;  
Water pipeline – 40 feet wide, 2,679 feet long, and contains 2.460 acres, more or less;  
Buried powerline – 20 feet wide, 2,116 feet long, and contains 0.972 acres, more or less;  
Located T. 49 N., R. 78 W.,  
Sec. 4: Lot 4, SWNW, N2SW, NWSE, S2SE,  
Sec. 7: N2NE, NENW, NWNW,  
Sec. 8: NWNW,  
T. 50 N., R. 77 W.,  
Sec. 32: Lot 5.

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

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

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

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

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

### 2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator’s proposal. The specific changes identified for the Golden Eagle POD are listed below under 2.3.1:

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

Well # (twin locations)	Aliquot	Section	T	R	Onsite Notes
23G/23M-298	NESW	2	49N	78W	well moved to avoid sage grouse habitat
43G/43M-298	NESE	2	49N	78W	well moved: >25% slopes, highly erosive soils, required engineered pad/access, lined pit would have also been required, access to S rerouted in 2 areas to get off ridge and contour of slope
14G/14M-398	SWSW	3	49N	78W	well moved: location too narrow, no room for pit, ingress/egress issues, access was engineered, template design will work
34G/34M-998	SWSE	9	49N	78W	well moved: excess dirt work for pad and access would have been required
41G/41M-998	NENE	9	49N	78W	well moved: no room for pit due to drainages
34G/34M-1098	SWSE	10	49N	78W	well moved(new location is a 33M/G1098): sagegrouse habitat, would require pad, new location no pad,
12G/12M-1198	SWNW	11	49N	78W	well moved(new location is a 42M/G1098) to avoid sage-grouse habitat
21G/21M-1198	NENW	11	49N	78W	access rerouted to miss large headcut, template design instead of engineering
41G/41M-1198	NENE	11	49N	78W	well moved(new location is a 31M/G1198) to avoid sage grouse habitat

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

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



#### **2.3.2.1. Groundwater**

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

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

2. Channel Crossings:
  - a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
  - b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
3. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
4. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.
5. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.
6. The operator will supply a copy of the complete approved Chapter 3 permit to construct associated treatment facilities to BLM as they are issued by WDEQ.

#### **2.3.2.3. Soils**

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

#### **2.3.2.4. Vegetation**

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

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

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.

3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
4. The lower edge of soil or other material stockpiles will be located outside the active floodplain.
5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

#### **2.3.2.6. Wildlife**

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.
4. Additional measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse effect on a Threatened, Endangered, Proposed, or Candidate species or their habitat.

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

##### **2.3.2.7.1. Bald Eagle**

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.

##### **2.3.2.7.2. Mountain Plover**

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

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

1. 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.
2. If reclamation or weed treatment is proposed within suitable Ute ladies'-tresses habitat and during the orchid's growing season (July 1 – September 30) then a survey for the orchid, according to FWS protocol, shall be conducted prior to treatment. If any orchids are found, in order to minimize potential effects, the Service shall be consulted with prior to implementation.

**2.3.2.8. Visual Resources**

1. The Companies will mount lights at 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.

**2.3.3. Site specific mitigation measures**

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

**General**

1. Please contact Eric Holborn – Natural Resource Specialist, @ (307) 684-1044, Bureau of Land Management, Buffalo, if there are any questions concerning surface use COAs.

**Surface Use**

Lease #	Well #	Aliquot	Section	T	R	Site Specific
WYW140813	14M/G-298	SWSW	2	49N	78W	Due to proximity to drainage and highly erosive soils the reserve pit will be lined.
WYW141239	31M/G-998	SWNE	9	49N	78W	Due to highly erosive soils the working area for the access/utility corridor will not exceed 35 feet, blading will not exceed 25 feet
WYW141663	43M/G-998	NESE	9	49N	78W	Due to sagebrush habitat and reclamation concerns mowing will not exceed 35 feet radius from well stake and not exceed 15 in width for the access/utility corridor.
WYW69912	21M/G-1098	NENW	10	49N	78W	Due to sagebrush habitat and reclamation concerns mowing for the access/utility corridor will not exceed 15 feet in width.
WYW69912	34M/34G-1098	SWSE	10	49N	78W	Due to highly erosive soils the working area for the access/utilities from well location to existing conventional location will not exceed 25 feet in width; blading will not exceed 15 feet.
WYW69912	43M/G-1098	NESE	10	49N	78W	The engineered access & intersection w/ main access to be adjusted at pre-construct, to alleviate 90 degree intersection
WYW145629	21M/G-1198	NENW	11	49N	78W	Due to proximity to drainage and highly erosive soils the reserve pit will be lined.
WYW145629	23M/G-1198	NESW	11	49N	78W	Mowing for the well location will not exceed 35 feet radius from the well stake.
WYW146909	43M/G-1198	NESE	11	49N	78W	At the pre-construction meeting the engineered pad will be field adjusted.

2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for the Golden Eagle POD is Carlsbad Canyon, (Munsell Soil Color 2.5Y 6/2).
3. The Golden Eagle POD project area has been identified to have limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.

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

Reclamation Standards:

- C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:
    - a. Large rills or gullies.
    - b. Perceptible soil movement or head cutting in drainages.
    - c. Slope instability on, or adjacent to, the reclaimed area in question.
  - C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
  - C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
    - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
    - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
  - C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.
4. 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 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>

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

Slopes too steep for machinery may be hand broadcast and raked with twice the specified amount of seed. Complete fall seeding after September 15 and prior to prolonged ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.

5. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.
6. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

<b>Grade</b>	<b>Drainage Spacing</b>
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft

7. The operator is responsible for having the licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
8. Proposed Template Roads/Spot Upgrade with Utility Corridor will be allowed a maximum working width of 45ft with a blading/clearing width not to exceed 35ft.
9. Proposed Primitive Roads with utility corridor will be allowed a maximum working width of 35 ft with a blading/clearing width not to exceed 20ft.

### **Wildlife**

1. The following conditions will minimize impacts to raptors;

- a. 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 affects the following infrastructure:

<b>Township/Range</b>	<b>Section</b>	<b>Infrastructure</b>
50/77	31	<ul style="list-style-type: none"> <li>The proposed water pipeline in the SE¼ of this section.</li> </ul>
50/77	32	<ul style="list-style-type: none"> <li>The proposed water pipeline in the SW¼ of this section.</li> <li>The proposed discharge point in the SE¼ of this section.</li> </ul>
49/77	6	<ul style="list-style-type: none"> <li>The proposed water pipeline in the NENW and S ½ SW¼ of this section.</li> </ul>
49/77	7	<ul style="list-style-type: none"> <li>The proposed water pipeline in the NWNW of this section.</li> </ul>
49/78	2	<ul style="list-style-type: none"> <li>Wells 33M&amp;G-298 and 14M&amp;G-298 and their associated infrastructure.</li> <li>All proposed pipelines in the SWSW of this section.</li> <li>The proposed power drop and associated overhead powerline in the SE¼ of this section</li> </ul>
49/78	3	<ul style="list-style-type: none"> <li>Wells 14M&amp;G-398 and their associated infrastructure.</li> <li>All proposed pipelines in the SESE of this section.</li> </ul>
49/78	9	<ul style="list-style-type: none"> <li>Wells 41M&amp;G-998 and their associated infrastructure.</li> <li>All proposed access routes, pipelines, and overhead powerlines within the NENE of this section.</li> </ul>
49/78	10	<ul style="list-style-type: none"> <li>Wells 21M&amp;G-1098, 32M&amp;G-1098, 41M&amp;G-1098, and 42M&amp;G-1098 and their associated infrastructure.</li> <li>The two pump stations proposed in the NE¼ of this section.</li> <li>All proposed access routes, pipelines, launchers, power drops and associated overhead powerlines within the N½, NESE, SESE of this section.</li> </ul>
49/78	11	<ul style="list-style-type: none"> <li>Wells 14M&amp;G-1198, 21M&amp;G-1198, 23M&amp;G-1198, 31M&amp;G-1198, 32M&amp;G-1098, and 43M&amp;G-1098, and their associated infrastructure.</li> <li>The pump station proposed in the NE¼ of this section.</li> <li>All proposed access routes, pipelines, launchers, power drops and associated overhead powerlines within this ENTIRE section.</li> </ul>
49/78	12	<ul style="list-style-type: none"> <li>The proposed water pipeline in the E½ of this section.</li> </ul>
49/78	14	<ul style="list-style-type: none"> <li>The proposed water pipeline in the NE¼ of this section.</li> </ul>

- b. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist 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.
- c. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to all the nests listed in Table 3.2 of this EA (Documented raptor nests within the Golden Eagle project area in 2007.).
2. The following conditions will minimize impacts to sage-grouse:

- a. No surface disturbing activities are permitted within 2 miles of the Tear Drop lek (NESW Section 33, T50N, R79W) and the Tear Drop II lek (SWNE Section 32, T50N, R79W) between March 1 and June 15, prior to completion of a greater sage-grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This affects the following infrastructure:

<b>Township/Range</b>	<b>Section</b>	<b>Infrastructure</b>
49/78	3	<ul style="list-style-type: none"> <li>Wells 14M&amp;G-398 and their associated infrastructure.</li> </ul>
49/78	4	<ul style="list-style-type: none"> <li>All proposed access routes, pipelines, power drops and overhead powerlines within this ENTIRE section.</li> </ul>
49/78	9	<ul style="list-style-type: none"> <li>Wells 31M&amp;G-998 and 41M&amp;G-998 and their associated infrastructure.</li> <li>All proposed access routes, pipelines and overhead powerlines within the N½ of this section.</li> </ul>
49/78	10	<ul style="list-style-type: none"> <li>Wells 21M&amp;G-1098 and their associated infrastructure.</li> <li>All proposed access routes, pipelines, launchers, stock tanks, and overhead powerlines within the NW¼ of this section.</li> </ul>

- b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season.
- c. If surveys indicate that the identified leks are 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.
- d. 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.
3. The following conditions will minimize impacts to nesting and roosting bald eagles;
- a. No surface disturbing activity shall occur within one mile of bald eagle habitat (Powder River) annually from November 1 through April 1, prior to a winter roost survey or from February 1 through August 15 prior to a nesting survey. This affects the following infrastructure:

<b>Township/Range</b>	<b>Section</b>	<b>Infrastructure</b>
50/77	31	<ul style="list-style-type: none"> <li>The proposed water pipeline within this ENTIRE section.</li> </ul>
50/77	32	<ul style="list-style-type: none"> <li>The proposed water pipeline within this ENTIRE section.</li> <li>The proposed discharge point in the SE¼ of this section.</li> </ul>
49/77	6	<ul style="list-style-type: none"> <li>The proposed water pipeline within this ENTIRE section.</li> </ul>
49/77	7	<ul style="list-style-type: none"> <li>The proposed water pipeline within this ENTIRE section.</li> </ul>

- b. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1-mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
- c. If a nest is identified and construction has not been completed, a minimum disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance-free buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).

4. All pits associated with water treatment facilities containing more than 17,000mg/L of sodium concentration will be netted to prevent access by migratory birds.
5. Any migratory bird killed by sodium toxicity or salt crystallization in the impoundments will be considered as birds taken in violation of the Migratory Bird Treaty Act. Each violation will be referred to the USFWS Office of Law Enforcement for investigation.

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

1. Construction of additional impoundments was considered but eliminated due to steep topography, erosive soils, and limited storage capacity.

**3. DESCRIPTION OF AFFECTED ENVIRONMENT**

Applications to drill were received on March 16, 2007 Field inspections of the proposed Golden Eagle CBNG project were conducted September 17-19, 2007 by

NAME	TITLE	AGENCY
Eric Holborn	Natural Resource Specialist	BLM
Theresa Gulbrandson	Wildlife Biologist	BLM
Wendy Sutton	Archeologist	BLM
Hilaire Peck (Sept. 18, 19 2007)	Civil Engineer	BLM
Rick Taylor	Production Superintendent	Devon Energy
Catherine Seaton	Operations Engineer	Devon Energy
Carol Chadwick (Sept. 18, 2007)	Civil Engineer	
Joy Kennedy (Sept. 19, 2007)	Permitting Agent	Lance Oil and Gas

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			Jennifer Morton, Theresa Gulbrandson
Floodplains		X		Eric Holborn,
Wilderness Values			X	Eric Holborn
ACECs			X	Eric Holborn
Water Resources	X			Mike McKinley,
Air Quality	X			Eric Holborn
Cultural or Historical Values		X		Wendy Sutton
Prime or Unique Farmlands			X	Eric Holborn
Wild & Scenic Rivers			X	Eric Holborn
Wetland/Riparian		X		Eric Holborn,
Native American Religious Concerns		X		Wendy Sutton
Hazardous Wastes or Solids		X		Eric Holborn



<b>Mandatory Item</b>	<b>Potentially Impacted</b>	<b>No Impact</b>	<b>Not Present On Site</b>	<b>BLM Evaluator</b>
Invasive, Nonnative Species	X			Eric Holborn
Environmental Justice		X		Eric Holborn

### **3.1. Topographic Characteristics of Project Area**

The Golden Eagle Plan of Development area is located in far eastern Johnson County, Wyoming, immediately north and east of Interstate- 90's Indian Creek exit. The development area is located within the Dry Creek watershed, which is a tributary to the Upper Powder River. The area is semi-badland country with many erosional features (buttes, badlands, break valleys, and canyons) and sparse vegetation. The elevation changes and presence of woody species provide a windbreak effect while also capturing additional moisture; vegetation from semi-desert to woodland, are supported.

This is an area of extensive existing CBNG development, as well as some existing conventional oil and gas production. Most of the roads which will be used for access to the proposed wells were constructed or improved to accommodate the current Fee or State of Wyoming minerals production and/or existing cattle operations.

### **3.2. Vegetation & Soils**

General vegetation communities within the project area consist of sagebrush/grassland. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the project area. Grass species consist of needle and thread, western wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and buffalo grass. Broom snakeweed, rubber rabbitbrush, and prickly pear are found interspersed throughout the area. Juniper trees were observed along incised draws, cottonwood trees and willows were observed in draw bottoms and along the Powder River flood plain. Differences in dominant species within the project area vary with soil type, aspect, and topography.

Soils within the project area were identified from the *North Johnson County Survey Area, Wyoming (WY719)*. The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area. The soils and landforms of this area present distinct challenges for reclamation. According to Soil Survey Geographical Data (SSURGO) approximately 53 percent of the area (1131 acres), within the POD boundary, are shown to have soil mapping units identified as being vulnerable to degradation (having a low reclamation potential) due to steep slopes and/or highly erosive soils.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 2 to 4 inches on ridges to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. Areas with limited reclamation capability and/or highly erosive soils were identified by BLM specialists and the operator during the pre-approval onsite inspection.

The map units identified for the soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

### Soil Map Unit Types

Map Unit Symbol	Map Unit Name	Acres	Percent
639	Forkwood-Cushman loams, 0 to 6 percent slopes	63	3%
684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	1131	53%
707	Theedle-Kishona loams, 6 to 20 percent slopes	4	<1%
708	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	304	14%
709	Theedle-Shingle loams, 3 to 30 percent slopes	523	25%
718	Vonalee-Terro-Taluce fine sandy loams, 3 to 30 percent slopes	93	4%

Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.1.

The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes.

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information. The map unit symbols identified for the soils and the associated ecological sites found within the POD boundary are listed in the table below.

#### Map Units and Ecological Sites

Map Unit Symbol	Ecological Site
639	LOAMY (10-14NP)
684	SHALLOW CLAYEY (10-14NP)
707	LOAMY (10-14NP)
708	LOAMY (10-14NP)
709	LOAMY (10-14NP)
718	SANDY (10-14NP)

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are: *Shallow Clayey and Loamy 10-14" precipitation zone Northern Plains*.

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

The *loamy sites* occur on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The present plant community for the project area, for both identified ecological sites, is defined as; Mixed Sagebrush/Grass.

Big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, and green needlegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Plains pricklypear and winterfat can also occur. Cheatgrass (downy brome) has invaded the project area.

A summary of the ecological sites within the project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

**Summary of Ecological Sites**

<b>Ecological Site</b>	<b>Acres</b>	<b>Percent</b>
SHALLOW CLAYEY (10-14NP)	1131	53%
LOAMY (10-14NP)	893	42%
SANDY (10-14NP)	93	4%

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

Riparian areas within the Golden Eagle project area can be found along unnamed tributaries and portions of Dry Creek, due to discharge from flow-through reservoirs. Also along the banks of the Powder River riparian environment exists primarily due to natural flow. The existing reservoirs (approved Kestrel POD) in the Indian Creek drainage are generally full-containment, however there is a potential for water to resurface downstream of on-channel impoundment creating a wetland environment.

### **3.2.2. Invasive Species**

A search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site ([www.weric.info](http://www.weric.info)) showed no state-listed noxious weeds and/or weed species of concern. The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices.

The operator has documented (see Weed Management Plan in the Golden Eagle POD) the following noxious weeds in the project area: Scotch thistle, Canada thistle, field bind weed, skeletonleaf bursage Russian knapweed, spotted knapweed, diffuse knapweed and black henbane (species of concern).

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

### **3.3. 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 Thunderbird-Jones & Stokes (TJS) and BKS Environmental (Brown, 2003, BKS 2006, Vetter 2006 and 2007). Thunderbird-Jones & Stokes performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2007; raptor, grouse and prairie dog surveys were also conducted from 2003-2006. Surveys were conducted for Ute ladies'-tresses orchid in 2005 (BKS 2006) and 2007 (Thunderbird 2007).

A BLM biologist conducted field visits on September 17 and 18, 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.

### **3.3.1. Big Game**

Big game species expected to be within the Golden Eagle project area include pronghorn antelope, mule deer, and white-tailed deer. The WGFD has determined that the project area contains Yearlong range for pronghorn antelope, Winter-Yearlong and Yearlong range for mule deer, and Yearlong range for white-tailed deer. Although no part of the project area is designated range for elk, elk do occasionally use the project area. Data points from Fortification Creek collared elk have been recorded northeast and south of the project area during spring (May and June).

**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.

Pronghorn antelope within the project area belong to the Ucross herd unit. The 2006 proposed estimate herd population is 8634 with a population objective of 2500. Mule deer within the project area belong to the Powder River herd unit. The 2006 proposed estimate herd population is 55,716 with a population objective of 52,000. White-tailed deer within the project area belong to the Powder River herd unit. The 2006 proposed estimate herd population is 10,655 with a population objective of 8000. Populations of pronghorn antelope, mule deer, and white-tailed deer within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

### **3.3.2. Aquatics**

The project area is drained by ephemeral tributaries of Dry Creek. No springs were documented within the project area (WWC 2007). The Powder River Basin is one of the last free-flowing prairie stream ecosystems left in the United States; with existing flows, turbidity, and water quality within historic ranges. Due to this, the Powder River still supports an intact native fish community including several rare or declining species. These species have evolved life history strategies that allow them to survive in extreme conditions (Hubert, 1993). Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carpsucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, white sucker and others. Six of these are designated by the Wyoming Game and Fish Department as either Native Species Status (NSS) 1, 2, or 3 species. Species in these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act.

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 for 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). Species recorded by Thunderbird-Jones & Stokes include loggerhead shrikes and Brewer's sparrows (Vetter 2006, Thunderbird 2007).

### 3.3.4. Raptors

Seventeen raptor nest sites were identified by Thunderbird-Jones & Stokes (2007) and BLM within 0.5 mile of the project area, of these, 7 nests were active in 2007.

**Table 3.2** Documented raptor nests within the Golden Eagle project area in 2007.

BLM ID#	Species	UTM (NAD 83)	Legal location	substrate	Condition in 2007	Status in 2007
3039	Ferruginous hawk	403075E 4897777N	SWSW Section 11 T49N, R78W	Creek bank	Poor	Inactive
4818	Red-tailed hawk	404000E 4898675N	SESE Section 11 T49N, R78W	Creek bank	Good	Active
4380	Unknown	404188E 4900339N	SESE Section 2 T49N, R78W	Ponderosa pine, live	Good	Inactive
2726	Unknown	406369E 4901369N	SESW Section 31 T50N, R77W	Cottonwood, live	Poor	Inactive
2729	Red-tailed hawk	408080E 4900949N	NENW Section 5 T49N, R77W	Cottonwood, live	Good	Active
3331	Unknown	408881E 4900714N	NENE Section 5 T49N, R77W	Cottonwood, live	Undetermined	Undetermined
4819	Red-tailed hawk	401601E 4899555N	SESW Section 3 T49N, R78W	Cottonwood, live	Good	Active
4820	Long-eared owl	401698E 4899450N	SESW Section 3 T49N, R78W	Juniper, live	Fair	Active
4821	Unknown	401770E 4899437N	SESW Section 3 T49N, R78W	Juniper, live	Fair	Inactive
4822	Northern harrier	402777E 4899015N	NWNW Section 11 T49N, R78W	Ground	Good	Active
2727	Golden eagle	406567E 4899014N	NENW Section 7 T49N, R77W	Ponderosa pine, live	Fair	Inactive
2724	Golden eagle	405632E 4898676N	SENE Section 12 T49N, R78W	Cottonwood, live	Good	Inactive
2723	Unknown	405629E	SENE Section 12	Cottonwood,	Fair	Inactive

BLM ID#	Species	UTM (NAD 83)	Legal location	substrate	Condition in 2007	Status in 2007
	Buteo	4898675N	T49N, R78W	live		
3758	Long-eared owl	405184E 4897167N	SWNE Section 13 T49N, R78W	Juniper, live	Poor	Inactive
1288	Red-tailed hawk	405155E 4897136N	SWNE Section 13 T49N, R78W	Cottonwood, live	Good	Active
3040	Prairie Falcon	401281E 4896456N	SWSW Section 15 T49N, R78W	Creek bank	Good	Active
3492	Northern Harrier	402830E 4895475N	SWNW Section 23 T49N, R78W	Ground	Gone	Gone

### 3.3.5. Threatened and Endangered and Sensitive Species

#### 3.3.5.1. Threatened and Endangered Species

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

##### 3.3.5.1.1. Black-footed ferret

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

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

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

Five black-tailed prairie dog colonies, totaling 33.6 acres, were identified during site visits by Thunderbird-Jones & Stokes within the project area (Thunderbird 2007). The project area is located approximately 12 miles south of the Arvada complex, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the Golden Eagle project area.

**Table 3.3** Black-tailed prairie dog colonies identified during site visits by Thunderbird-Jones & Stokes and the BLM BFO database within the project area or within 1.5km. of those colonies, totaling 33.6 acres.

Location	Size in acres	Status
NESE Sec. 3, T49N, R78W	1.5	Active
NW Sec. 7, T49N, R77W	22.3	Active
SW Sec. 12, T49N, R78W	6.2	Active
SWNE Sec. 22, T49N, R78W	2.1	Active
SENE Sec. 22, T49N, R78W	1.5	Active
<b>TOTAL</b>	<b>33.6</b>	

##### 3.3.5.1.2. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in

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

Dry Creek is intermittent and its tributaries within the project area are ephemeral. Drainage bottoms consist of dry water channels with upland grassland vegetation and big sagebrush communities intermingled throughout (BKS Environmental 2006). Thunderbird-Jones & Stokes identified potential orchid habitat in the SESE Section 31 and the SESE Section 32, T50N, R77W near the Powder River. No orchids were found in these areas during surveys conducted in August 2007 by Thunderbird-Jones & Stokes (Vetter 2007).

### **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.

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

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

#### **3.3.5.2.1. Bald eagle**

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

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base.

The diets of wintering bald eagles can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

Highly suitable nesting and roosting habitat exists along the Powder River, which is located 0.5 miles from the project area where the proposed outfall and water pipeline are located. The nearest known communal roost site is located approximately 0.6 miles to the east. Surveys conducted for roosting bald eagles identified eagles utilizing cottonwood habitat along the Powder River. The BLM database identified the following bald eagle observations near the project area. During 2006-2007 surveys, 66 eagles were observed along this section of the Powder River.

**Table 3.4- Bald eagle observations**

<i>Date</i>	<i>Township</i>	<i>Range</i>	<i>Section</i>	<i>Number of Eagles</i>	
				Adults	Juvenile
12/12/2006	50	77	S ½ 28	0	1
12/26/2006	50	77	S ½ 28	1	1
01/04/2007	50	77	S ½ 28	2	0
01/23/2007	50	77	S ½ 28	0	1
12/26/2007	50	77	W ½ 33	7	0
01/12/2007	50	77	W ½ 33	5	0
01/16/2007	50	77	W ½ 33	1	0
01/02/2007	50	77	W ½ 33	2	0
02/23/2007	50	77	W ½ 33	4	2
12/04/2006	50	77	32	1	0
12/26/2006	50	77	32	1	1
12/27/2007	50	77	32	3	0
03/17/2006	50	77	32	0	1
01/04/2007	50	77	32	1	0
01/10/2007	50	77	32	2	0
01/12/2007	50	77	32	0	1
01/16/2007	50	77	32	0	2
02/23/2007	50	77	32	1	0
12/04/2006	49	77	5	2	0
12/12/2006	49	77	5	1	0
12/16/2006	49	77	5	1	0
12/18/2006	49	77	5	1	0
12/27/2006	49	77	5	1	1
12/29/2006	49	77	5	2	0
01/04/2007	49	77	5	1	0
01/10/2007	49	77	5	1	0
01/16/2007	49	77	5	1	0
01/23/2007	49	77	5	3	0
02/23/2007	49	77	5	0	1
12/04/2006	49	77	N ½ 8	1	0
12/27/2006	49	77	N ½ 8	2	0



<i>Date</i>	<i>Township</i>	<i>Range</i>	<i>Section</i>	<i>Number of Eagles</i>	
12/18/2006	49	77	N ½ 8	2	0
01/23/2007	49	77	N ½ 8	1	0
01/13/2007	49	78	14	1	0
01/16/2007	49	78	15	1	0
01/04/2007	49	77	20	1	0
<b>Total</b>				<b>54</b>	<b>12</b>

### 3.3.5.2.2. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS. 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. Five black-tailed prairie dog colonies, totaling 33.6 acres, were identified during site visits by Thunderbird-Jones & Stokes within the project area (see Table 2) (Thunderbird 2007).

### 3.3.5.2.3. Greater sage-grouse

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

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). Suitable sage-grouse habitat is present throughout the project area. One female sage grouse was observed by Thunderbird-Jones & Stokes biologists on June 16, 2006 in SWNE Section 32, T50N, R78W in sagebrush-grassland habitat (Vetter 2006). Sage-grouse scat was documented at several locations throughout the project area during the onsite inspections. BLM records identified two sage grouse leks within 3 miles of the Golden Eagle POD; both leks are classified as occupied by the WGFD. These lek sites are identified below (Table 3.5).

**Table 3.5 Sage-grouse leks surrounding the Golden Eagle project area.**

<b>LEK NAME</b>	<b>LEGAL LOCATION</b>	<b>STATUS IN (YEAR) (PEAK MALES)</b>	<b>DISTANCE FROM PROJECT AREA</b>
Tear Drop	NESW Section 33, T50N, R79W	2007 (6) 2006 (0)	1.4 miles
Tear Drop II	SWNE Section 32, T50N, R79W	2007 (0) 2006 (0)	1.8 miles

### 3.3.5.2.4. Mountain plover

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

Suitable mountain plover habitat is present within the project area. Suitable habitat is limited to 5 small, occupied black-tailed prairie dog colonies and disturbed areas including pipeline corridors, roads, and

constructed pads (Thunderbird 2007). TJS conducted mountain plover surveys within the project area in 2003, 2004, and 2007. No mountain plovers were observed during any of these surveys.

### 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 3.6 Historical West Nile Virus Information**

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

\*Wyoming Department of Health Records September 12, 2007.

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

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

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder

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

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

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

### **3.5. Water Resources**

The project area is within the Upper Powder River drainage system. For a detailed description of the project area see section 3.1 of this document.

#### **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.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 6 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 40 to 2,500 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

### **3.5.2. Surface Water**

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

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

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 Golden Eagle POD project, following the Secretary of the Interior’s Guidelines and Standards. Two Class III archaeological inventories were conducted specifically for this project, BLM 70070071 (Greer Services) and BLM 70080054 (ACR). The Greer fieldwork was conducted between 2003 and 2006; it encompasses the central project area and all well locations (2,040 acres). BLM Report 70070071 records 5 sites and two isolates. The ACR fieldwork (33.5 acres) involved linear inventory along proposed infrastructure to the west of the Greer

area and along the proposed discharge line to the east; ACR recorded 1 isolate. Additional Class III inventories within the project area were also consulted during the review of the proposed action. BLM 70000147 encompassed the proposed EMITs facility location and portions of the discharge line. BLM Reports 70030068, 70050006, 70050023, 70050041.B, and 70050218 encompassed additional portions of the discharge line. BLM reports 61820226 & 65950016 encompass portions of linear infrastructure proposed in T49N R78W, Section 4. Sites and isolates are defined as specified by the 2006 State Protocol between the Wyoming Bureau of Land Management State Director and the Wyoming State Historic Preservation Officer. The following cultural resources are located in or near the APE (area of potential effect).

**Table 3.7 Cultural Resources Inventory Results**

<b>Site/Isolate Number</b>	<b>Description (Report #)</b>	<b>National Register Eligibility</b>
48JO1870	Historic Homestead & Prehistoric Lithic Scatter (70030068)	NE
48JO2494	Prehistoric Artifacts & Features (70050023)	NE
48JO2498	Prehistoric Lithic Scatter (70050023)	NE
48JO2733	Prehistoric Stone Circle (70070071)	Unevaluated
48JO2734	Historic Cairn (70070071)	NE
48JO2735	Prehistoric Stone Circle (70070071)	NE
48JO2736	Prehistoric Lithic Scatter (70070071)	NE
48JO3692	Prehistoric Campsite (70070071)	E – D
IR-1*	Prehistoric (70080054)	NE
IR-1	Prehistoric (70070071)	NE
IR-2	Prehistoric (70070071)	NE
IR-3	Prehistoric (70070071)	NE
IR-4	Prehistoric (70070071)	NE
IR-5	Prehistoric (70070071)	NE
IR-6	Prehistoric (70070071)	NE
IR-7	Prehistoric (70070071)	NE
IR-8	Prehistoric (70070071)	NE
IR-9	Historic (70070071)	NE
IR-10	Prehistoric (70070071)	NE

Site/Isolate Number	Description (Report #)	National Register Eligibility
IR-11	Prehistoric (70070071)	NE
IR-12	Prehistoric (70070071)	NE

NE (Not Eligible); E-D (Eligible under criterion D of the NRHP)

No resources of interest to Native American cultural groups or Traditional Cultural Properties are known to occur in the project area (PRB FEIS page 218-229).

#### 4. ENVIRONMENTAL CONSEQUENCES

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

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

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 24 proposed locations, (2 wells per location), 7 will be drilled with a constructed pad 100 feet x 125 feet with less than 4 feet of cut and 17 will require an engineered design well pad. Surface disturbance associated with the drilling of the 7 non-engineered locations, includes the reserve pit construction (estimated approximate size of 15 feet x 50 feet). Estimated disturbance associated with these 7 locations would involve approximately 0.3 acres/location for 2.1 total acres. The other 17 locations requiring an engineered design would disturb approximately .70 acres/location for a total of 11.9 acres. The total estimated disturbance for all 48 wells would be 14 acres.

Approximately 7.5 miles of improved roads would be constructed to provide access to various well locations. Approximately 2.0 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.09 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

**Table 4.1 - SUMMARY OF DISTURBANCE**

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Constructed Pad	24 locations	engineered: .70 ac/location non-engineered: .30 ac/location	16.8 7.2	Long Term
Water Discharge Points	1	0.01 ac/WDP	0.01	Long Term
Improved Roads				Long Term
Engineered w/ corridor Template	1.06	32 feet	4.11	
No Corridor	.32	22 feet	.86	
With Corridor	6.07	35 feet	26.0	
2-Track Roads w/ corridor	2.0	35 feet	8.51	Long Term
Pipelines				Short Term
No Corridor	1.09	35 feet	4.63	
With Corridor	9.13	35 feet	39.0	
Overhead Powerlines	5.5	35 feet	23.4	Long Term
EMIT Treatment Facility	1		5.0	Long Term

*OTHER: 4 pump stations 100 feet x 100 feet, .23 ac, (.92 ac total)*

*6 staging areas 200 feet x 200 feet, .92 ac, (5.51 ac total) note: once the wells are drilled and completed, the operator may apply for a compressor at any of the analyzed, permitted staging areas.*

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”.

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing results in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Loss of soil vegetation cover, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.
- Modification of hill slope hydrology.

These impacts would increase the potential for valuable soil loss due to increased water and wind erosion, invasive plant spread establishment, and increased sedimentation and salt loads to the watershed system.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). BLM reclamation goals emphasize ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

The soils and landforms of this area present distinct challenges for reclamation. There are many areas which will be reclaimed by traditional methods. However, some areas will be challenging for reclamation due to soil properties and other site characteristics. The Bureau of Land Management has an obligation to protect these lands from disturbance which could lead to irretrievable and irreversible impacts. The operator has agreed to design and implement specific reclamation practices (see POD, Master Surface Use Plan, item 10, pg.11) to address these areas of concern. In addition due to steep slopes and highly erosive soils the disturbances within these areas require the programmatic/standard COA's be complimented with a site specific performance based, reclamation, related COA. In the Golden Eagle POD, 53% (1131 acres) of the project area has been identified, through onsite and data analysis, to have low/poor reclamation potential. 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, wing ditches, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized. Seed mixes for the Golden Eagle POD were determined based on soil map unit types, the dominant ecological sites found within the project area, and the mixing of soil horizons in disturbed areas. A shallow clayey seed mix was created for the entire POD (see site specific COAs). In addition, the operator will adhere to COAs which limit the surface disturbance allowable for construction and improvements.

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

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

Identified wetland/riparian areas within the Golden Eagle project area are limited to the banks of the Powder River and its tributaries receiving discharged water. No water has been discharged to Indian Creek associated with Juniper Draw and Kestrel PODs. The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74), however in this POD it is anticipated that 80% of the produced water will be treated and only 20% will be discharged to impoundments. Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas." (PRB FEIS Page 4-175).



#### **4.1.2. Invasive Species**

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

1. Administer herbicides.
2. Incorporate weed prevention and control measures into environmental restoration and infrastructure maintenance activities (for specifics see Integrated Pest Management Plan (IPMP) in the POD.
3. Initiate a weed education policy to assist contractors and field employees in the identification of noxious weeds and to create an awareness of the impacts of noxious weeds and invasive plants.

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

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

#### **4.1.3. Cumulative Effects**

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Dry Creek and Indian Creek and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the Juniper Draw Golden Eagle proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

## **4.2. Wildlife**

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

Under the environmentally preferred alternative, Winter-Yearlong and Yearlong range for pronghorn antelope, mule deer, 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**

Produced water is to be piped to Devon’s Dry Creek EMIT facility to be treated and discharged into the Powder River. The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses.

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

continued maintenance of several species found in the Powder River (Hubert, 1993).

### **Change in Water Quality**

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

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

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their recently released report on the Powder River. This report indicated that CBNG discharges could affect native species in the drainage. During March through October, Devon expects to discharge water with an SAR of 7.0, and an EC of 2500  $\mu\text{mhos/cm}$ . During November through February, Devon expects to discharge water with an SAR of 9.75, and an EC of 2500  $\mu\text{mhos/cm}$ .

### **Change in Water Quantity**

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

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately 20 cfs per day of project treated water to an average flow of 30 cfs into the Powder River is unlikely to affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

#### **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.

### 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.

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). Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

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.

The use of the proposed water treatment facility can increase the potential for migratory bird mortality in the evaporation pond that receives a backwash stream from the conditioning ponds. This evaporation pond will contain a concentrated brine solution. Birds entering this pond can ingest the brine and die from sodium toxicity. Salt toxicosis has been reported in ponds with sodium concentrations over 17,000 mg/L. Ingestion of water containing high sodium levels can chronically affect aquatic birds, especially if a source of fresh water is not available nearby. Aquatic birds ingesting hypersaline water can be more susceptible to avian botulism. During cooler temperatures, sodium in the hypersaline water can crystallize on the feathers' thermoregulatory and buoyancy functions causing the bird to die of hypothermia or drowning (USFWS 2004). Effective wildlife exclusionary devices, such as netting, will be required to prevent access by migratory birds or other options should be utilized to contain and dispose of the brine solution should sodium concentrations rise over 17,000 mg/L.. 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.

**Table 4.2** Infrastructure within close proximity to documented raptor nests within the Golden Eagle project area (Timing limitations will apply to this infrastructure).

BLM ID#	INFRASTRUCTURE	DISTANCE (miles)
4380	Wells: 33M&G-298	0.36

BLM ID#	INFRASTRUCTURE	DISTANCE (miles)
	Proposed power drop	0.36
	Proposed overhead powerlines	0.36-0.50
4819	Wells: 14M&G-398	0.13 (out of line-of-sight)
	Wells: 21M&G-1098	0.18 (out of line-of-sight)
	Wells: 41M&G-998	0.46
	Proposed power drop	0.35
	Proposed overhead powerlines	0.35-0.50
4820	Wells: 14M&G-398	0.18 (out of line-of-sight)
	Wells: 21M&G-1098	0.11 (out of line-of-sight)
	Wells: 32M&G-1098	0.44
	Proposed power drop	0.31
	Proposed overhead powerlines	0.31-0.50 (SW) and 0.41-0.50 (SE)
	Proposed pump station	0.46
4821	Wells: 14M&G-398	0.24
	Wells: 21M&G-1098	0.12 (out of line-of-sight)
	Wells: 32M&G-1098	0.41
	Proposed power drops	0.33 (SW) and 0.43 (SE)
	Proposed overhead powerlines	0.33-0.50 (SW) and 0.36-0.50 (SE)
	Proposed pump stations	0.43 (SE) and 0.45 (E)
4822	Wells: 42M&G-1098	0.18 (out of line-of-sight)
	Wells: 41M&G-1098	0.19 (out of line-of-sight)
	Wells: 21M&G-1198	0.23
	Wells: 14M&G-298	0.30
	Wells: 32M&G-298	0.44
	Wells: 43M&G-1098	0.46
	Proposed power drops	0.13 (NE), 0.24 (NW) and 0.46 (E)
	Proposed overhead powerlines	0.13-0.50 (E) and 0.24-0.50 (W)
	Proposed pump stations	0.24 (NW) and 0.47 (E)
4818	Wells: 43M&G-1198	0.23
	Wells: 31M&G-1198	0.26
	Wells: 32M&G-1198	0.27
	Wells: 23M&G-1198	0.47
	Proposed power drops	0.31 (SW) and 0.33 (NW)
	Proposed overhead powerlines	0.26-0.50 (SW, W, and NW)
	Proposed pump station	0.30

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 rough topography and fragile soils, no wells were relocated to minimize the impacts to raptors within the project area. Nests 4819, 4820, and 4822 (see Table 3.2) will likely be abandoned as the proposed development surrounds them. The raptors occupying nests 4818 and 4822 (see Table 3.2) will likely experience greater electrocution and collision risks due to an increase in powerlines surrounding the nests. In order to mitigate impacts to nesting raptors, a timing limitation will be applied to all surface disturbing activities within 0.5 mile of all raptor nests within the project area. 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.

#### 4.2.5. Threatened and Endangered and Sensitive Species

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

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

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

<b>Common Name (scientific name)</b>	<b>Habitat</b>	<b>Presence</b>	<b>Project Effects</b>	<b>Rationale</b>
<b>Endangered</b>				
Black-footed ferret ( <i>Mustela nigripes</i> )	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
<b>Threatened</b>				
Ute ladies'-tresses orchid ( <i>Spiranthes diluvialis</i> )	Riparian areas with permanent water	NS	NLAA	Suitable habitat present and will be disturbed.

**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

**Effect Determinations**

**LAA** Likely to adversely affect

**NE** No Effect.

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

**4.2.5.1.1. Black-footed ferret**

Because the black-tailed prairie dog colonies within and adjacent to the Golden Eagle project area are of insufficient size for supporting ferrets and are isolated from any prairie dog complexes, implementation of the proposed development should have “no effect” on the black-footed ferret.

**4.2.5.1.2. Ute’s Ladies Tresses Orchid**

No springs have been identified within the project area. Suitable habitat is present within the Golden Eagle project area in SESE Section 31 and SWSE Section 32 T50NR77W. Disturbance in Section 31 includes a proposed pipeline drainage crossing; and in section 32, the disturbance is associated with the proposed outfall near the Powder River.

Implementation of the proposed coal bed natural gas project “may affect, but is not likely to adversely affect” the Ute ladies’- tresses orchid as suitable habitat is present and will be disturbed, though no population has been recorded at this site.

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

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



**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 affect existing waterways. Prairie not mountain habitat.
Spotted frog ( <i>Rana 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.
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Mature forest cover often within one mile of large water body.	K	MIIH	Project includes overhead power.
Brewer's sparrow ( <i>Spizella breweri</i> )	Basin-prairie shrub	K	MIIH	Sagebrush cover will be affected.
Burrowing owl ( <i>Athene cunicularia</i> )	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog towns will be affected.
Ferruginous hawk ( <i>Buteo regalis</i> )	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sagebrush cover will be affected.
Greater sage-grouse ( <i>Centrocercus urophasianus</i> )	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected.
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	Basin-prairie shrub, mountain-foothill shrub	K	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%	S	MIIH	Prairie dog towns will be affected.
Northern goshawk ( <i>Accipiter gentilis</i> )	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon ( <i>Falco peregrinus</i> )	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow ( <i>Amphispiza billineata</i> )	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher ( <i>Oreoscoptes montanus</i> )	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Trumpeter swan ( <i>Cygnus buccinator</i> )	Lakes, ponds, rivers	S	MIIH	Powder River may provide migratory habitat.
White-faced ibis ( <i>Plegadis chihi</i> )	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
<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.	K	MIIH	Prairie dog towns will be affected.
Fringed myotis ( <i>Myotis thysanodes</i> )	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis ( <i>Myotis evotis</i> )	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat ( <i>Euderma maculatum</i> )	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox ( <i>Vulpes velox</i> )	Grasslands	NP	NI	Habitat not present.
Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<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. Bald eagle**

The majority of the project area is proposed greater than one mile from the Powder River. The proposed pipeline and discharge point associated with the proposed EMITS facility is proposed within one mile of the Powder River. The proposed discharge point is located within an area of historical consistent use by both bald and golden eagles. Construction of the pipeline and discharge point would impact roosting and nesting bald eagles, therefore, to mitigate the impacts, construction of these facilities will not be permitted during the roosting season or nesting season.

There are no existing overhead three-phase distribution lines within the project area. Devon is proposing to have 5.5 miles of overhead three-phase distribution lines installed within the project area. There are currently no improved roads within the project area, with 7.5 miles proposed.

The presence of overhead power lines may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through August 14, 2007, Service Law Enforcement salvage records for northeast Wyoming identified that 180 raptors, including 1 bald eagle, 106 golden eagles, 1 unidentified eagle, 28 hawks, 44 owls and 8 unidentified raptors and 1 great-blue heron were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2007). Of the 180 raptors electrocuted 58 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

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

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

The proposed pipeline located within the prairie dog colony in the NW Section 7, T49N, R77W was not relocated due the location of the pipeline adjacent to the existing road. The EMITS facility is proposed adjacent to the prairie dog colony in SWNE Section 22, T49N, R78W. This location was chosen as the alternative location would have required extensive engineered roads to be built. The EMITS facility and power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog road mortalities.

#### **4.2.5.2.3. Greater sage-grouse**

The proposed project will directly impact approximately 5.3 acres of sage-grouse nesting, brood-rearing, and winter habitat. Braun (1998) reported that the presence of powerlines may limit sage-grouse use within 0.6 mile in otherwise suitable habitat. In this way, the proposed powerline will impact approximately 736 acres of otherwise suitable sage-grouse habitat.

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 impact 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).

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).

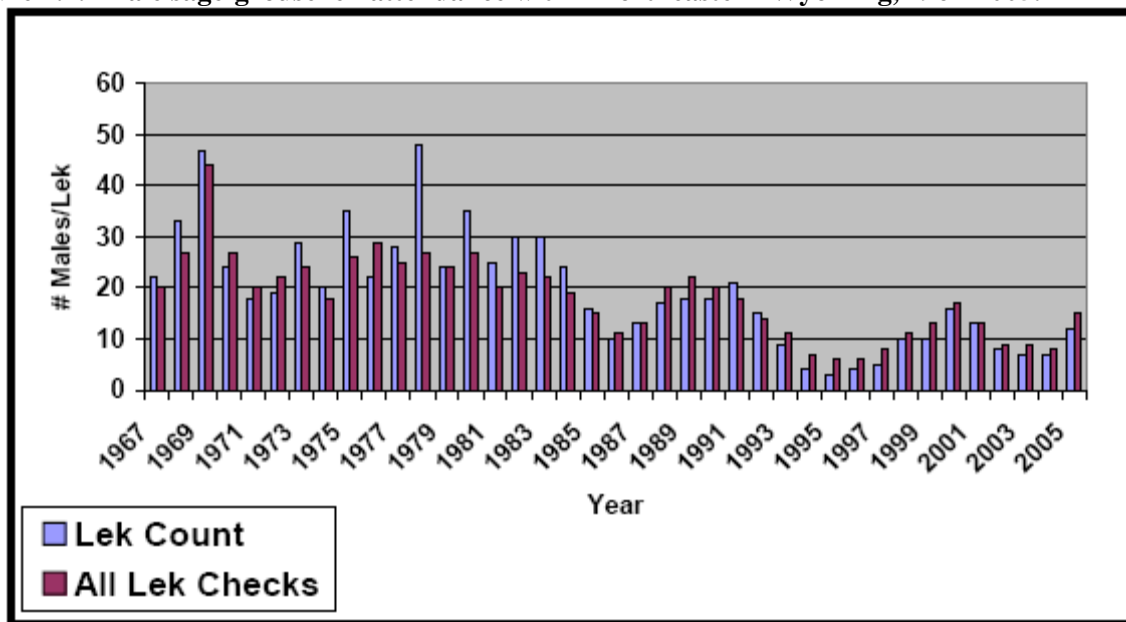
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently 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. In order to mitigate some impacts to nesting sage-grouse, a timing limitation will be applied to all surface disturbing activities within 2.0 miles of all sage-grouse leks within or surrounding the project 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 (Connely 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 (Connely et al. 2000) recommend increasing the protective distance around sage grouse leks. Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. As stated earlier, a well density of eight wells per section creates sage-grouse avoidance zones which overlap creating contiguous avoidance areas (WGFD 2004).

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

#### **4.2.5.2.4. Mountain plover**

Suitable mountain plover habitat is limited within the project area. The majority of the project area contains steep slopes or tall, dense vegetation. The project is not likely to impact mountain plovers.

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

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

### **4.3. West Nile Virus Direct and Indirect Effects**

BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNV species and its effects in Wyoming.

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

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

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

### **4.4. Water Resources**

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream 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 4.38 gpm per well or 210.0 gpm (0.47 cfs or 33.9 acre-foot per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected

volume produced within the watershed area was 171,423 acre-feet in 2006 (maximum production). As such, the volume of water resulting from the production of these wells is 0.2% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

#### **4.4.1. Groundwater**

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 16.8 gpm (only 20% discharge to impoundments) will infiltrate at or near the discharge points and impoundments (2.72 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 40 to 2,500 feet compared to 1,300-2,100 feet to the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

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

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring for Ground Water Protection Beneath



Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and is currently being revised as the “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which should be approved by June, 2006. Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an “Impoundment Monitoring Plan” to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1<sup>st</sup> effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

**4.4.1.1. Groundwater Cumulative Effects:**

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

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

**4.4.2. Surface Water**

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

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

<b>Predicted Values</b>	<b>TDS, mg/l</b>	<b>SAR</b>	<b>EC, µmhos/cm</b>
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Arvada Gauging station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit # WY0048020			
At discharge point	5,000	10	7,500
WYPDES Permit # WY0050504			
At discharge point	5,000	26*	7,500
WYPDES Permit # WY0055212			

<b>Predicted Values</b>	<b>TDS, mg/l</b>	<b>SAR</b>	<b>EC, µmhos/cm</b>
At discharge point	5,000	N/A	7,500
Predicted Produced Water Quality Big George Coal Zone	1,300	3.6	1,800

\* SAR value is daily maximum at irrigation compliance point.

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 1300.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 4.38 gallons per minute (gpm) is projected is to be produced from these 48 wells, for a total of 210.0 gpm for the POD. See Table 4.5.

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

There is 1 discharge point proposed for this project along the Powder River where treated water will be discharged. This outfall has been appropriately sited and utilizes an appropriate water erosion dissipation design. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of .014 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 48 wells is anticipated to be a total of 210.0 gpm of which 80% will be treated; 0.094 cfs will be discharged to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Dry Creek and Indian Creek from this action (0.014 cfs) may add a maximum 0.011 cfs to the Upper Powder River flows, or 0.02% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at each discharge point outfall. Aeration adds dissolved oxygen to

the produced water which can oxidize susceptible ions, which may then precipitate. This is particularly true for dissolved iron. Because iron is one of the key parameters for monitoring water quality, the precipitation of iron oxide near the discharge point will improve water quality at downstream locations.

The operator has obtained three Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of water produced from this project from the WDEQ and one EMITs WYPDES permit for treated water.

Permit effluent limits were set at (EMITs WYPDES WY0051934, Attachment B):

pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	2500 mg/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
Sulfates	3,000 mg/l max
Chlorides	150 mg/l
SAR (March-October)	7.0
SAR (November-February)	9.75
Total Flow, MGD	3.23

Permit effluent limits were set at (WYPDES WY0048020, Attachment B):

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Dissolved Iron	1,000 µg/l max
Dissolved Manganese	629 µg/l max
Total Recoverable Barium	1800 µg/l max
Total Recoverable Arsenic	7 µg/l max
Chlorides	150 mg/l
Total Flow, MGD	1.62

Permit effluent limits were set at (WYPDES WY0050504, Attachment B):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved Iron	299 µg/l max
Dissolved Manganese	629 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l
Total Flow, MGD	0.48

Permit effluent limits were set at (WYPDES WY0055212, Attachment B):

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Dissolved Iron	1,000 µg/l max
Dissolved Manganese	629 µg/l max
Total recoverable Barium	1800 µg/l max
Total Recoverable Arsenic	7 µg/l max
Chlorides	150 mg/l
Total Flow, MGD	0.55

The WYPDES permits also address existing downstream concerns, such as irrigation use, in the COA for the permit.

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, unless a reference well has been submitted with a previous POD within 6 miles of the nearest producing well within the Golden Eagle POD. 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 Juniper Draw Golden Eagle POD prepared by Western Water Consultants Devon Energy Production Company, L.P.

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

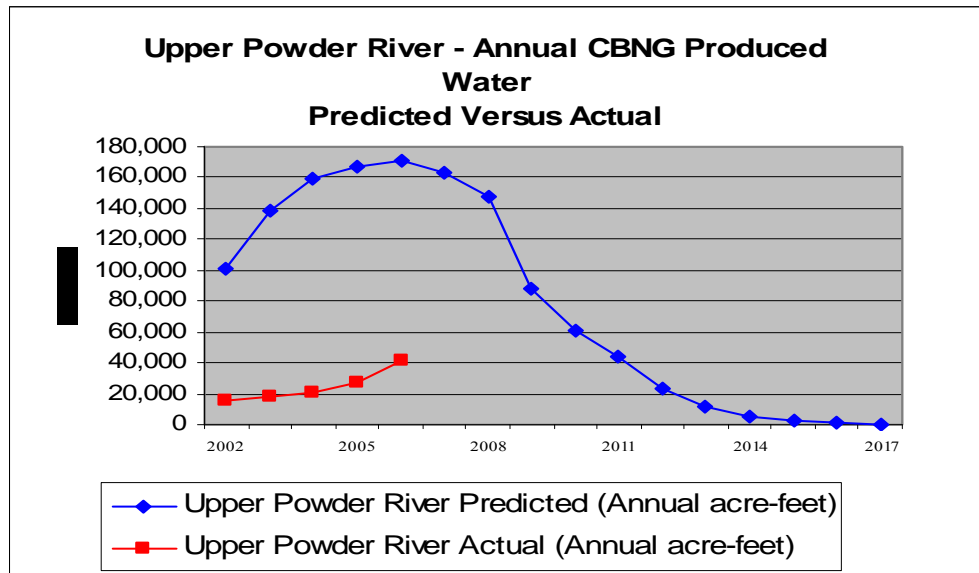
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of March 2007, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 900,040 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 16.8% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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

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

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



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Electrical Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data,

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

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

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

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

No additional mitigation measures are required.

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

#### 4.5. Cultural Resources

**Table 4.7 Effects to Cultural Resources**

Site/Isolate Number	Description (Report #)	National Register Eligibility	In APE	Effect
48JO1870	Historic Homestead & Prehistoric Lithic Scatter (70030068)	NE	Yes	No HP Affected
48JO2494	Prehistoric Artifacts & Features (70050023)	NE	Yes	No HP Affected
48JO2498	Prehistoric Lithic Scatter (70050023)	NE	No	No Effect
48JO2733	Prehistoric Stone Circle (70070071)	Unevaluated	No	No Effect
48JO2734	Historic Cairn (70070071)	NE	No	No Effect
48JO2735	Prehistoric Stone Circle (70070071)	NE	No	No Effect
48JO2736	Prehistoric Lithic Scatter (70070071)	NE	No	No Effect
48JO3692	Prehistoric Campsite (70070071)	E – D	No	No Effect

Site/Isolate Number	Description (Report #)	National Register Eligibility	In APE	Effect
IR-1*	Prehistoric (70080054)	NE	Y	No HP Affected
IR-1	Prehistoric (70070071)	NE	N	No Effect
IR-2	Prehistoric (70070071)	NE	N	No Effect
IR-3	Prehistoric (70070071)	NE	N	No Effect
IR-4	Prehistoric (70070071)	NE	Y	No HP Affected
IR-5	Prehistoric (70070071)	NE	N	No Effect
IR-6	Prehistoric (70070071)	NE	N	No Effect
IR-7	Prehistoric (70070071)	NE	N	No Effect
IR-8	Prehistoric (70070071)	NE	N	No Effect
IR-9	Historic (70070071)	NE	N	No Effect
IR-10	Prehistoric (70070071)	NE	N	No Effect
IR-11	Prehistoric (70070071)	NE	Y	No HP Affected
IR-12	Prehistoric (70070071)	NE	Y	No HP Affected

BLM review, conducted by Wendy Sutton, has determined that sites 48JO1870 and 48JO2494 will be impacted by the proposed project. Four isolates (48IR1\*, 48IR2, 48IR4, 48IR11 and 48IR12) will also be impacted by the proposed project. Impacts to these non-eligible sites and isolates will result in no effect/no historic properties affected. Following the Wyoming State Protocol, Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 11/16/2007 that the proposed project would result in *no historic properties affected* (DBU\_WY\_2007\_2697).

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
Brad Rogers	Wildlife Biologist	US Fish and 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.

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

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

Eric Holborn, Natural Resource Specialist  
Casey Freise, Supervisory Natural Resource Specialist  
Mike McKinley, Hydrologist  
Mike Worden, Petroleum Engineer  
Norma Cope, Legal Instruments Examiner  
Wendy Sutton, Archaeologist  
Jennifer Morton, Wildlife Biologist  
Gerald Queen, Geologist  
Denise Oliverius, Realty Specialist  
Chris E. Hanson, Field Manager

Interdisciplinary Team Lead : Eric Holborn