

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

**Devon Energy  
West Pine Tree Field Unit Kokanee POD**

**ENVIRONMENTAL ASSESSMENT – WY-070-06-114**

**DECISION:** Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Devon Energy’s West Pine Tree Field Unit Kokanee POD Coal Bed Natural Gas (CBNG) POD comprised of the following 35 Applications for Permit to Drill (APDs), and 2 groundwater monitor APDs as follows:

	<b>Name</b>	<b>Well #</b>	<b>Qtr/Qtr</b>	<b>Section</b>	<b>Twp</b>	<b>Rng</b>	<b>Lease #</b>
1	WPTU Kokanee	7S-1	NE NE	7	42N	76W	WYW147313
2	WPTU Kokanee	7S-3	NE NW	7	42N	76W	WYW147313
3	WPTU Kokanee	7S-5	SW NW	7	42N	76W	WYW147313
4	WPTU Kokanee	7S-7	SW NE	7	42N	76W	WYW147313
5	WPTU Kokanee	8S-1	NE NE	8	42N	76W	WYW147313
6	WPTU Kokanee	8S-3	NE NW	8	42N	76W	WYW147313
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9	WPTU Kokanee	8S-9	NE SE	8	42N	76W	WYW147313
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36	WPTU Kokanee (Monitor)	20S-16M	SE SE	20	42N	76W	WYW147315
37	WPTU Kokanee (Monitor)	20S-16MS	SE SE	20	42N	76W	WYW147315

The following impoundments are approved:

IMPOUNDMENT NAME	QTR/QTR	SEC	TWP	RNG	LEASE	OUTFALL
T42NR76W19NENW	NENW	19	42	76	WYW 147315	WY0053911-001DF
T42NR76W27NESW	NESW	27	42	76	WYW 147315	WY0053911-002DF
T42NR76W27SESE	SESE	27	42	76	WYW 147315	WY0053911-003DF
T42NR76W34SENW	SENW	34	42	76	WYW 147315	WY0053911-002&3DF
T42NR76W34NESE	NESE	34	42	76	WYW 147315	WY0053911-004DF
T42NR76W35NWNW	NWNW	35	42	76	WYW 147315	WY0053911-004DF
NICHOLS (T42NR76W28NESW)	NESW	28	42	76	WYW 147315	WY0053911-005DF
T42NR76W32NENE	NENE	32	42	76	WYW 147315	WY0053911-005DF
T42NR76W21SESW	SESW	21	42	76	WYW 147315	WY0053911-008DF
T42NR76W22NENW	NENW	22	42	76	WYW 147315	WYpending-001CD
T42NR76W11SWNW	SWNW	11	42	76	WYW 147315	WYpending-002CD
T42NR76W10NENE	NENE	10	42	76	WYW 147315	WYpending-003CD
T42NR76W7SWSW	SWSW	7	42	76	FEE	WY0053911-009DF

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

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

- 1 The Operator, in their Plan of Development, 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.
  - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
  - Provide water analysis from a designated reference well in each coal zone.
- 2 The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
- 3 Alternative C will not result in any undue or unnecessary environmental degradation.
- 4 It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
- 5 Mitigation measures applied by the BLM will alleviate environmental impacts.
- 6 Alternative C is the environmentally-preferred Alternative.
- 7 The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

**FINDING OF NO SIGNIFICANT IMPACT:** Based on the analysis of the potential environmental impacts of the proposed action in the attached environmental assessment, I have determined that NO significant impacts are expected 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  
West Pine Tree Field Unit Kokanee POD  
PLAN OF DEVELOPMENT  
WY-070-06-114**

## **INTRODUCTION**

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

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

The purpose for the proposal is to quantify reserves and produce coal bed natural gas (CBNG) on three valid federal oil and gas mineral leases issued to the applicant by the BLM.

#### **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 West Pine Tree Field Unit Kokanee POD Plan of Development (POD) for 35 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 35 CBNG wells and 2 groundwater monitor wells within this POD, as follows:

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37	WPTU Kokanee (Monitor)	20S-16MS	SE SE	20	42N	76W	WYW147315

### Impoundment Information

IMPOUNDMENT NAME	QTR/QTR	SEC	TWP	RNG	LEASE	OUTFALL
T42NR76W27NESW	NESW	27	42	76	WYW 147315	WY0053911-002DF
T42NR76W27SESE	SESE	27	42	76	WYW 147315	WY0053911-003DF
T42NR76W34SENW	SENW	34	42	76	WYW 147315	WY0053911-002&3DF
T42NR76W34NESE	NESE	34	42	76	WYW 147315	WY0053911-004DF
T42NR76W35NWNW	NWNW	35	42	76	WYW 147315	WY0053911-004DF
NICHOLS (T42NR76W28NESW)	NESW	28	42	76	WYW 147315	WY0053911-005DF
T42NR76W21SESW	SESW	21	42	76	WYW 147315	WY0053911-008DF
T42NR76W22NENW	NENW	22	42	76	WYW 147315	WYpending-001CD

IMPOUNDMENT NAME	QTR/QTR	SEC	TWP	RNG	LEASE	OUTFALL
T42NR76W11SWNW	SWNW	11	42	76	WYW 147315	WYpending-002CD
T42NR76W10NENE	NENE	10	42	76	WYW 147315	WYpending-003CD
42NR76W7SWSW	SWSW	7	42	76	WYW 147315	WY0053911-009DF

The following impoundments are secondary priority dams. Reclamation bonding prior to POD approval will not be required. However, if the operator chooses to build them, they will submit a sundry request to the BLM and have all permits and bonding in place prior to beginning construction.

IMPOUNDMENT NAME	QTR/QTR	SEC	TWP	RNG	LEASE	OUTFALL
T42NR76W19NENW	NENW	19	42	76	WYW 147315	WY0053911-001DF
T42NR76W32NENE	NENE	32	42	76	WYW 147315	WY0053911-005DF
T42NR76W11NWNW	NWNW	11	42	76	WYW 147315	WY0053911-004CD

County: Johnson, Campbell

Applicant: Devon Energy Production Company, Inc.

Surface Owners: Mark Iberlein

The proposed action involves the development of the project, which includes the following:

- Drilling of 35 total federal CBM wells in the Big George coal zone to depths of approximately 1500 feet.
- Development of two deep groundwater monitor wells.
- An unimproved and improved road network.

A water management plan that involves the following infrastructure: 9 upgraded existing and 5 proposed reservoirs; 11 discharge points; land application disposal by irrigation through at least two center pivots.

- A buried gas, water and power line network. An overhead power line network.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan, Drilling Plan and Water Management Plan in the Plan of Development (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 Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard Conditions of Approval contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their Plan of Development, 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 Provide water well agreements to the owners of record for permitted water wells within the area

of influence of the action.

- 4 Provide water analysis from a designated reference well in each coal zone.

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

### 2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be alleviated. 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 **Pine Tree Field Kokanee POD** are listed below under 2.3.1:

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

1. Flows below discharging reservoirs will be confined to as narrow an area as possible in order to reduce the potential surface area damage from soil/water interactions and to reduce the amount of forage inundated/changed by the discharges.
2. Moved outfall 004DF to the north a short distance to make a better, less erosive drop into the reservoir pool.
3. Dam 7 SWSW-S construction will be subject to landowner’s final approval. Two sites were evaluated for this dam. The outfall will be moved from its present proposed location.

The following dams were dropped from the original proposal due to landowner and environmental concerns.

IMPOUNDMENT NAME	QTR/QTR	SEC	TWP	RNG	LEASE	OUTFALL
T42NR76W33SENW	SENW	33	42	76	WYW 147315	WY0053911-007DF
T42NR76W28SESE	SESE	28	42	76	WYW 147315	WY0053911-006DF

#### 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 *Conditions of Approval* (COAs) and will be in addition to stipulations applied at the time of lease issuance and any standard conditions of approval.

##### 2.3.2.1. Groundwater

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which was approved September, 2006. For WYPDES permits received by DEQ after the effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

### **2.3.2.2. Surface Water**

1. Channel Crossings:
  - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
  - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
  - c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
  - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. 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 these impoundments.
4. Concerns regarding the quality of the discharged CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.
5. The operator will supply a copy of the complete approved WYPDES permits 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 CBM 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 geomorphologic 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. If any dead or injured threatened, endangered, proposed, or candidate species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374) and law enforcement office (307-261-6365) and BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
2. 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.
3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
4. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.
5. Native seed mixes will be used to re-establish short grass prairie vegetation, where appropriate, during reclamation.
6. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

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

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

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.
2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
3. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimum disturbance buffer zone of one mile will be established for all bald eagle nest sites (February 15 – August 15).
4. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
5. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

##### **2.3.2.7.2. Black-footed Ferret**

1. Prairie dog colonies will be avoided wherever possible.

#### **2.3.2.7.3. Mountain Plover**

1. A disturbance-free buffer zone of 0.25 mile will be established around all occupied mountain plover nesting habitat between March 15 and July 31.
2. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of known mountain plover habitat.
3. Construction of ancillary facilities (for example, compressor stations, processing plants) will not be located within ½ mile of known nesting areas. The threats of vehicle collision to adult plovers and their broods will be minimized, especially within breeding aggregation areas.
4. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
5. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.
6. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

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

1. 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.

#### **2.3.2.8. Visual Resources**

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

#### **2.3.2.9. Noise**

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

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

#### **Water Management**

1. Discharge point 004DF into reservoir T42NR76W35NWNW will have an alternative to the standard path from the stock tank to the reservoir pool because of the steepness and depth of the gully.
2. The operator will supply a copy of the complete approved WYPDES permits to BLM as they are issued by WDEQ.
2. Flows below discharging reservoirs will be confined to as narrow an area as possible in order to reduce the potential surface area damage from soil/water interactions and to reduce the amount of forage inundated/changed by the discharges.

3. Dam 7 SWSW will be constructed only if landowner approves a location. Two sites were evaluated. The downstream site will be constructed so as not to back water onto the toe of the slump on the left side of the pool area. If the upstream site is selected, construction oversight will be required due to concerns with poor geologic conditions in the area (weathered shale layers and coal seams).
4. Prior to construction of secondary priority dams, the BLM will be notified by Sundry notice and all applicable permits will be completed and approved. Reclamation bonds will be in place prior to Sundry approval.
6. The operator will sample natural spring(s) identified (if measurable) in the spring and fall seasons for the routine water quality parameters as listed below and discharge rates in order to monitor for groundwater quality changes resulting from the discharge of CBNG produced water. The results will be reported to the BLM Authorized Officer. After review of the initial samples, the suite of analyses may be reduced to primary cations and anions with any trace elements of interest. Monitoring will be continued for at least two years after the cessation of production.

pH	Electrical Conductivity
Total Dissolved Solids	SAR
Ca	Mg
Na	K
SO <sub>4</sub>	Cl
HCO <sub>3</sub>	CO <sub>3</sub>
Total Arsenic	Total Barium

Total Iron

#### Surface Use

1. 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 Kokanee POD, Carlsbad Canyon (2.5Y 6/2), from the Munsell Soil Color Chart.
2. There were two major ecological sites identified at the onsite inspection within this POD. In order to expediently re-claim and re-vegetate the disturbed surfaces, three seed mixes have been identified for the specific ecological site areas. These mixes will be applied to any surface disturbance related to the project on Federal surface. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

#### Ecological Site at Well Locations

Seed Mix A		Seed Mix B	
Clay Loam		Silty Loam	
7S-1	7S-3	17S-3	17S-5
7S-5	7S-7	17S-11	17S-13
8S-1	8S-3	17S-15	18S-9
8S-5	8S-7	18S-11	18S-13
8S-9	8S-11	18S-15	20S-1
8S-13	8S-15	20S-3	20S-7
20S-9	20S-11	21S-1	21S-3

Seed Mix A		Seed Mix B	
Clay Loam		Silty Loam	
20S-15	21S-9	21S-5	21S-7
21S-11	21S-13		
21S-15	20S-16M		
20S-16MS			

### Seed Mix A - Clayey Eco Site

Species - <i>Cultivar</i>	Full Seeding (lbs/ac PLS*)	% in Mix	Lbs PLS*
Western Wheatgrass - <i>Rosana</i>	6	40	4.8
Green needlegrass - <i>Lodorm</i>	6	40	4.8
American vetch <b>OR</b> Cicer Milkvetch - <i>Lutana</i>	7	15	2.1
Lewis - <i>Appar</i> , Blue, or Scarlet flax	4	5	0.4
<b>Totals</b>		<b>100%</b>	<b>12.1 lbs/acre</b>

### Seed Mix B - Loamy Eco Site

Species - <i>Cultivar</i>	Full Seeding (lbs/ac PLS*)	% in Mix	Lbs PLS*
Thickspike Wheatgrass - <i>Critana</i> <b>OR</b> Western Wheatgrass - <i>Rosana</i>	6	40	4.8
Bluebunch Wheatgrass - <i>Secar</i> or <i>P-7</i>	7	10	1.4
Green needlegrass - <i>Lodorm</i>	6	25	3.0
American vetch <b>OR</b> Cicer Milkvetch - <i>Lutana</i>	7	10	1.4
White - <i>Antelope</i> or Purple Prairie Clover - <i>Bismarck</i>	3	5	0.3
Lewis - <i>Appar</i> , Blue, or Scarlet flax	4	5	0.4
Winterfat - <i>Open Range</i>	8	5	0.8
<b>Totals</b>		<b>100</b>	<b>12.1 lbs/acre</b>

\*PLS = pure live seed

- In order to insure that 90% pure seed mixes are applied, the operator will provide the seed stock labels for any seed applied on Federal surface to the Authorized Officer in the BFO.

4. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12” or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

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

5. Provide 4” of aggregate where grades exceed 8%.

### **Wildlife**

1. No surface disturbing activity will be allowed within ½ mile of documented active raptor nests at the following locations from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation applies to the listed wells and associated infrastructure to include roads, pipelines, powerlines, etc. to protect future nesting sites.

<b>Nest</b>	<b>Township/ Range</b>	<b>Section</b>	<b>Proposed Wells and Infrastructure Affected (Listed wells include associated infrastructure)</b>
3500	42/76	6	7S-3, proposed 2 track road to the well
3501	42/76	5	8S-1, proposed 2 track road to the well
3502	42/76	8	7S-1, 7S-7, 8S-3, 8S-7, 8S-5, 8S-11, 8S-13, proposed pumping station, overhead powerlines, proposed stock tank, proposed access.
3503	42/76	8	8S-7, 8S-9, 8S-11, 8S-15, overhead powerlines, proposed access roads
3504	42/76	17	17S-11, 17S-15, 20S-1, overhead powerlines, proposed access.
3505	42/76	21	21S-3, 21S-7, 21S-5, 21S-11, 21S-9, 21S-15, and overhead powerlines, proposed access.
3506	42/76	21	21S-3, 21S-7, 21S-5, 21S-11, 21S-9, 21S-15, and overhead powerlines, proposed access.
3507	42/76	28	21S-13, overhead powerlines, proposed access, and monitor wells.
3508	42/76	28	21S-13, overhead powerlines, proposed access, and monitor wells.
3509	42/76	29	20S-15, proposed access and monitor wells.
3510	42/76	27	Proposed construction of discharge point, Proposed improved road in section 27 and proposed waterline in section 27.
3511	42/76	27	Proposed waterline in section 27 and proposed water discharge points in sections 27 and 34.
3512	42/76	34	Reservoir construction in section 34, construction of discharge point, pivot, and proposed waterline in section 34
3515	42/76	33	Proposed waterline and sprinkler pivot in section 33.
17	42/76	5	8S-1, proposed 2 track road to the well
18	42/76	15	Proposed stock tank
19	42/76	21	21S-11, 20S-9, 21S-5, 21S-7, 21S-11, 21S-13, 21S-15, proposed waterline, discharge point construction,
23	42/76	20	20S-3, 20S-11, proposed access

2. 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.
3. Nest productivity checks shall be completed for all raptor nests within the Kokanee POD listed in the table below. The productivity checks shall be completed for the first five years following project completion. The occupancy checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success/production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year.

BLM ID	UTM E	UTM N	Species	Activity	Legals
3503	418119	4830762	AMKE	Active 2005	T42N;R76W;S8
3505	419474	4827754	RTHA	Active 2005	T42N;R76W;S21
3506	419483	4827764	GHOW	Active 2005	T42N;R76W;S21
3513	417714	4824751	RTHA	Active 2006	T42N;R76W;S32
3514	418255	4824108	RTHA	Active 2006	T42N;R76W;S32
3515	419432	4823947	RTHA	Active 2006	T42N;R76W;S33
17	418567	4831746	GOEA	Active 2006	T42N;R76W;S8
19	419314	4827558	RTHA	Active 2006	T42N;R76W;S21

4. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
5. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
6. For any surface-disturbing activities proposed in sagebrush shrublands, the Company will conduct clearance surveys for sage grouse breeding activity during the sage grouse’s breeding season before initiating the activity. The survey must encompass all sagebrush shrublands within 0.5 mile of the proposed activity.
7. The company will construct powerlines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use and increasing the visibility of the individual conductors.
8. The following conditions will alleviate impacts to sage-grouse:
  - a. No surface disturbing activities are permitted between March 1 and June 15 within 2 miles of a documented sage grouse lek, 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 timing limitation affects the following wells as well as nearby reservoirs and infrastructure:

Lek Name	Township/ Range	Section	Proposed Wells and Infrastructure Affected
Cottonwood Creek 1	43/76	33	Well 8S-1 and associated infrastructure.
Cottonwood Creek 3	42/76	3	Well 8S-1 and associated infrastructure.

Lek Name	Township/ Range	Section	Proposed Wells and Infrastructure Affected
2007 New lek 1 & 2	42/76	16	<b>8S</b> -1, 3, 5, 7, 9, 11, 13, 15; <b>18S</b> -9; 17S-3, 5, 11, 13, 15; <b>20S</b> -1, 3, 7, 9, 11, 15; <b>21S</b> -1, 3, 5, 7, 9, 11, 13, 15; All associated roads, powerlines, utilities, discharge points, stock tanks, and any activity associated with the Kokanee POD

- b. If any additional active leks are identified during the survey, the 2 mile timing restriction (March 1- June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities will 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 BLM and WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist prior to surface disturbing activities.
- c. Disturbances in sagebrush and grassland habitats (such as mowing) may result in the destruction of individuals and active nests. Prior to any ground disturbing activities during the nesting season searches for active nests should be conducted prior to ground disturbing activities.

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

No other water management alternatives were outlined by the operator.

### 3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were assigned to the NFO on January 17, 2006. Field inspections of the proposed Devon Kokanee POD CBNG project were conducted on May 8, 16, 17, 25, and July 20, 2006, and May 10 and 11, 2007, and June 6, 2007 by:

Kevin McAulay - Devon Energy Production Co.  
 Dan Hengel - Devon Energy Production Co.  
 Kevin O'Dell - ARC Consultants  
 Ben Adams - BLM/BFO  
 James Bashor - BLM/NFO  
 Darci Stafford - BLM/WFO  
 G.L. "Buck" Damone III - BLM/BFO

Tom Holmes - Devon Energy Production Co.  
 Ed Guseman - Devon Energy Production Co.  
 Jim Powers - ARC Consultants  
 Mark Bollack - BLM/WFO  
 Alice Tratebras - BLM/NFO  
 Lynnda Jackson - BLM/NFO  
 Pat Kirkendoll - Devon Energy Production Co.

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			Stafford/West
Floodplains	X			Adams
Wilderness Values			X	Bashor
ACECs			X	Bashor
Water Resources	X			Adams

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

### 3.1. Topographic Characteristics of Project Area

The Kokanee POD area is located in the southwestern part of Campbell and southeastern Johnson County. The project area is approximately 15 to 17 miles southwest of Wright, Wyoming via state Highway 387. The elevation ranges from 4750' to 4890' above sea level in the southern portion of the POD.

This is an area of extensive existing CBNG and conventional oil well development. There are several roads which will be used for access to these wells that were constructed or improved to accommodate the current Fee production.

This is also an area of agricultural use. The area is used primarily for livestock grazing and wildlife habitat. There is no federal surface within the project area.

The topography consists of fairly flat, broad highlands which grade rapidly into deep, steep-sided, broad-bottomed gully systems. The southern area slopes from the Bozeman Trail gently down to Davis Draw. The Dry Fork of the Powder River flows from south to north within two miles of the western boundary of the POD.

### 3.2. Vegetation & Soils

#### 3.2.1. Ecological Sites

A primary determinant of ecological site in the Kokanee POD area is the soils and surficial geology of the area. The Wasatch formation in the Powder River Basin is generally thinly bedded and laterally discontinuous deposits of sandstones, shales, mudstones, siltstones, and carbonaceous zones. These surficial geologic deposits are discontinuous, resulting in a mosaic of soils that are characteristic of the geologic parent material.

The climate of the area is arid with a 10-14 inch precipitation regime. Most of the precipitation falls in the spring and summer as high intensity short duration rainfall events. Winters are cold and dry. Winter storms track over the Bighorn Mountains in a west to east pattern, with orographic lifting causing snowfall in the mountains, and a rain shadow in the Powder River Basin to the east.

Identified ecological sites at the onsite inspections were the loamy and clayey sites of the 10-14 inch precipitation zone, northern plains region. It is reasonable to expect other sites to be present in the POD area, but was not found in the areas examined for development. These two sites are summarized below.

#### Loamy Ecosite:

An ecological site observed within the proposed Kokanee POD was the Loamy ecosite with a plant community either mixed Sagebrush and Grass or Blue Grama and Plains Prickly Pear. This site occurs on land nearly level up to 50% slopes, with typical landforms being hill slopes, associated alluvial fans & stream terraces.

The soils of this site are deep to moderately deep (greater than 20" to bedrock), well-drained & moderately permeable. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture. The main soil limitations include moderate erodibility increasing with land slope.

Historically, the mixed sagebrush, grass plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush management. Wyoming big sagebrush is a significant component of this plant community. A mix of warm and cool-season grasses make up the majority of the understory with the balance made up of annual cool-season grasses, and miscellaneous forbs.

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

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

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

The **Blue Grama/ Plains Pricklypear/ Bare Ground** plant community is the result of frequent and severe year-long grazing over the long-term. Perennial plants are decreased. Cheatgrass, annual weeds, and bare ground have increased. Plains pricklypear may have increased, rendering much of the forage unusable by livestock.

This plant community is highly variable depending on the severity, frequency, and duration of the grazing, and also the condition of the plant community when this level of grazing began. Virtually all plants not resistant to overgrazing may have been eliminated. Dominant plants may include blue grama, threeawn, annuals, and rhizomatous wheatgrasses to a lesser degree. Perennial plant diversity is low.

This state is unhealthy and subject to increased erosion. Runoff is high on these sites due to the sod nature of blue grama and bare ground.

#### **Clayey Ecosite:**

Another ecosite observed within the Kokanee POD was the clayey ecosite, with typical plant communities being Mixed Sagebrush/Grass and Blue Grama Sod/Plains Pricklypear Plant Community. This site occurs on nearly level to 30% slopes, typically on hill sides, alluvial fans & stream terraces.

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The layers of soil having the most influence on plants vary from 4 to 8 inches thick. The surface soil will vary from 2 to 5 inches deep and have one of the following textures: silty clay, sandy clay, clay, and the finer portions of

silty clay loam, clay loam, and sandy clay loam. These soils may develop severe cracks. The main soil limitation is that the soils are subject to moderate to severe soil erosion from water depending on land slope and topographic position.

The plant communities are identical to the communities described under the Loamy ecosite. Soils of the clayey ecosite are finer in texture and more susceptible to erosion and gullyng from runoff.

### **3.2.2. Wetlands/Riparian**

Davis Draw, at the southern end of the project area, and the Dry Fork Powder River along the west, are typical of Powder River Basin ephemeral wetland/riparian systems. They have stands of cottonwood trees and other species of wetland and riparian vegetation. There have been few, if any, channel overtopping runoff events in this part of the basin within the last ten years, which helps explain why cottonwood regeneration is not readily apparent. These drainages possess well defined channels contained within relatively narrow floodplain systems which are bounded alternately by steep cut-banks and gently sloping landforms, and have potholes which often hold water late into the summer. Davis Draw and the other gully systems are heavily used by wildlife and livestock for cover during periods of inclement weather and shelter during the heat of summer.

### **3.2.3. Invasive Species**

No state-listed noxious weeds and invasive/exotic plant infestations were discovered by a search of inventory maps and/or databases or during subsequent field investigation by the proposed project proponent.

## **3.3. Wildlife**

The identified habitats within the proposed Kokanee project area are of importance to several wildlife species. Prior to project approval several resources were consulted to identify potential species that may occur in the proposed project area. Resources that were consulted include the wildlife database compiled and managed by Buffalo BLM wildlife biologists, the Wyoming Game and Fish Department (WGFD) big game and sage grouse maps, Wyoming Natural Diversity Database (WYNDD), and wildlife reports submitted by Thunderbird Wildlife Consultants to Devon for the proposed Kokanee POD. A BLM Worland Field Office (WFO) biologist, prior to project approval, conducted a field visit and a Biological Assessment was developed. Species that have been identified in the proposed project area, or that have been noted as being of special importance are described below.

### **3.3.1. Big Game**

The Kokanee project area is a yearlong use area for mule deer and winter-yearlong use for pronghorn antelope. Yearlong use is defined as when a substantial portion of a population makes general use of the habitat on a year-round basis. Winter-yearlong use is when a substantial portion of a population makes general use of the habitat on a year-round basis; during winter months there is an influx of additional animals into the area from other seasonal ranges. Big game range maps are available in the PRB FEIS and from the WGFD.

### **3.3.2. Aquatics**

The proposed Kokanee POD project area is located within the drainages of the Davis Draw and Cottonwood Creeks both tributaries to the Dry Fork which then drains into the Upper Powder River system. Within the POD boundary, all streams are included in the Powder River system. Creeks and drainages within the project area have been classified as either ephemeral or intermittent. Please see the master water management plan included in the Kokanee POD book for information on water quality within the project area. Aquatic organisms that have been identified to occur in the Upper Powder River watershed are listed in the PRB FEIS.

### **3.3.3. Migratory Birds**

Migratory birds are those that migrate from one locality to another for the purposes of breeding, and or foraging at some point during the calendar year. Please refer to the PRB FEIS for a list of potential migratory bird species that may occur in the project area. Species observed by TWC include Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes montanus*), and long-billed curlew (*Numenius americanus*).

#### **Brewer's Sparrow (*Spizella breweri*)**

Brewer's sparrows (*Spizella breweri*) are expected to occur in the project area. Brewer's sparrows (*Spizella breweri*) are sagebrush obligates. They prefer large intact stands of sagebrush and are sensitive to habitat fragmentation. *S. breweri* primarily feed on insects during the breeding season and shifting to seeds in response to reductions in prey. The nesting season begins with their arrival in mid-March and extends to early August, depending on geographic location. In Colorado *S. breweri* start to arrive in mid-April, therefore their arrival in Wyoming is probably similar or a couple of weeks later (Holmes 2005). The majority of nesting activity takes place between mid-May and July. *S. breweri* will double brood and therefore extend their susceptibility to disturbance by construction activities.

#### **Sage Sparrow (*Amphispiza belli*)**

Sage sparrows are suspected to occur in the project area. *A. belli* are considered sagebrush obligates with perennial bunch grass understory. *A. belli* densities appear to have a direct correlation with sagebrush patch size, cover, spatial distribution of patches, and level of disturbance and fragmentation (Holmes 2005). Nests are in shrubs (prefer live or mostly live shrubs), bunch grasses and occasionally on the ground (Holmes 2005). *A. belli* are ground foraging omnivores taking, adult and larval insects, spiders, seeds, small fruits, and succulent vegetation (Holmes 2005). *A. belli* arrive in February to April and males begin establishing territories shortly after arrival. *A. belli* in Idaho first egg dates range from April 6 to June 16 and *A. belli* in Idaho usually double broods (Holmes 2005).

#### **Sage Thrasher (*Oreoscoptes montanus*)**

Sage Thrashers are documented in the project area. *O. montanus* are considered sagebrush obligates, however it has been noted to nest in black greasewood in Utah and Nevada. *O. montanus* nest May through June and may have multiple broods (Reynolds 1999).

#### **Loggerhead Shrike (*Lanius ludovicianus*)**

*L. ludovicianus* are expected to occur in the project area. *L. ludovicianus* breed in a variety of habitats including grasslands, sage scrub, and other areas with a scatter of bushes, trees and bare ground (Wiggins 2005). Thorny trees or barbed wire for impaling prey have been listed as habitat requirements, however tree and shrub availability and protection against detection/predation may be more important factors regarding nest site selection. Foraging habitat appears to be defined by perch availability and grass cover. Some evidence suggests that *L. ludovicianus* may prefer foraging in ungrazed or lightly grazed short grass prairie types and moderate grazing in tall grass prairies (Wiggins 2005). The primary prey of *L. ludovicianus* consists of insects, mammals and spiders. Insects comprise the majority of their diet, however mice, birds and reptiles cannot be ruled out as a vital component.

Wiggins 2005 identifies threats to *L. ludovicianus* within Region 2 of the U.S. Forest Service as:

- Loss of habitat due to agricultural conversion
- Degradation and loss of nesting trees/shrubs
- Degradation of foraging habitat due to overgrazing by cattle
- Low reproductive success because of reductions in the prey base due to pesticides, or due to habitat fragmentation/degradation
- Susceptibility to toxin accumulations derived from their main (summer) prey sources (grasshoppers, beetles).

*L. ludovicianus* arrive in Wyoming mid to late March at the earliest through May (Wiggins 2005). Shrub

and tree nesting habitat is available in the project area. The proposed action will disturb nesting habitat for *L. ludovicianus*. Data for *L. ludovicianus* in South Dakota document first clutch date as late April to early May with hatch date and fledging May through July.

#### **3.3.4. Raptors**

Twenty-three raptor nests were identified within one half mile of the Kokanee project area (Thunderbird 2006); of these, three were observed to be active in 2005 (3503, 3505, and 3506) and 6 were active in 2006 (3506, 3513, 3514, 3515, 17, 19) (Table 4). Thirteen nests have wells within ½ mile of the nest. Several nests were within one quarter mile of well sites and infrastructure, but steps were taken by the BLM biologist to move well locations outside of the ¼ mile buffer or out of the line of sight of the nest. Six wells are within ¼ mile of raptor nests of those 3 wells are within ¼ mile of active nests. Twenty-five wells are within ½ of raptor nests of those thirteen wells are within ½ mile of active nests (Table Raptor Nest Data).

Species	Act 2006	Act 2005	Nest Cond	Sub	UTME	UTMN	T_N	R_W	SEC	QTRS	Nest #
FEHA	Inactive	Inactive	Poor	Ground	416196	4832180	42	76	6	NESW	3500
GOEA	Inactive	Inactive	Good	Cottonwood, live	418599	4831973	42	76	5	SESE	3501
RTHA	Inactive	Inactive	Good	Cottonwood, live	417282	4830979	42	76	8	NWSW	3502
MAKE	Inactive	Active	Undetermined	Willow dead	418119	4830762	42	76	8	NWSE	3503
BUTEO	Inactive	Inactive	Good	Cottonwood, live	418271	4828887	42	76	17	SESE	3504
RTHA	Inactive	Active	Good	Cottonwood, live	419474	4827754	42	76	21	SESW	3505
GHOW	Active	Active	Good	Cottonwood, live	419483	4828864	42	76	21	SESW	3506
FEHA	Inactive	Undetermined	Poor	Ground	418743	4826550	42	76	28	NWNW	3507
FEHA	Inactive	Undetermined	Fair	Ground	418758	4826494	42	76	28	NWNW	3508
FEHA	Inactive	Undetermined	Fair	Ground	418257	4826387	42	76	29	SWNE	3509
FEHA	Inactive	Undetermined	Poor	Ground	420930	4825899	42	76	27	NESW	3510
FEHA	Inactive	Undetermined	Poor	Ground	421096	4825418	42	76	27	SWNSE	3511
FEHA	Inactive	Undetermined	Remnants	Ground	420882	4825084	42	76	34	NESW	3512
RTHA	Active	Undetermined	Good	Cottonwood, live	417714	4824751	42	76	32	SESW	3513
RTHA	Active	Undetermined	Good	Cottonwood, live	418255	4824108	42	76	32	NESE	3514
RTHA	Active	Undetermined	Good	Cottonwood, live	419432	4823947	42	76	33	SESW	3515
GOEA	Active	—	Good	Cottonwood, live	418567	4831746	42	76	8	NENE	17
UNK	Inactive	—	Good	Cottonwood, live	424242	4828972	42	76	15	NWSE	18
RTHA	Active	—	Good	Cottonwood, live	419314	4827558	42	76	21	SESW	19
FEHA	Inactive	—	Good	Creek Bank	416817	4827598	42	76	19	NESE	20
FEHA	Inactive	—	Poor	Creek Bank	416614	4827570	42	76	19	NWSE	21
FEHA	Inactive	—	Good	Creek Bank	416509	4827555	42	76	19	NWSE	22
FEHA	Inactive	—	Fair	Rock outcrop	417223	4827536	42	76	20	NWSW	23

### **3.3.4 Threatened and Endangered and Sensitive Species**

#### **3.3.4.1. Threatened and Endangered Species**

##### **3.3.4.1.1. Black-footed ferret**

The Kokanee project area was surveyed for black-tailed prairie dog colonies by Thunderbird. Three prairie dog colonies were located and mapped with a total acreage of 1,064.5 acres (Thunderbird 2006). A GIS file originating from the Wyoming Game and Fish indicated that prairie dog colonies occurred in the same areas, although there was a discrepancy in colony boundaries. The mapping by WGFD was done in the early nineties and it is possible that colonies have declined over the last ten years.

##### **3.3.4.1.2. Bald eagle**

The Kokanee POD has several mature trees and stands of cottonwoods located within one mile of the project area (Thunderbird 2005). No bald eagle nest sites were located during surveys. A perennial water source containing a population of large-bodied fish is not present in the area, indicating that suitable potential nesting habitat is limited. Suitable potential roosting habitat is present in pockets throughout the project area. Riparian corridors of the Dry Fork Powder River and Davis Draw represent the most ideal roosting habitat in the area. During winter roost surveys, no bald eagle roosts were documented. However, one eagle was seen in NENE Section 14, and two eagles were observed in a live cottonwood tree along Davis Draw in NWSE Section 32 during the 2005 survey. Roost surveys conducted in 2006 identified bald eagles using 3 cottonwoods trees throughout the project area. In each year, all eagles were observed on the same day. Subsequent surveys for winter roosting bald eagles did not identify any bald eagles in the project area. According to BFO GIS files, three historical roost sites are located within 0.7, 0.8, and 1.1 miles of the POD. These records are associated with the large sheep operations that were in the area over 15 years ago.

The area is currently grazed by cattle; however, sheep grazing operations occur on adjacent lands. This may be a potential food source for transient and wintering eagles, as well as the prairie dog colonies occurring in the project area.

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

Produced water will be contained in 11 existing and 5 proposed reservoirs and surface discharged at 13 proposed sites. The reservoirs and outfalls are located within ephemeral drainages of the Davis Draw, Dry Fork Powder River, Fletcher Canyon, and Collins Draw watersheds. Suitable habitat is not present within portions of the Kokanee project area which were surveyed by BKS (BKS 2006)

#### **3.3.4.2. Sensitive Species**

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

The Kokanee project area was surveyed for prairie dog colonies by Thunderbird in 2005. Three colonies were located with a total acreage of 1,064.5 acres (Thunderbird 2006). A GIS file originating from the Wyoming Game and Fish indicated that prairie dog colonies occurred in the same areas, although there was a discrepancy in colony boundaries. The mapping by WGFD was done in the early nineties and it is possible that colonies have declined over the last ten years.

##### **3.3.4.2.2. Greater sage grouse**

Four occupied sage-grouse leks are present within two miles of the project area; Cottonwood Creek 1 is located approximately 1.7 miles northeast of the POD. Cottonwood Creek 3 is located approximately 1.8 miles northeast of the POD. Two new leks were identified during surveys in the spring of 2007. The new leks are located in section 16 and within 2 miles of all but seven wells. Suitable sage grouse habitat is present throughout the POD and sign was observed at several well locations by the BLM biologist.

##### **3.3.4.2.3. Mountain plover**

Suitable mountain plover habitat is present within the project area but it is limited. Mountain plovers

prefer relatively flat terrain, with short vegetation, and high percentages of bare ground. Flat areas with bare ground were not observed within the project area, and areas with very gentle slopes were rare. The best available plover habitat occurs in the prairie dog colonies, although some vegetation in these colonies might deter nesting plovers due to height. Given a certain amount of grazing pressure, precipitation, and time of year, some areas along ridgelines in the project area could host suitable nesting habitat for plovers. No mountain plovers were observed by Thunderbird during surveys (Thunderbird 2006).

### 3.4. West Nile Virus

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

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

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

**Table 3.4 Historical West Nile Virus Information**

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

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

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

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

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

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

### **3.5. Water Resources**

The project area covers a number of named and unnamed tributaries to the Dry Fork of the Powder River. Two of those major tributaries are Fletcher Canyon, a tributary to Seventeenmile Creek, and Davis Draw, both tributaries to the Dry Fork of the Powder River. Small portions of the project area lie in Von Burg Draw which is a tributary to Collins Draw. Collins Draw flows to the Dry Fork Powder River via Cottonwood Creek. The Dry Fork Powder River is a major ephemeral tributary to the Powder River system. The area is characterized by fairly flat upland areas which grade rapidly to steep and deep gullies, many of which rapidly grade into relatively flat broad-bottomed swales. Within the project area, all drainages are ephemeral, flowing water only in response to fairly large precipitation events and/or snowmelt. Only the main channel bottoms of Davis Draw, Dry Fork Powder River, and Collins Draw exhibit sinuous, well vegetated channel bottoms.

#### **3.5.1. Groundwater**

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

Wyoming Department of Environmental Quality (WDEQ) water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for Total Dissolved Solids (TDS) and the classes of groundwater; 500 mg/l TDS for drinking water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

The PRB EIS Record of Decision 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 related to groundwater, the plan identified the following (PRB EIS ROD page E-4):

- The effects of infiltrating 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 CBNG impoundments
- Shallow groundwater wells would be installed and monitored where necessary

As stated in the MMRP, an Interagency Working Group has been established to implement an adaptive management approach. BLM is working with the WDEQ and the Interagency Working Group regarding the monitoring information being collected and assessed to determine if changes in mitigation are warranted.

The BLM 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 had a battery of nineteen wells which were installed and monitored jointly by the BLM and USGS starting in August of 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment site, which has since been reclaimed, 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 indicated increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

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

The WDEQ implemented requirements for monitoring shallow groundwater of Class III or better quality under unlined CBNG water impoundments effective August 1, 2004. The intent is to identify locations where the impoundment of water could potentially degrade any existing [shallow groundwater aquifers](#). These investigations are conducted where discharged water will be detained in existing or proposed impoundments. If shallow groundwater is detected and the water quality is determined to fall within the Class III or better [class of use](#) (WDEQ Chapter 8 classifications for livestock use), operators are required to install batteries [of 1 to 3 wells](#), develop a monitoring plan and monitor water levels and quality. The results of these investigations have yet to be analyzed and interpreted.

A search of the Wyoming State Engineers Office Ground Water Rights Database for this area showed 8 registered stock and domestic water wells within one mile of the POD boundary with depths ranging from 8 to 1266 feet below the ground surface. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater) and 3-36

through 3-56 (surface water).

### 3.5.2. Surface Water

The project area lies within the Upper Powder River watershed. See section 3.5 above for a more complete description of the drainages covered by this plan of development.

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 drainage, the EC ranges from 1797  $\mu\text{mhos/cm}$  at Maximum monthly flow to 3400  $\mu\text{mhos/cm}$  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 on the Powder River at Arvada, WY (PRB FEIS page 3-49). As a comparison of tributary flow into the Powder River near this project area, Salt Creek near Sussex exhibits an EC that ranges from 5204 to 5668  $\mu\text{mhos/cm}$  and an SAR that ranges from 18.9 to 23.6.

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

The operator has identified a natural spring within this POD boundary at T42N, R76W, Sec 27 in the SWNW quarter quarter. This spring, known as Emigrant Spring (a significant site on the historic Bozeman Trail) was not flowing at the time of the site visit. However, the operator has committed to monitor the spring, collect and analyze a baseline sample, and collect and analyze samples in the future in order to detect any changes in water quality.

### 3.6. Cultural Resources

Class III cultural resource inventories were conducted for the **Pine Tree Field Kokanee POD** project prior to on-the-ground project work (BFO project no. 070060014). ACR Consultants conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. Alice Tratebras, Mark Bollack and G.L. "Buck" Damone III, BLM Archaeologists, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following cultural resources are located in or near the area of potential effect.

**Table 3.6 Cultural Resources Inventory Results**

Site Number	Site Type	Eligibility
48CA264	Bozeman Trail	Listed on NRHP
48CA5494	Ft. McKinney/Ft. Fetterman Telegraph Line	Eligible
48CA5694	Lithic Scatter/Historic Trash	Eligible
48CA5695	Lithic Scatter	Not Eligible
48CA5696	Lithic Scatter	Not Eligible

<b>Site Number</b>	<b>Site Type</b>	<b>Eligibility</b>
48CA5697	Lithic Scatter	Unevaluated
48CA5698	Lithic Scatter	Not Eligible
48CA5699	Historic Trash with Features	Not Eligible
48CA5700	Lithic Scatter/Historic Trash	Unevaluated
48CA5701	Lithic Scatter/Historic Trash	Not Eligible
48CA5702	Lithic Scatter/Historic Trash	Not Eligible
48CA5703	Lithic Scatter/Historic Trash	Not Eligible
48CA5704	Lithic Scatter/Historic Trash	Not Eligible
48CA5705	Historic Trash	Not Eligible
48CA5706	Lithic Scatter/Historic Trash	Not Eligible
48CA5707	Lithic Scatter	Eligible
48CA5846	Lithic Scatter/Historic Trash	Not Eligible
48CA5847	Historic Homestead	Not Eligible
48CA5848	Lithic Scatter/Historic Trash	Unevaluated
48JO134	Lithic Scatter/Historic Trash	Listed on NRHP
48JO3059	Lithic Scatter/Historic Trash	Eligible
48JO3191	Historic Trash	Not Eligible
48JO3194	Historic Trash	Not Eligible
48JO3195	Lithic Scatter/Historic Trash	Not Eligible
48JO3196	Lithic Scatter/Historic Trash	Not Eligible
48JO3197	Historic Trash	Not Eligible
48JO3198	Historic Trash	Not Eligible
48JO3199	Historic Trash	Not Eligible
48JO3200	Historic Trash	Not Eligible
48JO3201	Historic Trash	Not Eligible
48JO3202	Lithic Scatter/Historic Trash	Not Eligible
48JO3203	Lithic Scatter/Historic Trash	Not Eligible
48JO3204	Lithic Scatter	Not Eligible
48JO3205	Lithic Scatter	Eligible
48JO3206	Lithic Scatter/Historic Trash	Not Eligible

Site Number	Site Type	Eligibility
48JO3207	Historic Trash	Not Eligible
48JO3208	Historic Trash	Not Eligible
48JO3208	Historic Trash	Not Eligible
48JO3209	Historic Trash	Not Eligible

### 3.7. Foot Rot

Foot rot, also called infectious pododermatitis, foul claw, or hoof rot, is an acute or chronic infection of cattle characterized by lameness, swelling, and inflammation of the skin of the coronary band and the skin between the claws. The disease is seen most commonly in feedlot cattle or in the winter and spring months when mud, urine, and manure are the greatest problem. There is no indication that incidence of foot rot has occurred or increased anywhere in the Powder River Basin in association with coal bed methane development. It is extremely unlikely foot rot problems will occur or increase as a result of this project, therefore it will not be discussed further in this analysis.

## 4. ENVIRONMENTAL CONSEQUENCES

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

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

Impacts to vegetation and soils from surface disturbance would be reduced by following the operator's plans and BLM applied mitigation. Of the 37 proposed well locations (35 CBNG and 2 ground water monitoring), all can be drilled without a well pad being constructed. Disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 10 x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 37 wells would involve approximately 0.1 acre/well for 3.7 total acres. This would be a short-term impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in Conditions of Approval (COAs).

Approximately 3.93 miles of improved roads would be constructed to provide access to various well locations. Approximately 12.25 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 4.2 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 Master Surface Use Plan and the Water Management Plan maps (see the POD). These structures would be constructed in accordance with sound, engineering practices and BLM standards.

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. "Government soil experts

state that SAR values of only 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult.” (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

**Table 4.1 - SUMMARY OF DISTURBANCE**

<b>Facility</b>	<b>Number or Miles</b>	<b>Factor</b>	<b>Acreage of Disturbance</b>	<b>Duration of Disturbance</b>
Nonconstructed Pad	35	0.1/acre	3.5	Long Term
Constructed Pad	0	or Site Specific	0	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	2	0.1/acre	0.2	Long Term
Impoundments	16		147	Long Term
On-channel	16	Site Specific	147	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	13	Site Specific or 0.01 ac/WDP	0.2	
*Wetlands Filled	----	Site Specific	0.0	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	
Channel Modification		Site Specific	0.0	
Pipeline Crossing*		Site Spec or 0.01 acres	0.0	
Road Crossing*		Site Spec or 0.01 acres	0.0	
Improved Roads	8.64	40' Width or Site Specific	41.9	Long Term
No Corridor				
With Corridor				
2-Track Roads	13.9	12' Width or Site Specific	20.25	Long Term
No Corridor		20' Width or Site Specific		
With Corridor				
Pipelines	4.2	20' Width or Site Specific	10.2	Short Term
No Corridor				
With Corridor				
Buried Power Cable	0.0	12' Width or Site Specific	0.0	Short Term
No Corridor				
Overhead Powerlines	5.89	15' Width	10.71	Long Term
Additional Disturbance		Site Specific	0	

\*Already included in other categories of disturbance, but separated here for USCOE General Permit 98-08 reporting.

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

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

Due to the full containment and land application strategies the operator has proposed for this development, it is unlikely that sufficient quantities of water will reach areas where cottonwood trees and other wetland/riparian species would be affected. However, monitoring of the area should be implemented to ensure that adverse effects do not occur and to mitigate them (adverse effects) immediately if they do occur.

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

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

#### **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 relative to this project are anticipated to be within the parameters of the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the **Upper Powder River** drainage and the total amount that was predicted in the PRB FEIS, which is approximately 17% of that total (see section 4.4.2.1).
- The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Davis Draw and the Dry Fork of the Powder River and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water to flow into Upper Powder River.
- The water management plan for the Kokanee POD proposes that produced water will not contribute to significant 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** 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. No additional mitigation measures are required.

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

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. Produced water is to be **fully contained within reservoirs**. If a reservoir were to discharge, it is unlikely produced water would reach a fish-bearing stream.

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

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

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

##### **Migratory Birds**

There are no timing restrictions or survey requirements in place with the BLM to offer protection to nesting migratory passerines outside of raptor and sage-grouse timing buffers. Migratory birds and their active nests are protected under the Migratory Bird Treaty Act. Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the

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

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

Disturbances in sagebrush and grassland habitats (such as mowing) may result in the destruction of individuals and active nests. Prior to any ground disturbing activities during the nesting season searches for active nests should be conducted.

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

Several species of raptors may potentially be found in the habitat types associated with the proposed Kokanee POD project area. For a list of potential raptor species that may occur in the proposed project area please refer to the PRB FEIS. Sixteen raptor nest sites were identified by Thunderbird (Brown 2005); of these, 3 nests (3503, 3505, and 3506) were active in 2005. Species included red-tailed hawk, Swainson's hawk, and ferruginous hawk. Seven previously unrecorded nests were added to the list in 2006, or the 23 total nests 6 were active in 2006. Two nests that were active in 2005 were inactive in 2006.

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

To reduce the risk of decreased productivity or nest failure, the BLM BFO commonly 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.

The level of activity in the area may influence the quality of habitat for nesting raptors and result in decreased habitat effectiveness. Following BLM guidelines and may not ensure that impacts from development are adequately mitigated. For example four nests within in the POD are within ½ mile of 6 or more wells and all are within ¼ mile of a proposed well (out of line of sight). The impact of the level of development within ½ mile of nesting raptors has not been adequately documented. Impacts of development vary by species and by individual raptors. Development in the project area may result in some areas that were previously used for nesting becoming undesirable. The project area may also experience a shift in species diversity with species more tolerant to disturbance inhabiting nest sites previously used by species more sensitive to disturbance.

Location and status of nests affecting the Kokanee proposed project area are listed in the following table:

**TABLE 4.2.4 Raptor Nest Data**

2005 nest status	I	I	I	A	I	A	A	U	U	U	U	U	U	U	U	—	—	—	—	—	—	—	
2006 nest status	I	I	I	I	I	I	A	I	I	I	I	I	A	A	A	A	I	A	I	I	I	I	
Nest number → Well number ↓	3500	3501	3502	3503	3504	3505	3506	3507	3508	3509	3510	3511	3512	3513	3514	3515	17	18	19	20	21	22	23
7S-1			X																				
7S-3	X																						
7S-5																							
7S-7			X																				
8S-1		X															X						
8S-3			X																				
8S-5			X																				
8S-7			X	X																			
8S-9				X																			
8S-11			X	X																			
8S-13			X																				
8S-15				X																			
17S-3																							
17S-5																							
17S-11					X																		
17S-13																							
17S-15					X																		
18S-9																							
18S-11																							
18S-13																							
18S-15																							
20S-1					X																		
20S-3																							X
20S-7																							
20S-9																		X					
20S-11																							X
20S-15									X														
21S-1																							
21S-3						X	X																

**TABLE 4.2.4 Raptor Nest Data**

<b>2005 nest status</b>	I	I	I	A	I	A	A	U	U	U	U	U	U	U	U	—	—	—	—	—	—	—	
<b>2006 nest status</b>	I	I	I	I	I	I	A	I	I	I	I	I	A	A	A	A	I	A	I	I	I	I	
<b>Nest number →</b>	3500	3501	3502	3503	3504	3505	3506	3507	3508	3509	3510	3511	3512	3513	3514	3515	17	18	19	20	21	22	23
<b>Well number ↓</b>																							
21S-5						X	X												X				
21S-7						X	X												X				
21S-9						X	X																
21S-11						X	X												X				
21S-13								X	X										X				
21S-15						X	X												X				
<b>Wells within 1/4 mile</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**X** = wells within 1/2 mile of a nest      I = inactive, A = active, U = undetermined, — = no data

**4.2.5. Threatened and Endangered and Sensitive Species**

**4.2.5.1. Threatened and Endangered Species Direct and Indirect Effects**

**Table 4.2 (T&E table)**

<b>Common Name (scientific name)</b>	<b>Habitat</b>	<b>Presence</b>	<b>Project Effects</b>	<b>Rationale</b>
Endangered Black-footed ferret ( <i>Mustela nigripes</i> )	Black-tailed prairie dog colonies or complexes > 80 acres.	NS	NE	Existing prairie dog colonies insignificant.
Threatened Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Mature forest cover often within one mile of large water body.	K	LAA	Overhead electrical lines occur in the area.
Ute ladies'-tresses orchid ( <i>Spiranthes diluvialis</i> )	Riparian areas with permanent water	NP	NE	No habitat existing in project area.

**Presence**

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

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

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

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

**Effect Determinations**

**LAA** Likely to adversely affect

**NE** No Effect.

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

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

Implementation of the proposed development should have “no effect” on the black-footed ferret given that is unlikely that ferrets occur in the area since there is not sufficient habitat to support ferrets and there are no re-introduction sites in the project’s proximity.

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

Winter roosting habitat is available in the project area. Surveys for winter roosting eagles did not identify any winter roosts, however it should be noted that bald eagles were observed. The development of the project may result in reduced bald eagle use of the project area.

Devon is proposing to develop overhead power throughout the project area. The BLM biologist worked with representatives from Devon, Pacific Power, and PRECorp in order to make necessary modifications to the originally proposed routes in order to reduce effects of the lines on raptor species. There are currently 5.89 miles proposed overhead electrical lines within the project area. It is likely that lines will be constructed in compliance with the Avian Power Line Interaction Committee’s (most recent version) suggested practices and with the Service’s standards (USFWS 2002).

The presence of overhead power lines and roads may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. Twenty-two raptors including 16 golden eagles were electrocuted within Wyoming’s Powder River Basin in 2003; 12 electrocutions were on recently constructed lines which did not fully meet APLIC standards (Rogers pers. Comm.). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Devon is proposing 5 new reservoirs and there are 11 existing reservoirs associated with this project. The effect of the reservoir on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

The proposed project may affect, and is “likely to adversely affect” bald eagles. The presence of existing overhead electric lines being utilized for the project may present an electrocution risk. This is especially true near reservoirs where there may be an increase in prey availability. Eagles are likely to be present in the area due to the suitable habitat conditions and food sources.

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

Produced water will be contained in 11 existing and 5 proposed reservoirs and surface discharged at 13 proposed sites. The reservoirs and outfalls are located within ephemeral drainages of the Davis Draw, Dry Fork Powder River, Fletcher Canyon, and Collins Draw watersheds. Suitable habitat is not present within portions of the Kokanee project area which were surveyed by BKS (BKS 2006). Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial.

Implementation of the proposed coal bed natural gas project should have “no effect” on the Ute ladies’-tresses orchid. Most activities are proposed to occur in upland sites away from any potential habitat. Areas in the project area that have been surveyed were determined not to be able to support Ute Ladies’-tresses.

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

**Table 4.3 (Sensitive Species table)**

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<b>Amphibians</b>				
Northern leopard frog ( <i>Rana pipiens</i> )	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will effect existing waterways.
Spotted frog ( <i>Ranus pretiosa</i> )	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
<b>Birds</b>				
Baird's sparrow ( <i>Ammodramus bairdii</i> )	Grasslands, weedy fields	S	MIIH	Grassland habitats will be impacted.
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 colonies present.
Ferruginous hawk ( <i>Buteo regalis</i> )	Basin-prairie shrub, grasslands, rock outcrops	K	MIIH	Sagebrush and shrubland habitats 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	K	MIIH	Grasslands will be affected.
Mountain plover ( <i>Charadrius montanus</i> )	Short-grass prairie with slopes < 5%	NS	MIIH	Suitable habitat available.
Northern goshawk ( <i>Accipiter gentilis</i> )	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon ( <i>Falco peregrinus</i> )	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow ( <i>Amphispiza billneata</i> )	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher ( <i>Oreoscoptes montanus</i> )	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Trumpeter swan ( <i>Cygnus buccinator</i> )	Lakes, ponds, rivers	S	MIIH	Existing reservoirs present.
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>				
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, basin-prairie shrub	NP	NI	Cliffs & perennial water not present.
Swift fox ( <i>Vulpes velox</i> )	Grasslands	S	MIIH	Grassland habitats will be affected.
Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	Forests, basin-prairie shrub, caves and mines	NP	NI	Habitat not present.

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

**Effect Determinations**

**LAA** Likely to adversely affect

**NE** No Effect.

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

#### **4.2.5.3. Sensitive Species**

The Wyoming USDI Bureau of Land Management has prepared a list of sensitive species to focus species management efforts toward 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.

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

The BLM has taken steps to re-route the section of power line running through Section 24, so that it will run east-west along the border between sections 13/24 and 18/19. The original proposed route bisected a prairie dog colony. The proposed reroute will minimize the amount of overhead power running through the prairie dog colony.

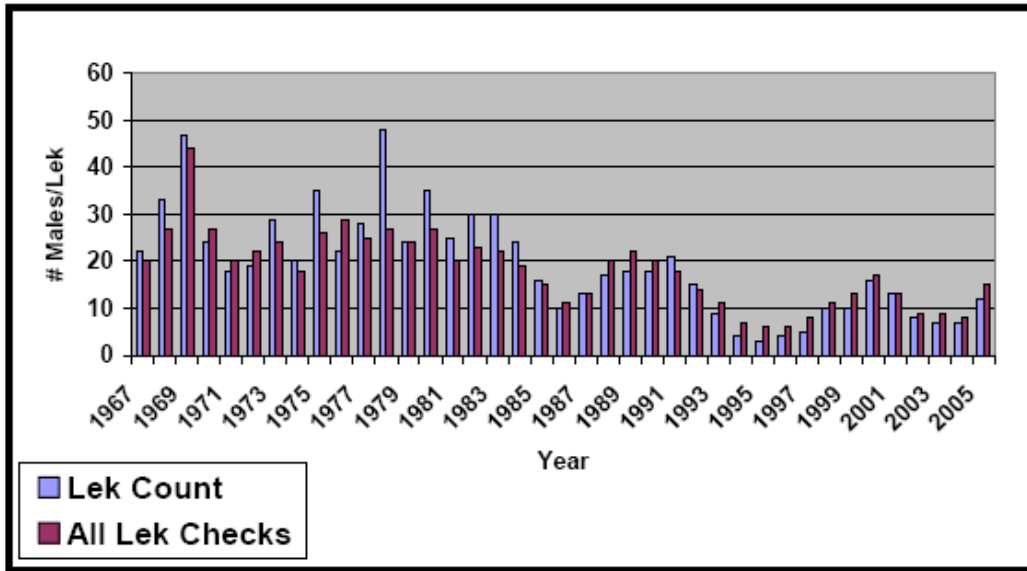
##### **4.2.5.3.2. Greater sage grouse**

New leks located in section 16 are within 2 miles of all but seven wells. Suitable sage grouse habitat is present throughout the POD and sign was observed at several well locations by the BLM biologist. One State well is located in section 16 and access to the proposed well is through the center of one of the new leks locations. Construction of a road through the lek may disturb displaying males and nesting females. Traffic during the breeding and nesting season may result in decreased nest success and possible direct mortality due to vehicle collisions. The proposed access route should be moved to protect nesting and displaying sage-grouse. The proposed access is on State of Wyoming owned surface, over which the BLM does not have jurisdiction.

Wells and other infrastructure located within sagebrush communities will result in direct habitat loss. Sage-grouse avoidance of these facilities produces even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage- grouse and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). Well houses and power poles may provide habitats for mammal and avian predators increasing sage grouse predation. Overhead power lines may also present a collision risk for sage-grouse. Sage-grouse may avoid suitable habitat containing overhead power lines to reduce their exposure to predation.

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

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



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

**4.2.5.3.3. Mountain plover**

A BLM habitat suitability model indicates the project area to be largely suitable plover habitat. Although a habitat suitability model predicts that the project area does contain suitable habitat, observations by the BLM biologist indicate that presence of plovers is unlikely due to canopy cover and height of sagebrush and seeded grass plots.

**4.2.5.4. 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. No additional mitigation measures are required.

**4.3. West Nile Virus**

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

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

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

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

#### **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 a commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should alleviate project area and downstream potential impacts from proposed water management strategies.

The WDEQ has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The Wyoming State Engineers Office (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 **29.2** gpm per well or **1022.0** gpm (2.3 cfs or 1662 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the **Upper Powder River** drainage, the projected volume produced within the watershed area was 163,521 acre-feet in 2007 (maximum production was predicted to have occurred in 2006). As such, the volume of water resulting from the production of these wells is 1% of the total volume projected for 2007. This volume of produced water is within the predicted parameters of the PRB FEIS.

##### **4.4.1. Groundwater**

The PRB FEIS predicts an infiltration rate of 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 409 gpm will infiltrate at or near the discharge points and impoundments (665 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). However, there is potential for infiltration of produced water to influence the quality of the antecedent groundwater. The WDEQ requires that operators determine initial groundwater quality below impoundments to be used for CBNG produced water storage. If high quality water is detected (Class 3 or better) the operator is required to establish a groundwater monitoring program at those impoundments.

Shallow ground water monitoring is ongoing at numerous 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 variability in 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 and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which was approved September, 2006. For WYPDES permits received by DEQ after the effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

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 in the water wells in the area. The permitted water wells in the area produce from alluvial zones above the targeted coal bed natural gas producing zones (8 to 1266 feet range in depth for the stock and domestic wells compared to 1300 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 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 within the POD boundary. The well will be sampled at the wellhead for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

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

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

Development of CBM through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water “cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and

coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBM development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65). No additional mitigation is necessary.

#### **4.4.2. Surface Water**

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 798.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). Land application disposal of produced water is included in this proposal. The operator has submitted a comprehensive Land Application Disposal Plan which can be studied in Appendix G of the Water Management Plan.

A maximum volume of 29.2 gallons per minute (gpm) is projected is to be produced from these 35 wells, for a total of 1022.0 gpm for the POD. The quality for the water produced from the Big George coal zone for these wells is predicted to be similar to the sample water quality collected from a location near the POD. That water quality was determined to be 1279.0 µmhos/cm electrical conductivity (EC), 798.0 mg/l total dissolved solids (TDS) and 6.1 sodium adsorption ratio (SAR). By comparison water quality limits for the Upper Powder River proposed by WDEQ are 1000-3200 µmhos/cm for EC and 2.0-10 for SAR. For more information, please refer to the Water Management Plan (WMP) included in this POD.

Based on the onsite review of discharge points, they have been appropriately sited and utilize appropriate water erosion dissipation designs. The anticipated total maximum rate of water discharged in this POD is 1022.0 gpm. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

#### **Table 4.4 Summary of Water Management Strategy**

##### Primary Watershed

- 0 % Direct Discharge P
- 0 % Containment Pond P
- 50 % Infiltration Pond P
- 0 % Injection P
- 0 % Active Treatment P
- 0 % Passive Treatment P
- 50 % LAD P
- 0 % Other P

To manage the produced water, 11 existing and 5 proposed impoundments (1098 acre-feet of storage) would be constructed/re-habilitated within the project area. These impoundments would disturb approximately 147 acres including the dam structures. These impoundments are all on-channel structures. They will be upgraded/constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.34 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of the channels and address any problems resulting from any discharge. Discharge from the impoundments could potentially allow for streambed enhancement through wetland-

riparian species establishment. Sedimentation in the impoundments will occur, 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 4-87). The predicted maximum discharge rate from these **35** wells is anticipated to be a total of **1022.0** gpm or 2.3 cfs to impoundments and land application disposal. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74), the produced water re-surfacing in Davis Draw and the Dry Fork of the Powder River from this action (0.34 cfs) may add a maximum of 0.28 cfs to the **Upper Powder River** flows, or 0.4% 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 except during periods when the river would otherwise be dry (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 to the Powder River resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The reservoirs, in addition to loss through evaporation and infiltration, would allow flexibility in the timing and quantity of surface discharge to receiving channels. This would alleviate erosion problems and potentially allow for streambed enhancement through wetland-riparian species establishment.

In the WMP portion of the POD, the operator did not provide an analysis of the potential development in the watershed above the project area. However, based on the areas of the Dry Fork of the Powder River and its tributaries above the POD (323 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 2584 total wells which could produce a maximum water rate of 74,936 gpm or 167 cfs. The BLM agrees with the operator that this is not expected to occur because:

1. Some of these wells have already been drilled and are producing.
2. This operator is not the exclusive lease holder in the watershed
3. New wells will be phased in over several years, and
4. A decline in well discharge generally occurs after several months of operation.

The potential maximum discharge rate of produced water within the watershed upstream of the project area, 167 cfs, is less than the rate of run off estimated from the 2-year storm event for these drainages. The estimated discharge rate of water produced from the full development in the watershed above the project area is about 1/6th the predicted natural run off from the area.

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

The operator has applied for a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ. A draft permit, number WY0053911, was issued, and effluent limits were set and are outlined in the following table:

pH	6.5 to 9
Total Dissolved Solids	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	650 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l
Total Recoverable Aluminum	750 µg/l max

A condition of approval has been added to this analysis that will limit the volume of water discharged within this project area to that which was analyzed in the WYPDES permit application (2.8 MGD). The analysis for the permit included produced water from a total of 66 Fee, State and Federal wells which the operator has drilled or has proposed to drill within the Dry Fork Powder River area.

The draft WYPDES permit issued by the WDEQ addresses existing downstream concerns, such as irrigation use, in the conditions of approval for the permit. The designated points of compliance identified for this permit are the ends of the discharge pipes. Additional monitoring is required at specified points should water travel farther down the Dry Fork toward the Powder River.

The quality for the water produced from the **Big George** coal zone is predicted to be similar to the sample water quality collected from a location near the POD. The TDS, EC and SAR of that sample is shown in Table 7 below. Table 7 also lists proposed limits for SAR and EC in the Powder River at the Montana Line, historic EC and SAR figures for the Powder River and for Salt Creek, and much more.

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

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit		2	1000
Least Restrictive Proposed Limit		10	3200
Powder River at Arvada gaging station			
Historic Data Average at Maximum Flow		4.76	1797
Historic Data Average at Minimum Flow		7.83	3400
Salt Creek near Sussex gaging station			
Historic Data Average at Maximum Flow		18.9	5204
Historic Data Average at Minimum Flow		23.6	5668
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 # WY0053911			
At discharge point	5000	10	7500
At Irrigation Compliance point	5000	10	7500
Predicted Produced Water Quality			
Big George coal zone	798	6.1	1279

In order to determine the actual water quality of the producing formations in this POD and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well to each coal zone within the POD boundary. The 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 permit domestic and stock water wells within the circle of influence of the proposed CBNG wells.

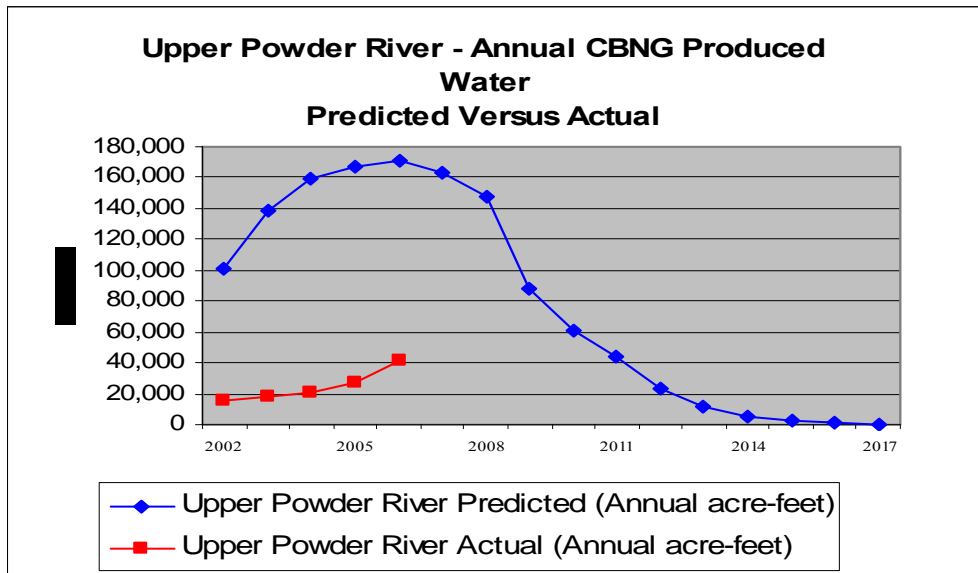
In-channel downstream impacts are addressed in the Water Management Plan for the Kokanee POD prepared by Applied Hydrology International for Devon Energy Production Company, L.P

**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 December 2006, 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 736,519 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 2 and numerically in Table 8 following.

**Figure 2.** Actual vs predicted water production in the **Upper Powder River** watershed.



**Table 8 PRB FEIS predicted vs. actual produced water volumes (Upper Powder River)**

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>			

The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and Sodium Adsorption Ratio (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 BLM requires each POD approved under the PRB FEIS to have a designated reference well to be sampled at the wellhead within 60 days of initial production. There is also a series of monitoring wells that are providing additional data. This data will be evaluated periodically to assess effects.

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

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects relative to this project are anticipated to be within the parameters of 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 and the total amount that was predicted in the PRB FEIS, which is approximately 17% of that total (see section 4.4.2.1).
2. The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator) to monitor the volume of water flowing into Dry Fork Powder River.

No additional mitigation measures are required.

Refer to the PRB FEIS, Volume 2, page 4-85 – 87 and table 4-6 for cumulative effects relative to the **Upper Powder River** watershed and start on page 4-117 for cumulative effects common to all sub-watersheds.

#### 4.5. Cultural Resources

Following the Wyoming State Protocol Section VI (B)(4) the Bureau of Land Management consulted the Wyoming State Historic Preservation Officer (SHPO) on a finding of “no adverse effect” to 48JO134/48CA264 (Bozeman Trail, listed on the NRHP) and site 48JO3059/48CA5494 (Ft. Fetterman - Ft. McKinney Telegraph Line, eligible for the NRHP). The sites will not be physically impacted by the project. Although much of the project will be visible to the sites, none of the contributing segments retain their integrity of setting. The SHPO concurred with the Bureaus eligibility determinations and finding of no adverse effect on 5/22/07. There are no other eligible sites within the APE of the proposed project. Non eligible sites 48CA5705, 48CA5846, 48JO3195, 48JO3196, 48JO3197, 48JO3200, 48JO3202 and 48JO3203 will be impacted by the project.

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

### 5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite?
Kevin McAulay	Foreman	Devon Energy Production Co.	Yes
Ed Guseman	Field Operations	Devon Energy Production Co.	Yes
Sandy Smith	POD Specialist	Devon Energy Production Co.	No
Mark Iberlin	Surface Owner		Yes
Randy Harry	Pacific Power Co.	Field Foreman	Yes
Mary Hopkins	Interim SHPO	Wyoming SHPO	No

### 6. OTHER PERMITS REQUIRED

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

### 7. REFERENCES AND AUTHORITIES

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