FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Devon Energy Production Company
West Pine Tree Unit – Brook Trout POD
ENVIRONMENTAL ASSESSMENT WY-070-EA08-129

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Devon Energy's West Pine Tree Unit – Brook Trout Coal Bed Natural Gas (CBNG) POD comprised of the following 50 Applications for Permit to Drill (APDs):

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	BROOK TROUT WPTU	3S-1	NENE	3	42N	76W	WYW147313
2	BROOK TROUT WPTU	3S-3	NENW	3	42N	76W	WYW147313
3	BROOK TROUT WPTU	3S-5	SWNW	3	42N	76W	WYW147313
4	BROOK TROUT WPTU	4S-1	NENE	4	42N	76W	WYW147313
5	BROOK TROUT WPTU	4S-13	SWSW	4	42N	76W	WYW147313
6	BROOK TROUT WPTU	4S-3	NENW	4	42N	76W	WYW147313
7	BROOK TROUT WPTU	4S-5	SWNW	4	42N	76W	WYW147313
8	BROOK TROUT WPTU	4S-7	SWNE	4	42N	76W	WYW147313
9	BROOK TROUT RANCH	5S-1	NENE	5	42N	76W	WYW158419
10	BROOK TROUT RANCH	5S-9	NESE	5	42N	76W	WYW158419
11	BROOK TROUT WPTU	10S-1	NENE	10	42N	76W	WYW147313
12	BROOK TROUT WPTU	10S-3	NENW	10	42N	76W	WYW147313
13	BROOK TROUT WPTU	10S-7	SWNE	10	42N	76W	WYW147313
14	BROOK TROUT WPTU	10S-9	NESE	10	42N	76W	WYW147313
15	BROOK TROUT WPTU	10S-11	NESW	10	42N	76W	WYW147313
16	BROOK TROUT WPTU	10S-13	SWSW	10	42N	76W	WYW147313
17	BROOK TROUT WPTU	10S-15	SWSE	10	42N	76W	WYW147313
18	BROOK TROUT WPTU	11S-13	SWSW	11	42N	76W	WYW147313
19	BROOK TROUT WPTU	15S-15	SWSE	15	42N	76W	WYW147314
20	BROOK TROUT WPTU	15S-7	SWNE	15	42N	76W	WYW147314
21	BROOK TROUT WPTU	15S-9	NESE	15	42N	76W	WYW147314
22	BROOK TROUT WPTU	19S-1	NENE	19	42N	76W	WYW132928
23	BROOK TROUT WPTU	19S-3	NENW	19	42N	76W	WYW147314
24	BROOK TROUT WPTU	19S-5	SWNW	19	42N	76W	WYW147314
25	BROOK TROUT WPTU	19S-11	NESW	19	42N	76W	WYW147314
26	BROOK TROUT WPTU	19S-13	SWSW	19	42N	76W	WYW147314
27	BROOK TROUT WPTU	19S-15	SWSE	19	42N	76W	WYW147314
28	BROOK TROUT WPTU	22S-11	NESW	22	42N	76W	WYW147315
29	BROOK TROUT WPTU	22S-13	SWSW	22	42N	76W	WYW147315
30	BROOK TROUT WPTU	22S-15	SWSE	22	42N	76W	WYW147315
31	BROOK TROUT WPTU	22S-3	NENW	22	42N	76W	WYW147315
32	BROOK TROUT WPTU	22S-5	SWNW	22	42N	76W	WYW147315

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
33	BROOK TROUT WPTU	22S-7	SWNE	22	42N	76W	WYW147315
34	BROOK TROUT WPTU	22S-9	NESE	22	42N	76W	WYW147315
35	BROOK TROUT WPTU	23S-4	NWNW	23	42N	76W	WYW147315
36	BROOK TROUT WPTU	27S-1	NENE	27	42N	76W	WYW147316
37	BROOK TROUT WPTU	27S-11	NESW	27	42N	76W	WYW147316
38	BROOK TROUT WPTU	27S-13	SWSW	27	42N	76W	WYW147316
39	BROOK TROUT WPTU	27S-15	SWSE	27	42N	76W	WYW147316
40	BROOK TROUT WPTU	27S-3	NENW	27	42N	76W	WYW147316
41	BROOK TROUT WPTU	27S-9	NESE	27	42N	76W	WYW147316
42	BROOK TROUT WPTU	28S-1	NENE	28	42N	76W	WYW147316
43	BROOK TROUT WPTU	28S-10	NWSE	28	42N	76W	WYW147316
44	BROOK TROUT WPTU	28S-11	NESW	28	42N	76W	WYW147316
45	BROOK TROUT WPTU	28S-13	SWSW	28	42N	76W	WYW147316
46	BROOK TROUT WPTU	28S-15	SWSE	28	42N	76W	WYW147316
47	BROOK TROUT WPTU	28S-3	NENW	28	42N	76W	WYW147316
48	BROOK TROUT WPTU	28S-5	SWNW	28	42N	76W	WYW147316
49	BROOK TROUT WPTU	28S-7	SWNE	28	42N	76W	WYW147316
50	BROOK TROUT WPTU	28S-9	NESE	28	42N	76W	WYW147316

The following impoundments were inspected and approved for use in association with the water management strategy for the POD in the Cheyenne River Watershed.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	31-28-4176	NWNE	28	41	76	16	6	WYW314304
2	33-28-4176	NWSE	28	41	76	5.8	2	WYW160418
3	IBERLIN 32-27-4176	SWNE	27	41	76	16.9	6.5	WYW314310

The following impoundments were inspected and approved for use in association with the water management strategy for the POD in the Upper Powder River Watershed.

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	WINTERMUTE	SWSW	24	42	76	3	1	WYW147315
2	13-25-4276	NWSW	25	42	76	11	4	WYW147316
3	33-30-4275	NWSE	30	42	75	14.2	5	WYW311966
4	11-31-4275	NWNW	31	42	75	16.5	6	WYW311966
5	21-1-4176	NENW	1	41	76	6.9	3	WYW147310
6	31-2-4176	NWNE	2	41	76	6.2	2	FEE
7	IBERLIN 23-9-4176	NESW	9	41	76	14.8	4.5	WYW150758
8	IBERLIN 33-14-4176	NWSE	14	41	76	8.6	2.6	FEE
9	11-22-4176	NWNW	22	41	76	21.6	8	FEE

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
10	ARTESIAN UPPER RES	SWNW	11	41	76	47.5	10	FEE
11	T42NR76W36SESW	SESW	36	42	76	1.4	1	STATE
12	44-31-4276	SESE	31	42	76	48.7	15	WYW147317

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

Right-of-Way	Qtr/Qtr	Sec	TWP	RNG	Use/Type	Surface Disturbance (Acres)
WYW-170174 (amendment)	SWNW	24	41N	76W	3" water pipeline and stock tank	0.165

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

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

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

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

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

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

Field Manager: _____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Devon Energy Production Company
West Pine Tree Unit – Brook Trout
PLAN OF DEVELOPMENT
WY-070-EA08-129

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to produce coal bed natural gas (CBNG) on 6 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 Unit – Brook Trout Plan of Development (POD) for 51coal bed natural gas well APDs and associated infrastructure.

Proposed Well Information: There are 51 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with one well per location. Each well will produce from one coal seam, Big George. Proposed well house dimensions are 4ft wide x 4ft length x 4ft height. Well house color is Covert Green (18-0617 TPX); selected to blend with the surrounding vegetation. Wells are located as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	BROOK TROUT WPTU	3S-1	NENE	3	42N	76W	WYW147313
2	BROOK TROUT WPTU	3S-3	NENW	3	42N	76W	WYW147313
3	BROOK TROUT WPTU	3S-5	SWNW	3	42N	76W	WYW147313
4	BROOK TROUT WPTU	3S-7	SWNE	3	42N	76W	WYW147313
5	BROOK TROUT WPTU	4S-1	NENE	4	42N	76W	WYW147313
6	BROOK TROUT WPTU	4S-3	NENW	4	42N	76W	WYW147313
7	BROOK TROUT WPTU	4S-5	SWNW	4	42N	76W	WYW147313
8	BROOK TROUT WPTU	4S-7	SWNE	4	42N	76W	WYW147313
9	BROOK TROUT WPTU	4S-13	SWSW	4	42N	76W	WYW147313
10	BROOK TROUT RANCH	5S-1	NENE	5	42N	76W	WYW158419
11	BROOK TROUT RANCH	5S-9	NESE	5	42N	76W	WYW158419
12	BROOK TROUT WPTU	10S-1	NENE	10	42N	76W	WYW147313
13	BROOK TROUT WPTU	10S-3	NENW	10	42N	76W	WYW147313
14	BROOK TROUT WPTU	10S-7	SWNE	10	42N	76W	WYW147313
15	BROOK TROUT WPTU	10S-9	NESE	10	42N	76W	WYW147313
16	BROOK TROUT WPTU	10S-11	NESW	10	42N	76W	WYW147313
17	BROOK TROUT WPTU	10S-13	SWSW	10	42N	76W	WYW147313
18	BROOK TROUT WPTU	10S-15	SWSE	10	42N	76W	WYW147313
19	BROOK TROUT WPTU	11S-13	SWSW	11	42N	76W	WYW147313
20	BROOK TROUT WPTU	15S-7	SWNE	15	42N	76W	WYW147314
21	BROOK TROUT WPTU	15S-9	NESE	15	42N	76W	WYW147314
22	BROOK TROUT WPTU	15S-15	SWSE	15	42N	76W	WYW147314
23	BROOK TROUT WPTU	19S-1	NENE	19	42N	76W	WYW132928
24	BROOK TROUT WPTU	19S-15	SWSE	19	42N	76W	WYW147314
25	BROOK TROUT WPTU	19S-3	NENW	19	42N	76W	WYW147314
26	BROOK TROUT WPTU	19S-5	SWNW	19	42N	76W	WYW147314
27	BROOK TROUT WPTU	19S-13	SWSW	19	42N	76W	WYW147314
28	BROOK TROUT WPTU	19S-11	NESW	19	42N	76W	WYW147314
29	BROOK TROUT WPTU	22S-1	NENE	22	42N	76W	WYW147315
30	BROOK TROUT WPTU	22S-3	NENW	22	42N	76W	WYW147315
31	BROOK TROUT WPTU	22S-5	SWNW	22	42N	76W	WYW147315
32	BROOK TROUT WPTU	22S-7	SWNE	22	42N	76W	WYW147315
33	BROOK TROUT WPTU	22S-9	NESE	22	42N	76W	WYW147315
34	BROOK TROUT WPTU	22S-11	NESW	22	42N	76W	WYW147315
35	BROOK TROUT WPTU	22S-13	SWSW	22	42N	76W	WYW147315
36	BROOK TROUT WPTU	22S-15	SWSE	22	42N	76W	WYW147315
37	BROOK TROUT WPTU	27S-1	NENE	27	42N	76W	WYW147316
38	BROOK TROUT WPTU	27S-3	NENW	27	42N	76W	WYW147316
39	BROOK TROUT WPTU	27S-9	NESE	27	42N	76W	WYW147316
40	BROOK TROUT WPTU	27S-11	NESW	27	42N	76W	WYW147316

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
41	BROOK TROUT WPTU	27S-13	SWSW	27	42N	76W	WYW147316
42	BROOK TROUT WPTU	27S-15	SWSE	27	42N	76W	WYW147316
43	BROOK TROUT WPTU	28S-1	NENE	28	42N	76W	WYW147316
44	BROOK TROUT WPTU	28S-3	NENW	28	42N	76W	WYW147316
45	BROOK TROUT WPTU	28S-5	SWNW	28	42N	76W	WYW147316
46	BROOK TROUT WPTU	28S-7	SWNE	28	42N	76W	WYW147316
47	BROOK TROUT WPTU	28S-9	NESE	28	42N	76W	WYW147316
48	BROOK TROUT WPTU	28S-10	NWSE	28	42N	76W	WYW147316
49	BROOK TROUT WPTU	28S-11	NESW	28	42N	76W	WYW147316
50	BROOK TROUT WPTU	28S-13	SWSW	28	42N	76W	WYW147316
51	BROOK TROUT WPTU	28S-15	SWSE	28	42N	76W	WYW147316

Water Management Proposal: The following impoundments were proposed for use in association with the water management strategy for the POD.

	IMPOUNDMENT Name / Number	QTR	Sec	T/R	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
1	WINTERMUTE	SWSW	24	42N/76W	3	1	WYW147315
2	13-25-4276	NWSW	25	42N/76W	11		WYW147316
3	33-30-4275	NWSE	30	42N/75W	14.2		WYW311966
4	11-31-4275	NWNW	31	42N/75W	16.5		WYW311966
5	14-35-4276	SWSW	35	42N/76W	4.4	2.5	FEE
6	21-1-4176	NENW	1	41N/76W	6.9		WYW147310
7	31-2-4176	NWNE	2	41N/76W	6.2	2	FEE
8	IBERLIN 23-9-4176	NESW	9	41N/76W	14.8	4.5	WYW150758
9	IBERLIN 33-14-4176	NWSE	14	41N/76W	8.6	2.6	FEE
10	11-22-4176	NWNW	22	41N/76W	21.6		FEE
11	ARTESIAN UPPER RES	SWNW	11	41N/76W	47.5		FEE
12	T42NR76W36NESE (Dropped by operator)	NESE	36	42N/76W	0.6	0.5	STATE
13	T42NR76W36SESW	SESW	36	42N/76W	1.4	1	STATE
14	IBERLIN 32-27-4176	SWNE	27	41N/76W	16.9	6.5	WYW314310
15	31-28-4176	NWNE	28	41N/76W	16	6	WYW314304
16	33-28-4176	NWSE	28	41N/76W	5.8	2	WYW160418
17	44-31-4276	SESE	31	42N/76W	48.7	15	WYW147317

Counties: Campbell and Johnson

Applicant: Devon Energy Production Company

Surface Owners: Iberlin Ranch Partnership, Moore Land Company LLC, BLM, and State of Wyoming.

Project Description:
The proposed action involves the following:

- Drilling of 51 total federal CBNG wells in the Big George coal seam to depths ranging from 1,280 to 1,630 feet. A singe well bore will be installed at each location.

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

- Well metering shall be accomplished by telemetry and well visitation. Metering would entail 8 to 10 visits per month to each well.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 19 existing and 11 proposed discharge points with 13 existing and 1 proposed stock water reservoirs within the Upper Powder River watershed and 3 existing discharge points with 3 existing stock water reservoirs within the Upper Cheyenne River watershed.

- An unimproved and improved road network.

- An above ground power line network to be constructed by a contractor. The proposed route has been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing. Until overhead power is operational, portable generators may be placed at the 14 proposed power drops to provide initial power for the submersible pumps.

- A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for approximately six to twelve months. Fuel deliveries are anticipated to be two times per week. Noise level is expected to be 74.6 decibels at 100 feet distance.

- A buried gas, water and power line network, which includes three proposed water pumping stations and two existing Thunder Creek Gas Systems (TCGS) low pressure gas gathering sites.

- A right-of-way amendment, WYW-170174, granted under the Federal Land Policy and Management Act of 1976, for an additional 3" water pipeline, hydrant, and stock tank, on public lands described as follows:

  6th PM, Campbell County, Wyoming,
  T. 41 N., R. 76 W.,
  sec. 24: SWNW.

- The proposed right-of-way amendment area is 10 feet wide, 720 feet long and contains 0.165 acres, more or less.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well

drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

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

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

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

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

2.3. Alternative C – Environmentally Preferred

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

2.3.1. Changes as a result of the on-sites

Well	Aliquot	Section	T/R	Notes
27S-13	SWSW	27	42/76	Rerouted the access road to come from the NE, off 27S-11. The new route is shorter and avoids using a reclaimed pipeline corridor.
27S-11	NESW	27	42/76	Well location moved to a flat area down the primitive road, approx. 320ft S/SW. The new location sits within a small bowl and open grass pocket.
27S-15	SWSE	27	42/76	Traffic along the reclaimed pipeline corridor was noted. CBM-related traffic will be restricted to the authorized/permitted access roads only. Signs will be posted to restrict vehicle use along corridors.
27S-3	NENW	27	42/76	Pipeline corridor and primitive road will not be sited as shown on Map D. Archeological concerns were identified. Primitive access road and utility corridor will come off the main all-weather road. A gate will be installed at fence line to allow access to the well location.

Well	Aliquot	Section	T/R	Notes
28S-1	NENE	28	42/76	Primitive access road and utility corridor will come off the main all-weather road. A gate will be installed at the fence line to allow well access from the main road. Rancher's ROW will not be used.
28S-7	SWNE	28	42/76	Rerouted the primitive access road and utility corridor to come from the west, off the main all-weather road/proposed utility corridor.
28S-11	NESW	28	42/76	Location not shown correctly on project map. Map location situated at -/+ 400 N from the actual on-the-ground location. A gate will be installed off the ROW.
28S-5	SWNW	28	42/76	Road grades exceed 8% both on the uphill and downhill segments of the access road. Sideslopes not a concern. Soils are stable. The road will service 2 wells. A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.
19S-1	NENE	19	42/76	Well location was moved out of a sagebrush stand. Good habitat characteristics for sage-grouse were noted. The new site is located approx. 460ft S/SE, upslope near the access road. The new site is located on level ground and within an open cheatgrass pocket.
5S-9	NESE	5	42/76	Well location moved due to tight location for drilling, as well as soil fragility. Poor reclamation potential noted in the general area. The well was moved approx. 513ft N/NE to an open grass pocket at the end of flat low lying ridgeline. The access road will come off the main access road through open grass pockets and scattered sagebrush. Due to reclamation and soil stability concerns mowing for the access/utility corridor will not exceed 15 feet in width. The operator will trench a 15ft ROW for utility installation, and redress disturbed area to create 12ft primitive 2-track. The well site layout will not exceed an area 100ft x 75ft.
4S-13	SWSW	4	42/76	Active raptor nests located in Fletcher Canyon. Signs restricting CBM traffic will be posted at each end of the primitive access road. "No Access Across Fletcher Canyon."
4S-5	SWNW	4	42/76	Rerouted the utility corridor to follow the location's access road from the south, coming from well location 4S-13. The extension of the access road and proposed utility corridor to the north, which crosses Cedar Draw and the Taylor Cow Camp, were dropped as a result of this change. Also, the new corridor location will not disturb sloped areas in and out of Cedar draw. Signs will be posted restricting CBM traffic across the draw.
5S-1	NENE	5	42/76	The access road was rerouted to follow the pipeline corridor.

Well	Aliquot	Section	T/R	Notes
4S-3	NENW	4	42/76	The well location was moved approx. 53ft W/NW out of the line-of-sight of an existing/active raptor nest. The new well site is flat with very little brush vegetation on location.
3S-3	NENW	3	42/76	Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress disturbed area to create 12ft primitive 2-track. A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.
3S-5	SWNW	3	42/76	Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track. A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.
3S-7	SWNE	3	42/76	Well location dropped. Well was located within the cottonwood creek 3 sage-grouse lek. Signs of sage-grouse activity were noted during the onsite inspection.
3S-1	NENE	3	42/76	Well location moved approx. 432ft S/SE due to sagegrouse habitat concerns. The original site was located just outside the 1/4 mile boundary, but still within good habitat. The first location also required a long access road through the sagegrouse 1/4 mile buffer area. The operator relocated the well to a location that allows the use of an existing primitive road. Due to the sensitivity of the area, the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track.

Well	Aliquot	Section	T/R	Notes
10S-3	NENW	10	42/76	The well location was moved approx. 50ft S/SE out of the line-of-sight of an active raptor nest. The nest is located in the adjacent drainage to north of the well location. Poor sandy soils are a concern, particularly the last 200ft of the access road. The operator will avoid the rocky outcrop before the road drops to the end of the finger ridge/well location. Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track. A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access. The application of aggregate applies only to the last 200ft of access road. A pit liner will be required at this location due to soil fragility and the location's proximity to the drainage.
10S-1	NENE	10	42/76	The proposed well location was within line of sight of an active raptor nest. Relocated the well to the top of a hill away and out of line of sight from the nest. The well was moved approx. 500ft. SE. Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track.
10S-11	NESW	10	42/76	Well location moved approx. 70ft E, due to limited space for drilling equipment/infrastructure.
10S-13	SWSW	10	42/76	Rerouted the access road to follow the existing primitive road on the north side of the fence line. An access gate will be installed at a point west of the drainage dip.
10S-9	NESE	10	42/76	Well location moved approx. 555ft S/SE, due to the moderate grade of the proposed access road. The new location is situated within an open grass pocket, with a scattered sagebrush perimeter.
11S-13	SWSW	11	42/76	Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track.
15S-7	SWNE	15	42/76	The access road to the original well location required upgrades and/or template design to accommodate both grade (> 8%) and fair to moderate soils. The operator moved the well location 550ft NW/N, to the top of the adjacent ridgeline. Good soils and no access road upgrades required at this new location. The well site is flat with scattered sagebrush on location.

Well	Aliquot	Section	T/R	Notes
22S-3	NENW	22	42/76	The operator moved the well location to better accommodate drilling equipment at this site. The well was moved approx. 60ft W/NW. The well site is flat with scattered sagebrush on location. The access road will come off the main access road through open grass pockets within a dense sagebrush stand. Due to the sensitivity of the area, the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track.
22S-5	SWNW	22	42/76	Original proposed location is in high quality sage-grouse habitat, based on sagebrush height and density and interspatial ground cover. Sage-grouse sign was abundant along the proposed access road to the well location, and throughout the sagebrush stand surrounding the proposed well site as well as within the general area. A sage-grouse hen was seen within 50 yards of proposed location. The well was moved approx. 490ft SW/S, along the main access road corridor. Due to the sensitivity of the general area, the well site layout will not exceed an area 100ft x 75ft. In addition, the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track.
22S-13	SWSW	22	42/76	The proposed well location is in sagebrush stand of about 20-25% cover with adequate grass understory for sage-grouse nesting. Sage-grouse sign abundant throughout area. Relocated the well to a location along the main access road, approx. 354ft SW/S from the original location.
22S-15	SWSE	22	42/76	Relocated the well upslope, approx. 604ft W/SW, out of the dense sagebrush stand. Original proposed location was in sagebrush stand with about 20-25% cover with adequate grass understory for sage-grouse nesting. Location was also within line of sight of raptor nests in drainage to the north. These nests were not reported by the consultant. Relocated well away from raptor nests and out of the sagebrush stand. Requested that these nests be surveyed this year.

Well	Aliquot	Section	T/R	Notes
15S-15	SWSE	15	42/76	Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track. A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access. The surfacing material will be added to approx. 150yards of access road, covering the downhill segment of the access road from well location 22S-7. A pit liner will be required at this location due to soil fragility and the location's proximity to the drainage.
22S-11	NESW	22	42/76	Original proposed location was in dispersed sagebrush stand along a ridge outcrop. Sage-grouse sign was frequent. This may be a wintering area for sage-grouse. Relocated the well approx. 600ft N/NE to the next ridge and closer to the access road. Sage-grouse sign was not noted. The new well site is flat with scattered sagebrush on location.
27S-1	NENE	27	42/76	A minimum of 2 inches of aggregate (gravel) will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.
22S-9	NESE	22	42/76	The proposed well was located on a ridgeline within a quarter mile of a red-tailed hawk nests. The well was relocated approx. 580ft E, uphill outside the 1/4 mile buffer.
22S-1	NENE	22	42/76	The operator moved the well location to better accommodate drilling equipment at this site. The well was moved approx. 60ft E. The new well site is flat with minimal sagebrush on location. Due to reclamation and soil stability concerns the access/utility corridor will not exceed a disturbance width of 15 ft. The operator will trench a 15ft ROW for utility installation, and redress the disturbed area to create a 12ft-wide primitive 2-track. A pit liner will be required at this location due to soil fragility and shallow sandy soils.
15S-9	NESE	15	42/76	The well was moved approx. 503ft E to a flat spot at the bottom of a knoll. The well was moved due to the location's highly erosive soils and poor reclamation potential. Two potential access roads were onsited for this well location. The first access road comes over a hill/knoll with slopes in excess of 12%. Fragile soils were also noted. The second access road comes around the hill/knoll from the north side through moderately dense sagebrush. This access would cut through small-sized channels that require the installation of culverts and low water crossings. The latter was selected after the onsite because it does not involve engineering an improved access road. This option can be put in as a primitive 2-track with minor upgrades.

Water Management
Cheyenne River Watershed—aside from Ute Ladies' Tresses orchids, there are no water related issues for this watershed. See the Wildlife sections for Ute Ladies' Tresses issues.

Powder River Watershed

ITEM	Aliquot	SEC	TWP/RNG	NOTE
Outfall 008 AD	NENE	21	41N 76W	Outfall moved to reservoir margin to reduce adverse impacts to draw.
Outfalls 004AD 005AD 006AD	NENE SENE SWSW	12 13 13	41N 76W 41N 76W 41N 76W	Outfall use "…will only be done with proper planning, careful monitoring of the downstream channels, and on an intermittent basis. No perennial discharges will occur at these outfalls."
Outfall 002 AD	SWNW	11	41N 76W	Outfall relocated from original location to a place next to the Artesian Upper Reservoir
Outfall 003 AD	NWNE	2	41N 76W	Outfall relocated from original location to a place next to the E31-2-4176 Reservoir
Outfall 008 DD	NWSE	30	42N 75W	Outfall relocated from original location to be next to E33-30-4275 Reservoir
Outfall 006 CD	SWSW	25	42N 76W	Flow from tire-tank outfall will be piped to discharge below the headcut.
14-35-4276 Dam & Outfall	SWSW	35	42N 76W	Dropped by Operator. Too close to highway.
T42NR76W36NESE Dam	NESE	36	42N 76W	Dropped by Operator.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.

4. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.

5. Identified springs will be sampled for flow rate and water quality prior to development of this POD and annually during and following operation of the field.

2.3.2.3. Soils

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

2.3.2.4. Wetland/Riparian

1. 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.

2. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.

3. The lower edge of soil or other material stockpiles will be located outside the active floodplain.

4. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphologic configuration and properly stabilized.

5. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

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

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

3. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage-grouse breeding or nesting grounds to prevent raptor predation and sage-grouse collision with the conductors. Power poles within 0.5 mile of any sage-grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.

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

Developments: Suggestions and Recommendations.

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

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

2. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.6.2. Black-footed Ferret

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

2.3.2.6.3. Mountain Plover

1. 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.

2. 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.

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

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

2.3.2.7. 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.

2.3.2.8. Noise

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

General

1. All changes made at the pre-approval onsite will be followed. They have all been incorporated into the operator's plan of development (POD). Please refer to Table 2.3.1 "Changes as a result of the onsite" on pages 9-14 of EA#WY-070-EA08-129, and/or the Post-Onsite Deficiency Letter dated 05/16/2008.

2. All Devon Energy field representatives and contractors will have a copy of the approved POD map and conditions of approval (COAs) at all times while conducting activities within the Brook Trout POD project area.

3. Please contact Julian Serafin – Natural Resource Specialist, @ (307) 684-1043, Bureau of Land Management, Buffalo, if there are any questions concerning surface use COAs.

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 Brook Trout POD is Covert Green, 18-0617 TPX.

2. Interim Reclamation of disturbed areas will adhere to the following guidance (as per the Wyoming Policy on Reclamation (IM WY-90-231):
   A. The reclaimed area shall be stable and exhibit none of the following characteristics:
      i. Large rills or gullies.
      ii. Perceptible soil movement or head cutting in drainages.
      iii. Slope instability on, or adjacent to, the reclaimed area in question.
   B. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
   C. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself.
      This shall be demonstrated by:
      i. Successful onsite establishment of species included in the planting mixture or other desirable species.
      ii. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

D. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

3. All topsoil removed during construction activities will be respread for interim reclamation success.

4. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

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

Ecological Site	**Wells and infrastructure**
Sandy	27S-9, 19S-5, 5S-9, 3S-3, 3S-5, 3S-1, 10S-3, 10S-1, 10S-11, 11S-13, 22S-7, 15S-15, 22S-11, 23S-4, and 15S-9

Sandy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	20	2.4
Prairie sandreed (Calamovilfa longifolia)	30	3.6
Indian ricegrass (Achnatherum hymenoides)	20	2.4
Needleandthread (Hesperostipa comata ssp. comata)	15	1.8
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax***(Linum lewisii)	5	0.6
Totals	**100%**	**12 lbs/acre**

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

5. The disturbance areas identified below have limited reclamation potential that shall be stabilized in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities. Stabilization efforts include mulching, matting, soil amendments, etc.
   - Wells: 28S-5, 28S-11, 28S-13, 3S-5, 19S-5, 5S-9, 3S-3, 10S-3, 10S-1, 11S-13, 22S-7, 15S-15, 22S-11, 22S-1, and 15S-9.

6. Due to soils fragility, poor reclamation potential, and road grades equal to or greater than 8%, the access road/utility corridor to the following well locations will not exceed a disturbance width of 15ft.
   - Wells: 28S-5, 5S-9, 3S-5, 3S-3, 3S-1, 10S-3, 10S-1, 11S-13, 22S-3, 22S-5, 15S-15, 27S-1, and 23S-4.

   ***Note**: A minimum of 2 inches of aggregate will be added across the width of the primitive road (approx. 10ft) to prevent soil erosion and accommodate safe, environmentally-sound access.

7. Final grading and surfacing shall occur immediately after utility installation is complete. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.

8. The operator will maintain all existing improved roads in the Brook Trout POD in accordance with guidelines contained in the BLM/FS Gold Book, 4th Edition "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development," and/or the Road Standards in the BLM Manual 9113.

9. Pipeline corridor disturbance shall not exceed the approved disturbance width for road construction.

10. Utility corridors will be expediently reclaimed following construction and maintained in a professional and workmanship manner avoiding tire rutting, settling and erosion.

11. CBM-related traffic will be restricted to the authorized/permitted access roads only. Signs will be posted to restrict vehicle use along the existing reclaimed corridors.

12. CBM-related traffic across Fletcher Canyon, Cedar Draw, and the Taylor Cow Camp will not be authorized. Signs will be posted at each end of the primitive access roads.

13. The operator will maintain well drilling, completion and associated construction operations within a 100 x 75 foot work area at the following well locations: 5S-9 and 22S-5.

14. Reserve pits will be lined at the following locations: 27S-9, 19S-5, 5S-9, 3S-3, 3S-5, 10S-3, 10S-1, 10S-11, 11S-13, 22S-7, 15S-15, 22S-11, 23S-4, and 15S-9.

15. All stock water tanks installed on BLM surface will be installed with a rock apron of 4 inch aggregate surrounding the tank and extending a minimum of 8 feet out from the tank.

Water Management

1. Discharges from the following outfalls will be coordinated with the BLM Hydrologist at the Buffalo

Field Office prior to implementation:
002 FP 003 FP 006 AD 005 AD 004 AD

2. Requests for "Pulsed Releases under WYPDES Assimilative Capacity Rules" from dams in the Powder River watershed, including all Kokanee POD reservoirs, will be submitted to the BLM's Buffalo Field Office for review and approval well in advance of implementation. This is because the drainages downstream of these dams were not evaluated for their ability to handle discharged CBNG produced water in any fashion. In some cases, no additional field work will be necessary. In other cases, field evaluations with BLM Hydrologists and other specialists may be required prior to approval or denial of discharge request.

3. Identified springs will be sampled for flow rate and water quality prior to development of this POD and annually during and following operation of the field.

Wildlife

Bald Eagles

The following conditions will alleviate impacts to bald eagles:

1. No project related actions shall occur within one mile of bald eagle habitat along the Dry Fork Powder River, Seventeenmile Creek, Cedar Canyon, and Davis Draw annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1 through August 15 (CM8) prior to a nesting survey. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive. This affects the following wells and infrastructure:

Legal	Wells and Infrastructure
S3 T42N R76W	Wells 3S-5, 3S-3, and 3S-1. Roads in NW ¼ and NE ¼. Corridors in NW ¼, and NE ¼. Waterline in eastern ½ of section. Pumping station in SE ¼. Powerline in SW ¼ of SE ¼.
S4 T42N R76W	Wells 4S-1, 4S-3, 4S-5, 4S-7, and 4S-13. Powerline in SW ¼, NW ¼, and NE ¼. Power drops in NW ¼. Corridors in NW ¼, NE ¼, and SW ¼. Roads in north ½ of NW ¼, southern ½ of SW ¼.
S5 T42N R76W	Wells 5S-1 and 5S-9. Road in NE ¼ of NE ¼. Corridors in NE ¼ of NE ¼ and SE ¼.
S10 T42N R76W	Wells 10S-9, 10S-15, 10S-13, 10S-11, 10S-7, 10S-1, and 10S-3. Corridors in the eastern ½. Waterline in the eastern ½. Roads in SE ¼, NE ¼, and NE ¼ NW ¼. Overhead power in the NE ¼.
S14 T42N R76W	Road and corridor in NW ¼ of SW ¼.
S15 T42N R76W	Wells 15S-9, 15S-15, 15S-7. Roads in SE ¼ NW ¼ and SE ¼ NE ¼, SE ¼ of SW ¼, SE ¼ of SE ¼, and NE ¼ of SE ¼. Waterline in southern ½ of NW ¼ and western ½ of SW ¼. corridors in northern ½ of section and southern ½ of SW ¼.
S16 T42N R76W	Powerline and power drop in NE ¼ of SE ¼.
S19 T42N R76W	Wells 19S-13, 19S-15, 19S-3, 19S-11, and 19S-5. Roads in NW ¼, NW ¼ of NE ¼, southern half of SW ¼, and SW ¼ of SE ¼. Corridors in NE ¼, NW ¼, NE ¼ of SW ¼, southern half of SW ¼, and SW ¼ of SW ¼.
S22 T42N R76W	Wells 22S-3 and 22S-5. Road and corridor in NE ¼ of NW ¼ and SW ¼ of NW ¼. Waterline in NW ¼ of NW ¼ and SW ¼ of NW ¼.
S27 T42N R76W	Wells 27S-13, 27S-15. Roads and corridors in SW ¼ of SE ¼ and SW ¼ of SW ¼.
S28 T42N R76W	Wells 28S-13 and 28S-15. Roads in NW ¼ of SW ¼, SW ¼ of SW ¼ and SW ¼ of SE ¼.

2. If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites and a one-mile minimum disturbance zone from November 1 - April 1. Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.

3. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle nest sites (February 1 - August 15).

4. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.

Burrowing Owls

The following conditions will alleviate impacts to burrowing owls:

1. No surface disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities within the prairie dog town(s). This timing limitation will be in effect unless surveys determine the nest(s) to be inactive. This timing limitation will affect the following:

Legal	Wells and Infrastructure
S4 T42N R76W	Road in NW ¼ of NW ¼. Corridor in NW ¼ of NW ¼.
S5 T42N R76W	Well 5S-1. Road and corridor in NENE ¼.
S19 T42N R76W	Wells 19S-5, 19S-11, and 19S-15. Roads and corridors in NW ¼, SW ¼ and SE ¼.
S33 T42 R76W	Waterline in SW ¼ of NW ¼.
S34 T42N R76W	Outfall in NE ¼ of NW ¼.
S6 T41N R76W	Reservoir in northern ½ of NE ¼. Waterline in NE ¼ of NW ¼.
S31 T42N R76W	Reservoir in SW ¼ of SE ¼. Waterlines in NE ¼, NW ¼ of SE ¼ and eastern ½ of SW ¼.
S32 T42N R76W	Waterline in western ½ of SW ¼.
S4 T41N R76W	Waterline in NW ¼ of SW ¼.
S5 T41N R76W	Waterline in SE ¼ of NW ¼.

Mountain Plovers

The following conditions will alleviate impacts to mountain plovers:

1. A mountain plover nesting survey is required in suitable habitat prior to commencement of surface disturbing activities in prairie dog colonies. No surface disturbing activities are permitted in these areas from March 15-July 31, unless a mountain plover nesting survey has been conducted during the current breeding season. This timing limitation will be in effect unless surveys determine no plovers are present. This timing limitation will affect the following:

Legal	Wells and Infrastructure
S4 T42N R76W	Road in NW ¼ of NW ¼. Corridor in NW ¼ of NW ¼.
S5 T42N R76W	Well 5S-1. Road and corridor in NE ¼ of NE ¼.
S19 T42N R76W	Wells 19S-5, 19S-11, and 19S-15. Roads and corridors in NW ¼, SW ¼ and SE ¼.

Legal	Wells and Infrastructure
S33 T42 R76W	Waterline in SW ¼ of NW ¼.
S34 T42N R76W	Outfall in NE ¼ of NW ¼.
S6 T41N R76W	Reservoir in northern ½ of NE ¼. Waterline in NE ¼ of NW ¼.
S31 T42N R76W	Reservoir in SW ¼ of SE ¼. Waterlines in NE ¼, NW ¼ of SE ¼ and eastern ½ of SW ¼.
S32 T42N R76W	Waterline in western ½ of SW ¼.
S4 T41N R76W	Waterline in NW ¼ of SW ¼.
S5 T41N R76W	Waterline in SE ¼ of NW ¼.

2. Mountain plover nesting surveys shall be conducted by a biologist following the most current USFWS Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities.
    a) If occupied mountain plover habitat is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31.
    b) If no mountain plover observations are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).

3. No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.

Raptors

The following conditions will alleviate impacts to raptors:

1. No surface disturbing activity shall occur within 0.5 miles of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following:

Legal	Infrastructure
S03 T42N R76W	Wells 3S-7, 3S-5, and 3S-3. Corrridors in NW ¼ and NE ¼. Roads in NW ¼. Waterline in eastern ½ of section. Pumping station 2 in SW ¼ of SE ¼. Powerline in SW ¼ of SE ¼.
S04 T42N R76W	Wells 4S-3, 4S-13, 4S-1, 4S-7, and 4S-5. Powerline in western ½ and northern ½. Corridors in western ½ and northern ½. Roads NW ¼ and SW ¼.
S05 T42N R76W	Wells 5S-1 and 5S-9. Road in NE ¼ of NE ¼. Corridors in NE ¼ of NE ¼ and SE ¼.
S10 T42N R76W	Wells 10S-9, 10S-11, 10S-7, 10S-1, and 10S-3. Roads in northern ½ of section, eastern ½ of NE ¼, SW ¼, and NE ¼ of SW ¼.
S11 T42N R76W	Well 11S-13. Road and corridor in SW ¼ of SW ¼.
S14 T42N R72W	Powerline in SW ¼. Road and corridor in NW ¼ of SW ¼.
S15 T42N R76W	Wells 15S-9, 15S-15, and 15S-7. Roads and corridors in northern ½ of section and in southern ½ of SW ¼. Waterline in SW ¼ and SW ¼ of NW ¼.
S19 T42N R76W	Wells 19S-13, 19S-15, 19S-1, and 19S-11. Roads in SE ¼ of NW ¼, NE ¼ of SW ¼, SW ¼ of SW ¼, and SE ¼ of section. Corridors in NE ¼, SW ¼ of NW ¼, NE ¼ of SW ¼, SE ¼ of SW ¼, SW ¼ of SW ¼, and SE ¼.
S22 T42N R76W	Wells 22S-11, 22S-7, 22S-15, 22S-9, and 22S-3. Waterlines in eastern ½ of NW ¼ and SE ¼ of SW ¼. Roads in SW ¼ of NW ¼, NE ¼, NW ¼ of SE ¼, SE ¼ of SW ¼. Powerline in eastern ½ of SW ¼. Corridors in NW ¼, NW ¼ of SE ¼, and eastern ½ of SW ¼.
S23 T42N R76W	Well 22S-1. Roads and corridors in NW ¼ of NW ¼, and NW ¼ of SW ¼.

Legal	Infrastructure
S25 T42N R76W	Road in SW ¼. Outfall 006 in in SW ¼. Road in SW ¼ and SE ¼. Powerline in SW ¼ of SW ¼. Reservoir E13-25-4275 in SW ¼. Waterline in southern ½ of SW ¼.
S26 T42N R76W	Powerlines in SE ¼ of NW ¼, SW ¼, and NW ¼ of SW ¼. Waterline in southern ½ of NW ¼. Road in SW ¼ and NW ¼ of SW ¼.
S27 T42N R76W	Wells 27S-13, 27S-1, 27S-9, 27S-15, 27S-11, and 27S-3. Powerlines and associated powerdrops in NW ¼, NE ¼, and SE ¼. All roads and corridors in section.
S28 T42N R76W	Wells 28S-3, 28S-11, and 28S-5. Waterline in NW ¼, western ¼ of NE ¼, and NW ¼ of SW ¼. Roads in NW ¼, western ¼ of NE ¼, NW ¼ of SW ¼. Corridors in NW ¼, western ¼ of NE ¼, northern ½ of SW ¼. Powerline in southern ½ of NW ¼ and northern ½ of SW ¼.
S30 T42N R75W	Reservoir E33-30-4275 in SW ¼. Waterline and road in SW ¼ of SW ¼.
S31 T42N R75W	Outfall 007 in NW ¼. Reservoir E11-31-4275 in NW ¼. Roads in western ½. Waterline in NW ¼, SW ¼, and SE ¼.
S34 T42N R76W	Outfall 012 in NW ¼.

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 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.

3. Nest occupancy and productivity checks shall be completed for nests within a ½ mile of any surface disturbing activities (e.g., well drilling, pipeline installation, or road improvements) across the entire POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy and productivity checks shall continue for the first five years on all nests that are within a ½ mile of locations where any surface-disturbing activities took place. Productivity checks shall be completed only on those nests that were verified to be occupied during the initial occupancy check of that year. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. In 2009, this applies to the nest(s) listed and is subject to change each year after that, pending surveys.

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 should be minimized as much as possible during the breeding season (February 1 – July 31).

Sage-Grouse

The following conditions will alleviate impacts to sage-grouse:

1. No surface disturbing activities are permitted within 2 miles of sage-grouse lek(s) between March 1 and June 15, prior to completion of a sage-grouse lek survey. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the following:

Legal	Wells and Infrastructure
S03 T42N R76W	Wells 3S-1, 3S-7, 3S-5, and 3S-3. All waterlines, roads, corridors, and water management facilities.
S04 T42N R76W	Wells 4S-3, 4S-13, 4S-1, 4S-7, and 4S-5. All powerlines, power drops, corridors, and roads.
S05 T42N R76W	Well 5S-1 and 5S-9. All roads and corridors.
S10 T42N R76W	Wells 10S-9, 10S-15, 10S-13, 10S-11, 10S-7, 10S-1, and 10S-3. All roads, corridors, powerlines, and power drops.
S11 T42N R76W	Well 11S-13. All roads and corridors.
S15 T42N R76W	Wells 15S-9, 15S-15, and 15S-7. All waterlines, roads, and corridors.
S22 T42N R76W	Wells 22S-13, 22S-11, 22S-7, 22S-15, 22S-5, 22S-9, and 22S-3. All roads, corridors, powerlines, power drops, and waterlines.
S23 T42N R76W	Well 22S-1. All roads, corridors, powerlines, and water management facilities.
S25 T42N R76W	All water management facilities.
S27 T42N R76W	Wells 27S-1, 27S-9, 27S-15, 27S-11, and 27S-3. All waterlines, powerlines, and power drops. All roads and corridors, with the exception of the last 490 feet going to Well 27S-13.
S28 T42N R76W	Wells 28S-3 and 28S-1. Waterline in northern ½ of section. Powerline in NE ¼ of NE ¼. Roads and corridors in northern ½ of section.

2. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

3. Well metering, maintenance and other site visits within 2.0 miles of documented sage grouse lek sites should be minimized as much as possible during the breeding season (March 1– June 15).

4. Raptor perch inhibitors will be installed along powerlines that are adjacent to areas with documented sage-grouse use. This will affect the powerline in the following locations:

Legal	Infrastructure
S22 T42N R76W	All powerline in this section
S23 T42N R76W	All powerline in this section
S26 T42N R76W	Powerline running North-South in section

Swift Fox

The following conditions will alleviate impacts to swift fox:

1. A swift fox survey will be required in suitable swift fox habitat (prairie dog colonies listed) between April 15 and June 15. This condition will be implemented on an annual basis for the duration of surface disturbing activities.

2. If a swift fox den is identified, then a seasonal disturbance-free buffer of 0.25 mile shall be maintained between March 1 and August 31. If no swift fox dens are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 1).

Ute Ladies-tresses
The following conditions will alleviate impacts to Ute ladies'-tresses:

1. A habitat suitability survey will be conducted each year to evaluate all areas impacted by the project for potential Ute ladies'-tresses habitat.

2. In areas identified to be suitable habitat, a protocol survey will be required each year, according to the according to Powder River Basin Interagency Working Group's (PRBIWG) accepted protocol. If individual plants are found, then BLM reserves the right to re-evaluate the water management plan to mitigate potential impacts to the plant.

2.4. Alternatives considered but not analyzed in detail

The operator considered several alternative water management strategies for this plan of development. They included direct discharge of produced water, full containment in impoundments, re-injection, land application, and treatment with subsequent discharge of treated water. For a complete discussion of these alternatives and why they were discounted, begin on page 9 of the water management plan (WMP).

2.5. Summary of Alternatives

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

Table 2.5 Summary of the Alternatives

The proposed Brook Trout POD is located within the West Pine Tree Unit (Unit), Campbell and Johnson Counties, Wyoming, agreement number WYW154379X. The Unit covers the majority of the sections in T42N R76W as well as Sections 1-4 in T41N R76W, an area of approximately 19,928.6 acres. Existing energy development in the Unit includes Federal, Fee, and State CBNG and conventional oil and gas wells and associated infrastructure. The Kokanee Federal CBNG POD, a project area within the Unit of approximately 14,464 acres, operated by Devon Energy Production Company, EA # WY-070-EA06-114, approved on 06/15/2007, includes all or portions of Sections 7-9, 15-22, 26-28, and 33-25 in T42N R76W and Section 4 in T41N R76W.

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
POD/Unit Boundary Size (acres)	19,928.6	4,856.8	4,856.8
Total CBNG Wells	103	51	50
Fee	56		
Fed	35		
State	12		
Total Locations	103	51	50

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Nonconstructed Pads		51	50
Slotted Pads		0	0
Constructed Pads		0	0
Conventional Wells	7	0	0
Gather/Metering Facilities	1	0	0
Pumping Stations	3	4	3
Compressors	2	0	0
Monitor Wells	2	0	0
Impoundments			
On-channel	16	20	15
Off-channel			
Water Discharge Points	15	20	33
Treatment Facilities	0	0	0
Improved Roads	15.0	3.6	6.40
No Corridor		0	0.05
With Corridor		3.6	6.35
2-Track Roads	44.7	21.75	31.04
No Corridor		4.53	6.04
With Corridor		17.22	25.00
Buried Utilities	61.7	3.6	4.09
No Corridor		2.4	2.53
With Corridor		1.2	1.56
Overhead Powerlines	16.9	1.33	6.0
Communication Sites		0	0
Staging/Storage Areas	5	0	0
Other Disturbance: Channel Modification	0	0	Site specific (approx. 1.5ac)
Acres of Disturbance	548.23	241.42	285.42

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on June 27, 2007. Field inspections of the proposed Brook Trout CBNG project were conducted on 04/22/2008 and 04/23/2008 by:

NAME	TITLE	AGENCY
G.L. "Buck" Damone III	Archeologist	Bureau of Land Management
Ben Adams	Hydrologist	Bureau of Land Management
Andy Perez	Natural Resource Specialist	Bureau of Land Management
Julian Serafin	Natural Resource Specialist (Interdisciplinary Team Lead)	Bureau of Land Management
Donald Brewer	Wildlife Biologist	Bureau of Land Management
Courtney Frost	Wildlife Biologist (Lead)	Bureau of Land Management
Larry Gerard	Wildlife Biologist	Bureau of Land Management
Rick Taylor	Field Foreman	Devon Energy
Craig Harran	Geologist	Devon Energy
Kathleen Fields	Land Advisor	Devon Energy
Ed Glass	Operations Engineer	Devon Energy
Pat Kirkendoll	Production Foreman	Devon Energy
Rebecca Byram	Regulatory Analyst	Devon Energy
Nathan Kuhnert	Senior Hydrologist	Devon Energy
Scott Covington	Wildlife Biologist	US Fish & Wildlife Service
Brad Rogers	Wildlife Biologist	US Fish & Wildlife Service
Jack Fritz	Hydrological Consultant	WWC Engineering/Devon Energy

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			Courtney Frost
Floodplains	X			Ben Adams
Wilderness Values			X	Julian Serafin
ACECs			X	Julian Serafin
Water Resources	X			Ben Adams
Air Quality	X			Julian Serafin
Cultural or Historical Values	X			Buck Damone III
Prime or Unique Farmlands			X	Julian Serafin
Wild & Scenic Rivers			X	Julian Serafin
Wetland/Riparian	X			Ben Adams
Native American Religious Concerns			X	Buck Damone III
Hazardous Wastes or Solids		X		Julian Serafin
Invasive, Nonnative Species	X			Julian Serafin
Environmental Justice			X	Julian Serafin

3.1. Topographic Characteristics of Project Area

The Brook Trout POD includes all or portions of Sections 3-5, 10, 11, 15, 19, 22, 27, and 28 in T42N R76W, approximately 7.5 miles east of Linch, Johnson County, Wyoming. Elevations within the project area range from 4,700 to 5,340 feet above sea level. Topography consists of fairly flat, broad highlands to deep, steep-sided, broad-bottomed gully systems, particularly along Von Burg Draw, Cedar and Fletcher Canyons, and their tributaries. Rocky outcrops occur on ridge tops in the north and far west, and eroded embankments with exposed sandstone and bare soil exist in drainages throughout the project area. The climate is semi-arid, averaging 13.1 inches of precipitation annually, about 68% of which occurs between April and September. The 57-year mean maximum and minimum temperatures for July and January were 90°F and 12°F, respectively. Land use in the area includes livestock grazing, existing oil production and, more recently, CBNG development. A network of existing roads within the project area will be used to access wells in the Brook Trout POD. These roads were constructed or improved to accommodate the existing fee CBNG production and development.

3.2. Vegetation & Soils

The general vegetation community within the project area consists of a mixed sagebrush/grassland mosaic. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the project area. The greatest concentrations of sagebrush occurred among the gentler upland slopes that bordered Von Burg Draw, Cedar and Fletcher Canyons, and several minor tributaries of Seventeenmile Creek and the Dry Fork Powder River. Stands of sagebrush were especially dense in NE Section 4, NW Section 10, SW Section 15, SW Section 17, N ½ Section 19, SW Section 20, E ½ Section 22, W ½ Section 23, and NE Section 27, T42N R76W. Expansive grasslands occurred throughout the rolling hills and bottomlands in Section 27-29 and 32-34, T42N R76W. Elsewhere, grasslands occurred strictly along bottomlands, on ridge tops, and as infrequent upland meadows.

Perennial cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Common grasses noted during the onsite investigation include Indian ricegrass, needle and thread, western wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and buffalo grass. Broom snakeweed, rubber rabbitbrush, and prickly pear are also found interspersed throughout the area. Trees within the project area were primarily limited to the major drainages (Dry Fork Powder River, Seventeenmile Creek, Cedar and Fletcher Canyons, and Von Burg Draw).

The dominant soil orders in this Major Land Resource Area are Aridisols and Entisols. Soils have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams resulting in a wide variety of surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive, though varies with texture, slope and other characteristics such as topographic location, slope and elevation.

Soils within the project area were identified from the *South Campbell County Survey Area, Wyoming (WY605)* and the *South Johnson County Soil Survey Area (WY619).* The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

The dominant map units identified for the soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary. The map unit symbols within this project area were filtered and map units representing 3.0% or greater in extent within the pod boundary are displayed.

Table 3.2 – Soil Map Unit Types

Map Unit	Map Unit Name	Acres	Percent
122	Cushman-Cambria loams, 6 to 15 percent slopes	128.8	3%
146	Forkwood-Cushman loams, o to 6 percent slopes	406.1	8%
147	Forkwood-Cushman loams, 6 to 15 percent slopes	498.8	10%
215	Theedle-Kishona loams, 6 to 20 percent slopes	251.2	5%
216	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	761.5	16%
221	Turnercrest-Keeline-Taluce fine sandy loams, 6 to 30 percent slopes	440.3	9%
233	Ustic Torriorthents, gullied	791.4	16%
BU	Briggsdale-Renohill association	140.6	3%
SNe	Shingle-Tassel association	144.4	3%

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

Soil Map Units 221, 233 and SNe have been identified as having a low reclamation potential. These areas within the POD have been designated using the following criteria:

- Soil droughtiness (less than or equal to .05 inches per inch)
- Vegetation not supported (soils classified as miscellaneous areas)
- Soil rooting depth (very shallow soils).

Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8+ inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness and low water holding capacity, and high erosion potential in areas of steep slopes. Approximately 1,536 acres (32%) within the POD boundary have been identified by BLM as having low reclamation potential due to highly erosive soils by utilizing Soil Survey Geographical Data (SSURGO).

3.2.1. Dominant Ecological Sites and Plant Communities by dominant soil series

Ecological Site Descriptions are used to provide site and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information.

The map unit symbols for the soils identified above and the associated ecological sites for the identified soil map unit symbols found within the POD boundary are listed in the table below.

Table 3.2.1 – Map Units and Ecological Sites

Map Unit	Ecological Site
122	LOAMY (10-14NP)
146	LOAMY (10-14NP)
147	LOAMY (10-14NP)
215	LOAMY (10-14NP)
216	LOAMY (10-14NP)
221	SANDY (10-14NP)
233	BADLANDS
BU	LOAMY (10-14NP)
SNe	SHALLOW LOAMY (10-14NP)

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure are predominately Loamy, Sandy, and miscellaneous areas described as Badlands in the 10-14 inch

precipitation zone of the Northern Plains.

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

Sandy Sites: occur on nearly level to steep slopes on landforms which include alluvial fans, hillsides, plateaus, ridges and stream terraces in the 10-14 inch precipitation zone. The soils of this site are moderately deep to very deep (greater than 20"to bedrock), well drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid or rapid permeability. The main soil limitations include low available water holding capacity, and high wind erosion potential.

"Miscellaneous Areas", Badlands: This site occurs on steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels, but may also occur on all slopes that include landforms such as hillsides, ridges and escarpments. These sites are identified as miscellaneous areas and classified as Badland. Badland have essentially no soil and support little or no vegetation. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

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

Table 3.2.2 – Summary of Ecological Sites

Ecological Sites	Acres	Percent
LOAMY (10-14NP)	3020.3	62%
BADLANDS	791.4	16%
SANDY (10-14NP)	706.1	15%
SHALLOW LOAMY (10-14NP)	207.5	4%
CLAYEY (10-14NP)	87.7	2%
LOWLAND (10-14NP)	39.8	1%
SHALLOW SANDY (10-14 NP)	4.0	<1%

3.2.2. Wetlands/Riparian/Floodplains

A considerable number of wetland and riparian areas were observed during the onsite visit. Many of the dams have been in existence for many years, developing excellent wetlands around their shores and downstream of their dams. These wetlands have developed plant communities dominated by cattails, rushes, sedges, willows and other wetland species. Artesian Draw has numerous wet and boggy areas within a mile of Artesian Upper Reservoir. Some of these are simply potholes which hold water from runoff events and snowmelt, then dry up in the late summer. Artesian Draw may also have a significant groundwater contribution, which is unusual for a watershed of this size.

Davis Draw, north of state highway 387, hosts a number of cottonwood communities in various stages of growth, senescence and rejuvenation. While this draw does not flow water year-round, there does appear to be a groundwater component present, even in the late summer. Davis Draw can be characterized as ephemeral to intermittent with a broad, flat floodplain as it nears its confluence with the Dry Fork of the Powder River.

BT-3 and Zephyr draws are headwater tributaries to Antelope Creek, home to an identified population of

Ute Ladies' Tresses orchids. This orchid population is located on BLM land more than 20 stream miles downstream of the project area.

The larger ephemeral and intermittent draws in the project area have well developed floodplains. Some have incised channels through them. Others fan out into broad-bottomed swales. These floodplains serve to retard the typical flood flow caused by thunderstorms in the area. Few, if any, dwellings are constructed in these types of floodplains. However, they are floodplains, nonetheless.

3.2.3. Invasive Species

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

- Black henbane (*Hyoscyarnus niger L.*)
- Scotch thistle (*Onopordum acanthium L.*)
- Halogeton (*Halogeton glomeratus*)

The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Additionally, the operator inspected the Pine Tree Brook Trout POD for noxious weeds, and confirmed isolated patches within the project area. The following is a list of State and County Designated Noxious Weeds that were encountered within Brook Trout POD:

- Canada Thistle (*Cirsium arvense L.*)
- Field Bind Weed (*Convolvulus arvensis L.*)
- Skeleton leaf bursage (*Franseria discolor Nutt.*)
- Russian knapweed (*Centaurea repens L.*)
- Spotted knapweed (*Centaurea maculosa Lam.*)
- Diffuse knapweed (*Centaurea diffusa Lam.*)

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

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Thunderbird – Jones & Stokes (later renamed Jones & Stokes) in 2006, 2007, and 2008. Surveys for Ute ladies'-tresses were conducted in 2008 by Big Horn Environmental Consultants (2008a, 2008b, 2008c, 2008d, 2008e). All surveys were conducted according to the Powder River Basin Interagency Working Group's (PRBIWG) accepted protocol (available on the CBM Clearinghouse website at www.cbmclearinghouse.info). In 2006, Thunderbird – Jones & Stokes performed surveys for greater sage-grouse, sharp-tailed grouse, mountain plover, raptor nests, bald eagle winter roosts, prairie dog colonies, and Ute ladies'-tresses orchid (Thunderbird – Jones & Stokes 2006). Surveys were repeated in 2007 for all but mountain plover and Ute ladies'-tresses (Jones & Stokes 2007). Mountain plover surveys were not conducted due to access restrictions during the lambing season. Ute ladies'-tresses surveys were not conducted because the consultants concluded in 2006 that suitable habitat was not present in the project area. Surveys for bald eagles, raptor nests, grouse, mountain plovers, and prairie dogs were conducted in 2008 (Jones & Stokes 2008a, 2008b). After the onsite in 2008, BLM requested that Devon Energy survey the portion of the Fink Prong of Wind Creek that would receive CBM water for Ute ladies'-tresses potential and occurrence. Big Horn Environmental Consultants performed these surveys and additional surveys in Artesian Draw that

would also receive CBM water in 2008 (2008a, 2008b, 2008c, 2008d, 2008e).

BLM wildlife biologists conducted field visits on April 22-23, 2008. During this time, the biologists reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

3.3.1. Big Game

Big game species expected to be within the Pine Tree Brook Trout project area include pronghorn and mule deer. During the onsite, pronghorn individuals and sign were observed throughout the project area. Mule deer sign was noted frequently across the POD. The WGFD has determined that the project area contains winter-yearlong range for pronghorn and both yearlong and winter-yearlong range for mule deer. Yearlong use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. Winter-yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. Populations of pronghorn and mule deer within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by the ephemeral and intermittent tributaries of the Dry Fork of the Powder River, a component of the Powder River Basin, and Antelope Creek, a component of the Cheyenne River basin. The Dry Fork of the Powder River is located to the west of the POD and drains to the north. Several springs were documented within the project area. Fish that have been identified in the Upper Powder River and Cheyenne River watersheds are listed in the PRB FEIS (3-156-159).

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available. Confluence Consulting, Inc. identified the following species present within the Clear Creek and Powder River watersheds: Woodhouse's toad, Northern leopard frog, gopher snake, and garter snake (Confluence Consulting, Inc. 2004). Because sampling at the upper two sites on Clear Creek occurred late in the season, seasonality may have influenced the lack of reptiles and amphibians observed at these sites.

3.3.3. Migratory Birds

Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151). Species observed by Jones & Stokes include Brewer's sparrow, loggerhead shrike, and sage-thrasher, all of which are listed on BLM Wyoming's Sensitive Species List.

3.3.4. Raptors

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

Fifty-eight raptor nest sites were identified by Jones & Stokes (Jones & Stokes 2008) and BLM within 0.5 miles of the project area. Of these, six nests (1981, 3505, 4484, 4488, 5332, and 5892) were active in

2008. Three of these were occupied by red-tailed hawks. One was occupied by Swainson's hawks. One was occupied by great-horned owls, and one was occupied by golden eagles. A discrepancy exists in the BLM database regarding nests 1980 and 1982. Jones & Stokes did not locate these nests in 2006 and 2007. They reported that neither the nests nor the reported substrates exist at those locations. Other consultants, however, reported that they did locate those nests, and so the activity reported by those consultants is included in Table 1 for the years prior to 2008. Nest 5655 was not checked after 2005.

Table 1. Raptor nests sites within the Pine Tree Brook Trout project area in 2008

BLM ID	UTMs	Legal	Sub-strate[1]	Year	Condition	Status[2]	Species[3]
1980	414950E 4826750N	T42N R77W S25	CTL	2008	Gone	INAC	
				2007	Good	ACTI	RETA
				2006	Unknown	ACTI	RETA
				2005	Unknown	ACTI	RETA
				2004	Fair	INAC	
1981	414849E 4826788N	T42N R77W S25	CTL	2008	Good	ACTI	RETA
				2007	Good	INAC	
				2006	Unknown	ACTI	RETA
1982	415050E 4826688N	T42N R77W S25	CTL	2008	Gone	INAC	
				2007	Good	ACTI	RETA
				2006	Unknown	ACTI	RETA
				2004	Good	INAC	
3501	418599E 4831973N	T42N R76W S5	CTL	2008	Gone	INAC	
				2007	Good	INAC	
				2006	Good	INAC	
				2005	Fair	INAC	
3505	419474E 4827754N	T42N R76W S21	CTL	2008	Good	ACTI	RETA
				2007	Good	INAC	
				2006	Good	INAC	
3506	419483E 4827764N	T42N R76W S21	CTL	2008	Fair	INAC	
				2007	Good	ACTI	GRHO
				2006	Gone	INAC	
3507	418743E 4826550N	T42N R76W S28	GRN	2008	Poor	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	
3508	418758E 4826494N	T42N R76W S28	GRN	2008	Fair	INAC	
				2007	Fair	INAC	
				2006	Gone	INAC	
3509	418257E 4826387N	T42N R76W S29	GRN	2008	Fair	INAC	
				2007	Fair	INAC	
				2006	Fair	INAC	
3510	420930E 4825899N	T42N R76W S27	GRN	2008	Remnants	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	
3511	421096E 4825418N	T42N R76W S27	GRN	2008	Remnants	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	

BLM ID	UTMs	Legal	Sub-strate[1]	Year	Condition	Status[2]	Species[3]
3512	420882E 4825084N	T42N R76W S34	GRN	2008	Poor	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	
4484	420013E 4833884N	T43N R76W S33	CTL	2008	Good	ACTI	SWHA
				2007	Fair	INAC	
				2006	Fair	INAC	
4485	420454E 4833533N	T43N R76W S34	GHS	2008	Poor	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	
4486	419401E 4833357N	T42N R76W S4	CTL	2008	Good	INAC	
				2007	Good	ACTI	RETA
				2006	Good	ACTF	RETA
4487	421101E 4832562N	T42N R76W S3	GHS	2008	Poor	INAC	
				2007	Poor	INAC	
				2006	Poor	INAC	
4488	419514E 4832014N	T42N R76W S4	CTL	2008	Good	ACTI	GRHO
				2007	Good	INAC	
				2006	Gone	ACTI	GRHO
4489	418567E 4831746N	T42N R76W S5	CTL	2008	Good	INAC	
				2007	Good	ACTI	GOEA
				2006	Good	ACTI	GOEA
4490	421212E 4828972N	T42N R76W S15	CTL	2008	Fair	INAC	
				2007	GOOD	ACTI	GRHO
				2006	Good	INAC	
4491	416817E 4827598N	T42N R76W S19	GHS	2008	Fair	INAC	
				2007	Good	INAC	
				2006	Good	INAC	
4492	416614E 4827570N	T42N R76W S19	GHS	2008	Remnants	INAC	
				2007	Fair	INAC	
				2006	Poor	INAC	
4493	419314E 4827558N	T42N R76W S21	CTL	2008	Fair	INAC	
				2007	Good	ACTI	RETA
				2006	Good	ACTI	RETA
4494	416509E 4827555N	T42N R76W S19	GHS	2008	Fair	INAC	
				2007	Fair	INAC	
				2006	Good	INAC	
4495	417223E 4827536N	T42N R76W S20	ROC	2008	Poor	INAC	
				2007	Fair	INAC	
				2006	Fair	INAC	
4714	419191E 4832548N	T42N R76W S4	CTL	2008	Good	INAC	
				2007	GOOD	ACTI	SWHA
				2006	Unknown	ACTI	SWHA

BLM ID	UTMs	Legal	Sub-strate[1]	Year	Condition	Status[2]	Species[3]
4716	417882E 4833497N	T43N R76W S32	CTL	2008	Gone	INAC	
				2007	Unknown	UNK	
				2006	Unknown	INAC	
				2005	Unknown	ACTI	AMKE
4733	415152E 4826525N	T42N R77W S25	CTL	2008	Good	INAC	
				2007	Unknown	UNK	
				2006	Unknown	INAC	
4741	419851E 4832324N	T42N R76W S4	CTL	2008	Poor	INAC	
				2007	Unknown	UNK	
4748	418612E 4831277N	T42N R76W S8	CTL	2008	Good	INAC	
				2007	Unknown	UNK	
4749	418591E 4831128N	T42N R76W S8	CTL	2008	Fair	INAC	
				2007	Unknown	UNK	
4750	418482E 4831057N	T42N R76W S8	CTL	2008	Gone	INAC	
				2007	Gone	INAC	
				2006	Unknown	INAC	
4890	417558E 4832642N	T42N R76W S5	CTL	2008	Gone	INAC	
				2007	Unknown	UNK	
4898	417849E 4833435N	T43N R76W S32	CTL	2008	Fair	INAC	
				2007	Unknown	UNK	
5327	420690E 4833442N	T43N R76W S34	CTL	2008	Good	INAC	
				2007	Good	ACTI	RETA
5328	419083E 4833001N	T42N R76W S4	CTL	2008	Good	INAC	
				2007	Good	INAC	
5329	419093E 4832999N	T42N R76W S4	CTL	2008	Good	INAC	
				2007	Good	INAC	
5330	421774E 4831563N	T42N R76W S10	CTL	2008	Good	INAC	
				2007	Good	ACTI	RETA
5331	421779E 4830935N	T42N R76W S10	CTL	2008	Fair	INAC	
				2007	Good	INAC	
5332	422566E 4829329N	T42N R76W S14	CTL	2008	Good	ACTI	GOEA
				2007	Good	ACTI	GOEA
5333	421482E 4828750N	T42N R76W S15	CTL	2008	Fair	INAC	
				2007	Good	INAC	
5334	419892E 4828477N	T42N R76W S16	CTL	2008	Fair	INAC	
				2007	Good	INAC	
5336	422051E 4825529N	T42N R76W S26	CKB	2008	Good	INAC	
				2007	Good	INAC	
5424	419520E 4833402N	T43N R76W S33	CTL	2008	Fair	INAC	
5425	419403E 4833361N	T42N R76W S4	CTL	2008	Poor	INAC	
5426	420198E 4832669N	T42N R76W S4	CTL	2008	Poor	INAC	
5427	419571E 4832119N	T42N R76W S4	CTL	2008	Good	INAC	
5655	415000E 4826660N	T42N R77W S25	CTL	2005	Good	ACTI	RETA
5886	418641E 4831334N	T42N R76W S8	CLF	2008	Good	INAC	
5887	421547E 4827660N	T42N R76W S22	JUN	2008	Good	INAC	

BLM ID	UTMs	Legal	Sub-strate[1]	Year	Condition	Status[2]	Species[3]
5888	417535E 4832640N	T42N R76W S5	CTL	2008	Fair	INAC	
5889	419193E 4832560N	T42N R76W S4	CTL	2008	Fair	INAC	
5890	417006E 4827551N	T42N R76W S19	JUN	2008	Good	INAC	
5891	421454E 4827176N	T42N R76W S22	CTL	2008	Good	INAC	
5892	421453E 4827053N	T42N R76W S22	CTL	2008	Good	ACTI	RETA
5897	417544E 4832633N	T42N R76W S5	CTL	2008	Fair	INAC	
6098	421087E 4831593N	T42N R76W S5	CTL	2008	Good	INAC	
6280	419338E 4821367N	T41N R76W S9	CTL	2008	Fair	UNK	
6281	419035E 4820620N	T41N R76W S9	CTL	2008	Good	UNK	

Notes:
1 CTL = Cottonwood tree - Live; JUN = Junipertree; CLF = Cliff
2 INAC = Inactive; ACTI = Active; UNK = Unknown
3 AMKE = AmericanKestrel; GOEA = Golden Eagle; GRHO = Great-horned Owl; RETA = Red-tailed Hawk; SWHA = Swainson's Hawk

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act: the black-footed ferret and the Ute ladies'-tresses orchid.

3.3.5.1.1. Black-footed Ferret

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

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1,000 acres of black-tailed prairie dog colonies for survival (USFWS 1989).

The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn Mountains (Grenier 2003). USFWS has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004) and therefore no black-footed ferret surveys were required or conducted.

Approximately 14 black-tailed prairie dog colonies totaling 2,166 acres in size have been identified within the project area (Jones & Stokes 2008a, WGFD 2007). Table 2 lists the location and size of these colonies. In the table, each colony has been assigned a BLM ID in order to serve as a reference later in this document. At least 298 mapped prairie dog colonies occur within 1.5 km of each other, beginning with colonies in the project area. These colonies, some of which overlap, cover an area approximately 19,915 acres in size and make up much of the Linch complex, a potential black-footed ferret reintroduction area (noted above). The Pine Tree Brook Trout project area intersects the Linch complex and, at its closet point, is located approximately seven miles from the edge of the Ross complex, another potential reintroduction area. Black-footed ferret habitat is present within the Pine Tree Brook Trout

project area.

Table 2. Black-tailed prairie dog colonies in the Pine Tree Brook Trout project area

BLM ID	Legal	Acres
A	S13, S24 T42N R77W S19, S20, S29, S30 T42N R76W	1,284
B	S36 T42N R77W S31, S32 T42N R76W S5, S6 T41N R76W S1 T41N R77W	632
C	S32, S33, T42 R76W	85
D	S4 T41N R76W	53
E	S4, S5 T42N R76W S33 T43N R76W	40
F	S34 T42N R76W	19
G	S7 T42N R76W	14
H	S4, S5 T41N R76W	12
I	S34 T42N R76W	6
J	S4 T41N R76W	6
K	S6 T41N R76W	5
L	S12 T42N R77W S7 T42N R76W	5
M	S34 T42N R76W	4
N	S18 T42N R76W	1
Total		**2,166**

3.3.5.1.2. Ute Ladies'-Tresses Orchid

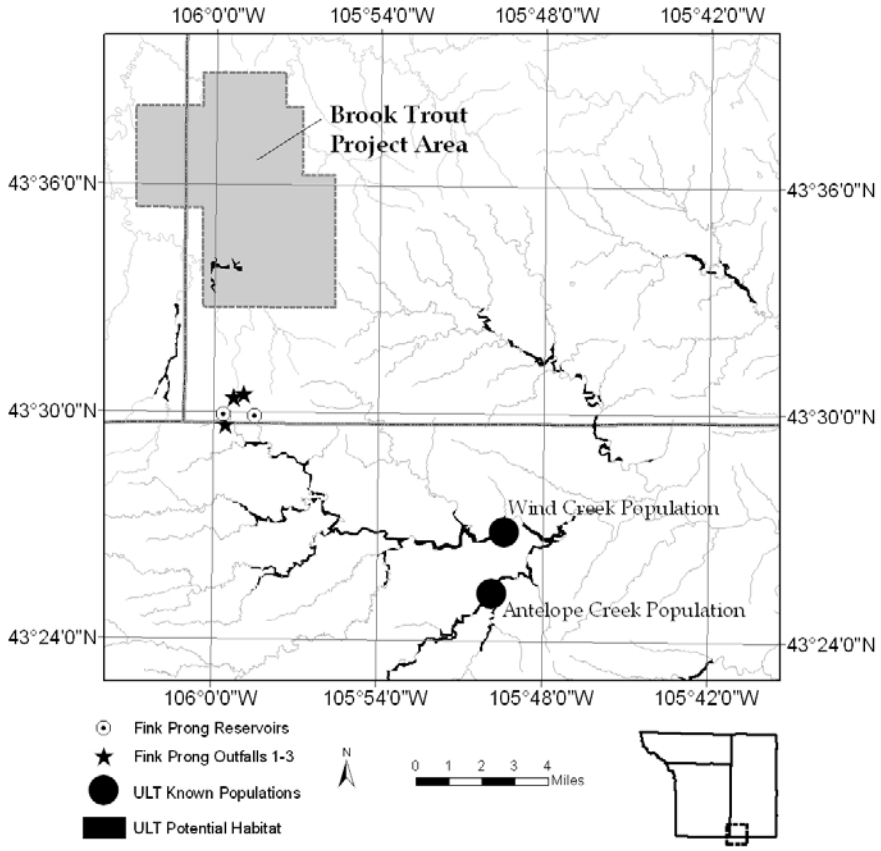
Ute ladies'-tresses orchid (ULT) is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. In Wyoming, ULT blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

Prior to 2005, only four ULT populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented ULT populations include Wind Creek and Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. The lower North Fork of Wind Creek is the closest known population to the project area and is located approximately nine miles to the southeast and 15 miles downstream.

A WYNDD model predicts undocumented populations may be present in the Buffalo Field Office administrative area, particularly within southern Campbell and northern Converse Counties – some of which are within the Brook Trout project area. The model predicted that about 2.5 miles of Davis Draw (S33, 34 T42N R76W) and about 0.5 miles of Hay Draw (S4 T41N R76W) that occur within the project area are likely to support ULT. Approximately 0.8 miles to the west and southwest of the project area, a

three mile stretch of the Dry Fork of the Powder River and one of its tributaries (S5, 8, 17, 19, & 20 T41N R76W) are also predicted by the model to support ULT (Figure 1).

Figure 1. Known and Predicted Distribution of Ute Ladies'-Tresses in relation to the Pine Tree Brook Trout Project Area*



* Note in the Figure that the Fink Prong Reservoirs and Outfalls are outside and to the south of the project area boundary, directly upstream of a known ULT population.

According to Big Horn Environmental Consultants (2008a, 2008b, 2008c), potential habitat in the project area includes reaches of Artesian Draw and of the Fink Prong of Wind Creek. These areas were surveyed for potential to support ULT and presence of the species in the summer of 2008 (2008a, 2008b, 2008c). In the upper reaches of Artesian Draw, upland vegetation completely covers draw bottoms with no apparent source of perennial water. The lower reaches of the draws, on the other hand, are sub-irrigated and seasonally flooded, increasing the potential for ULT. Numerous springs and pools connected by flowing water were observed throughout the area in May. Aquatic and hydrophilic plants dominated the draw bottoms and pools, with narrow transition zones leading directly to prairie habitat. Transition zones were primarily dominated by mats of northern green rush (*Juncus balticus*), a species associated with ULT orchid habitat (Fertig 2000). Other associated species, including switchgrass (*Panicum virgatam*), horsetail (*Equisetum laevigatum*), and sedges (*Carex* spp.) were identified only along the stretch of Artesian Draw between the Upper and Lower reservoirs (S3,10 T41N R76W). Overall, the soils tended towards very dense with fine organic and clay substrates.

No source of perennial water was observed in the immediate vicinity of the outfalls located in the upper portions of the Fink Prong of Wind Creek. Perennial water was observed, however, within the lower

reaches of the Fink Prong (S27 T41N R76W).

Suitable orchid habitat is present within the Pine Tree Brook Trout project area.

3.3.5.2. Sensitive Species

BLM Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Two habitat types – prairie dog colonies and sagebrush ecosystems – are the most common within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. The species associated with these ecosystems are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are also described in more detail in this section. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.5.2.1. Prairie Dog Colony Obligates

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

Forty percent of wildlife taxa in South Dakota (134 vertebrate species) are associated with prairie dog colonies (Agnew 1983, Apa 1985, McCracken et al. 1985, Agnew 1986, Uresk and Sharps 1986, Deisch et al. 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list: swift fox, mountain plover, ferruginous hawk, burrowing owl, loggerhead shrike, and long-billed curlew. Of these, Jones & Stokes observed loggerhead shrike in the project area.

3.3.5.2.2. Sagebrush Obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates require sagebrush for some part of their life cycle. They cannot survive without sagebrush and its associated perennial grasses and forbs. Sagebrush obligates within the Powder River Basin that are listed as sensitive species by BLM Wyoming include Brewer's sparrow, sage thrasher, sage sparrow, and greater sage-grouse. Greater sage-grouse, sage sparrows, Brewer’s sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer’s sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Greater sage-grouse will be discussed in more detail later in this document. Other sagebrush obligate species not listed as sensitive species include sagebrush vole, pronghorn antelope, and sagebrush lizard. Sagebrush obligates observed by Jones & Stokes in the project area included Brewer’s sparrow and sage thrasher.

3.3.5.2.3. Bald Eagle

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

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

Suitable nesting and winter roosting habitat is present within one mile of the Brook Trout POD along the riparian corridors of the Dry Fork Powder River, Seventeenmile Creek, Cedar Canyon, and Davis Draw. In those areas, scattered individual and clustered stands of mature cottonwoods form relatively continuous bands. Isolated individual and small stands of mature cottonwoods along Fletcher Canyon and Von Burg Draw also provide marginal roosting and nesting habitat. Sheep grazing and extensive prairie dog towns in the vicinity of the project area provide ample prey source for bald eagles in the area. At least two locations, both within one mile of the project area, have been used consistently by wintering bald eagles: two observations were made in close proximity of each other in Davis Draw in S32 T42N R76W and three observations were made on the Dry Fork of the Powder River in S12 T42N R77W (Table 3).

Table 3. Bald eagle observations within one mile of the Pine Tree Brook Trout Project Area

Legal	Date	Total	Ad	Imm	Unk	Habitat	Behavior
S02 T41N R76W	1/13/2007	1	0	1	0	Cottonwood/sagebrush	Perched
S03 T41N R76W	2/14/2007	1	1	0	0	Cottonwood	Perched
S06 T41N R75W	1/20/2007	1	0	1	0	Unknown	Flying
S12 T42N R77W	12/23/2003	1	1	0	0	Unknown	Unknown
S12 T42N R77W	1/22/2005	1	0	0	1	Unknown	Perched
S12 T42N R77W	1/30/2006	1	1	0	0	Unknown	Unknown
S13 T42N R77W	2/14/2008	2	2	0	0	Cottonwood	Perched
S24 T42N R77W	1/14/2004	1	1	0	0	Unknown	Unknown
S24 T42N R77W	2/22/2007	1	1	0	0	Cottonwood riparian	Flying
S26 T42N R76W	12/13/2007	1	1	0	0	Sagebrush	Flying
S32 T42N R76W	1/16/2006	2	2	0	0	Unknown	Perched
S32 T42N R76W	12/13/2007	2	2	0	0	Cottonwood	Perched
S32 T42N R76W	12/14/2008	2	2	0	0	Cottonwood	Perched
S36 T42N R76W	1/30/2007	0	0	0	0	Sagebrush/prairie	Perched

3.3.5.2.4. Black-tailed Prairie Dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 (USFWS 2000) but was then removed from the list on August 12, 2004. BLM Wyoming considers black-tailed prairie dogs a sensitive species and continues to afford this species the protections described in the PRB FEIS.

The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems that affect long term population viability, such as landowner poisoning and disease (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 Digital Ortho Quads indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of known colonies indicated that approximately 47% of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2004).

Approximately 14 prairie dog colonies, totaling 2,166 acres, were identified during site visits by Jones & Stokes and by historical WGFD records within the project area. Table 2 lists the location and size of these colonies. One large colony, located in the western portion of the project area, makes up a large portion of the acreage (1,284 acres).

3.3.5.2.5. Western Burrowing Owl

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

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

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

Although extensive habitat is present, the BLM BFO databases and the survey information provided by Jones & Stokes did not indicate that any burrowing owl nests were found in the POD.

3.3.5.2.6. Grouse

3.3.5.2.6.1. Greater Sage-grouse

The greater sage-grouse (sage-grouse) is listed as a sensitive species by BLM Wyoming. In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. In 2007, the U.S. District Court remanded that decision, stating that the USFWS's decision-making process was flawed and ordered the USFWS to conduct a new Status Review (Winmill Decision Case No. CV-06-277-E-BLW,

December 2007).

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

Suitable sage-grouse habitat is present in the project area. Much of the POD has the potential to support sage-grouse throughout the year. Sparse to dense patches of sagebrush are present throughout the POD. Large stands of moderately dense sagebrush along the gentler upland slopes of Von Burg Draw, Cedar and Fletcher Canyons, and several of the minor tributaries of Seventeenmile Creek and the Dry Fork Powder River could provide adequate habitat for nesting and wintering sage-grouse. Sparse to moderately dense sagebrush located near moist draws throughout the project area could provide adequate brood rearing and late summer habitat. Approximately 3% percent of the project area falls within areas delineated by Buffalo BLM that meet seasonal habitat requirements of sage-grouse and that are large enough to meet the landscape scale requirements of the bird (BLM 2008). According to a statewide population density model that was developed based on lek attendance (Doherty 2008), the project area is almost entirely contained in an area, that when combined with other similar areas, is predicted to contain 75% of the state's sage-grouse population.

At the onsite, BLM biologists found abundant sage-grouse sign in NESW S22 T42N R76W, SWNW S22 T42N R76W, NENW S28 T42N R76W, and NENE S10 T42N R76W. A female sage-grouse was also seen in the vicinity of the originally proposed location of well 22S-5 (S22 T42N R76W). On May 30, 3008, Jones & Stokes observed nine male sage-grouse walking through sagebrush in NWSE S21 T42N R76W. In the spring of 2007, Jones & Stokes reported seeing a female sage-grouse flush from the prairie dog colony in NWNE S19 T42N R76W and another female foraging in moderately dense sagebrush in NENE S10 T42NR76W. In the spring of 2006, Jones & Stokes observed a sage-grouse flush from sagebrush in SESW S33 T42N R76W and more than ten fresh roost piles in nearby sagebrush. Older, dessicated roost piles were also found in SWSW S33 T43N R76W; and SWSW and NENE S10 and NWNW S22 T42N R76W. BLM records show 10 sage-grouse leks within 4 miles of the project area. The 4-mile distance was recommended by the State wildlife agencies' ad hoc committee for consideration of oil and gas development effects to nesting habitat (WGFD 2008). These 10 lek sites are identified below (Table 4) with up to five years of lek count data. Where a year is not listed, no data were reported for that year.

Table 4. Sage-grouse leks within 4 miles of the Pine Tree Brook Trout project area

Lek Name	Legal Location	Distance from Project Area (mi)	Year: Peak Males
Cedar Canyon	SENE S16 T42N R76W	0.0	2008: 13 2007: 54
Collins SW	NWSE S23 T42N R76W	0.0	2008: 21 2007: 29
Cottonwood Creek 3	SENW S42 T42N R76W	0.0	2008: 0 2007: 2 2006: 6 2005: 7
Collins	NWSE S13 T42N R76W	0.3	2008: 0 2007: 8 2006: 0

Lek Name	Legal Location	Distance from Project Area (mi)	Year: Peak Males
Cottonwood Creek 1	SENW S33 T43N R76W	0.6	2008: 5 2007: 40 2006: 29 2005: 15
Collins North	SESE S12 T42N R76W	0.9	2008: 0 2007: 0 2006: 5
T-Chair	NWNE S17 T42N R75W	2.0	2007: 19 2006: 25
Bushwhacker Creek IV	SWNW S34 T43N R77W	2.4	2007: 5 2006: 5 2005: 9
Bushwhacker Creek V	NESE S4 T42N R77W	3.1	2007: 0 2005: 12
Cottonwood Creek 2	SESE S15 T43N R76W	3.2	2007: 21 2006: 25 2005: 12

3.3.5.2.6.2. Sharp-tailed Grouse

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

Habitats within the Pine Tree Brook Trout project area have limited potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands that occurs in the area could provide nesting and brood-rearing habitat. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter. No leks were identified nor were any sharp-tailed grouse noted in the project area.

3.3.5.2.7. Mountain Plover

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

Suitable mountain plover habitat is present within the project area. Adequate nesting habitat was noted within the black-tailed prairie dog colonies located in S19 T42N R76W, S24 T42N R77W and in S33 T43N R76W, S4 T42N R76W (Jones & Stokes 2006). No observations of mountain plovers were noted in the wildlife surveys (Jones & Stokes 2006, 2007, 2008), but an individual was seen at the north half of S16 T41N R76W during the onsites.

3.3.5.2.8. Swift Fox

The swift fox is native to the grassland prairies of North America. The original range of the species was influenced primarily by the extent of the shortgrass prairie and midgrass prairie ecosystems. The swift fox range primarily follows the distribution of the black-tailed prairie dog. Swift fox populations have been

reduced to about 40% of their former range. The swift fox was removed from the Federal list of candidate species in January 2001 due to the implementation of the Swift Fox Conservation Plan. It remains a BLM sensitive species, and, as such, recommendations for mitigation contained within the Swift Fox Conservation Plan will be applied to the project in order to uphold the direction set forth in BLM Manual 6840.

Swift foxes tend to have their dens on or within 0.8 kilometers of prairie dog colonies (Hillman and Sharps 1978). The major portions of the swift fox diet are prairie dogs (49%) and insects (27%) (Uresk and Sharps 1986). Breeding occurs from December to February depending on latitude (Kilgore 1969, Hines 1980, Covell 1992). Gestation is approximately 51 days (Kahn et al. 1997). Pups are reared in dens with den sites possibly being changed several times during the pup-rearing period (Kahn et al. 1997). Under certain circumstances, litters from different fox pairs might share the same natal dens. At four or five months, the young foxes are almost fully grown and difficult to distinguish from adults (Kahn et al. 1997). Though little is known about pup-dispersal, it begins during September and October (Kahn et al. 1997).

Suitable swift fox habitat exists throughout the project area and is associated with the prairie grasslands that occur in the southwestern and southern portions of the POD and the active prairie dog colonies that occur across the western and southern portions of the POD. For prairie dog colony locations, refer to Table 2 in Section 3.3.5.1.1 (Black-footed Ferret). The closest known active dens in 2008 are located approximately two miles to the west in S15 T42N R77W and six miles to the northwest in S19 T43N R77W. In 2007, active dens were reported six miles to the northwest in S19 and S30 T43N R77W and approximately 10 miles to the northeast in S8 T43N R74W. Jones & Stokes did not survey for swift fox dens in their wildlife surveys for the Brook Trout POD.

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 are summarized below. Reported data from the Powder River Basin (PRB) includes Campbell, Sheridan and Johnson counties.

Table 3.4 Historical West Nile Virus Information

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

*Wyoming Department of Health Records September 12, 2007.

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

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

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

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

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

3.5. Water Resources

The project area is within the Upper Powder River drainage system. However, the water management strategy proposes to pump a portion of the produced water from the project across the divide for discharge into the Cheyenne River Watershed. The water system is fully manifolded, so it is conceivable that all

1450 gpm of produced water could be discharged into the Cheyenne River watershed.

BT-3 and Zephyr draws are headwater tributaries to Antelope Creek, home to an identified population of Ute Ladies' Tresses orchids.

3.5.1. Groundwater

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 was 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 WDEQ implemented requirements for monitoring shallow groundwater of Class III or better quality under unlined CBNG water impoundments effective August 1, 2004. The intent was 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 Engineer Office (WSEO) Ground Water Rights Database for this area showed 15 registered stock and domestic water wells within 1 mile of the POD with depths ranging from 0 to 1200 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area lies in headwater tributaries to Collins Draw, the Dry Fork of the Powder River, and Collins Draw. All are tributaries to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt). Some of the drainages, Davis Draw and Artesian Draw in particular, could be characterized as intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels range from steep gullies to gentle, well vegetated grassy swales, without defined beds and banks.

The water management strategy for this plan of development includes a trans-basin pumping of CBNG produced water to the Cheyenne River drainage. BT-3 and Zephyr draws are headwater tributaries to Fink and Wind prongs of Antelope Creek. These two draws can be described as ephemeral, without a strong gully component. They grade fairly quickly into gentle topography with broad-bottomed grassy swales without well defined beds and banks.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "…illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1197 µmhos/cm at Maximum monthly flow to 3400 µmhos/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 (PRB FEIS page 3-49). The Antelope Creek near Teckla, Wyoming, gage shows an EC that ranges from 1800 µmhos/cm at maximum monthly flow to 2354 µmhos/cm at low monthly flow, and an SAR that ranges from 2.82 at maximum monthly flow to 2.6 at low monthly flow. The gage on the Cheyenne River near Riverview, Wyoming, shows ECs ranging from 2271 µmhos/cm at maximum monthly flow to 4127 µmhos/cm at low monthly flows and SARs ranging from 5.63 at maximum monthly flows to 8.66 at low monthly flows.

The operator identified 5 permitted natural springs within ½ mile of this POD. They are listed in Attachment D of the water management plan. The operator also identified 42 unpermitted springs or pothole/waterholding/seep features in the POD area. They have committed to further evaluate these areas. True springs will be monitored while those which are only seeps or potholes will not.

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

3.6. Cultural Resources

A Class III cultural resource inventory was conducted for the Pine Tree Brook Trout project prior to on-the-ground project work (BFO project no. 70080006). ACR Consultants, Inc. conducted a block and

linear Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. G.L. "Buck" Damone III, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located within the project area.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48CA264	Bozeman Trail	Eligible
48CA1568	Deadwood Road	Eligible
48CA3913	Prehistoric Site	Not Eligible
48CA3914	Historic Site	Not Eligible
48CA5494	Historic Telegraph Line	Eligible
48CA5694	Prehistoric/Historic Site	Eligible
48CA6560	Prehistoric Site	Eligible
48CA6707	Historic Site	Not Eligible
48CA6708	Prehistoric Site	Not Eligible
48CA6709	Prehistoric/Historic Site	Not Eligible
48CA6710	Prehistoric Site	Unevaluated
48CA6711	Prehistoric Site	Unevaluated
48CA6712	Prehistoric/Historic Site	Not Eligible
48CA6723	Historic Site	Not Eligible
48CA6862	Prehistoric Site	Not Eligible
48CA6867	Prehistoric Site	Not Eligible
48CA6923	Historic Site	Not Eligible
48CA6924	Historic Site	Not Eligible

Sites 48CA264 (Bozeman Trail), 48CA1568 (Deadwood Road) and 48CA5494 (Ft. Fetterman to Ft. McKinney Telegraph Line) are eligible for the National Register. Contributing portions (typically expressed as wagon ruts) of each site are present in the project area. None of the contributing portions of the sites retain their integrity of setting due to modern additions to the landscape including CBM wells, upgraded roads, pipelines, reservoirs, POD buildings, compressor stations, etc.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action, which resulted in development of Alternative C as the preferred alternative, have reduced the potential impact to the environment that will result from this action. The environmental consequences of Alternative C are described below. Under this alternative, 50 wells would be drilled at 50 locations to Federal minerals on 80 acre spacing. The wells have been sited so that construction will disturb a minimum area. There are some well locations and other areas along the access routes that cross highly erosive soils and will require expedient or extraordinary stabilization to reduce erosion potential. For the most part, the operator utilized existing primitive and improved roads as infrastructure for this POD. As a result of changes made at the pre-approval onsite, an additional 9.29 miles of new and existing two-track primitive roads were added to the project. This mileage increase is a result of efforts to avoid or reduce disturbance to quality sagebrush habitat and areas of highly erosive soils.

The total miles of overhead power lines also increased under alternative C. The original plan involved 1.33 miles of new overhead power lines in the West Pine Tree Unit. Prior to the pre-approval onsite, the proponent modified the POD to include an additional 4.67 miles of overhead power lines for a total of 6.0 miles.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 50 proposed well locations, all can be drilled without a well pad being constructed. As such, surface disturbance associated with the drilling of the wells would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 12 x 15 x 50 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 50 wells would involve approximately 1.0 acre/well for a total estimated disturbance of 50 acres.

Approximately 6.4 miles of improved roads would be constructed to provide access to various well locations. Approximately 31.04 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 4.09 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	50	1.0/acre (200 x 200 feet)	50	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells		0.1/acre		Long Term
Impoundments				Long Term
On-channel	15	Site Specific	80	
Off-channel	0	Site Specific	0	
Water Discharge Points	33	Site Specific or 0.02 ac/WDP	1	
Channel Disturbance				
Channel Modification	0.5	Site Specific	1.5	Long Term
Improved Roads	6.4		31.07	Long Term
No Corridor	0.05	40' Width		
With Corridor	6.35			
2-Track Roads	31.04		87.17	Long Term
No Corridor	6.04	25' Width		
With Corridor	25.00	20' Width		
Pipelines	4.09			Short Term
No Corridor	2.53	20' Width	9.92	
With Corridor	1.56			
Overhead Powerlines	6.0	30' Width	21.76	Long Term
Additional Disturbance:				Long Term
Pumping Stations	3.0	1.0/acre (200 x 200 feet)	3.0	

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. Soils

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing results in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay

content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.

- Loss of soil vegetation cover, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.
- Soil productivity would be eliminated along improved roads and severely restricted along two track trails until successful final reclamation is achieved.
- Modification of hill slope hydrology.

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

Areas identified as having a low reclamation potential were identified at the onsite and avoided wherever possible. However, some areas of low reclamation potential will be affected by the proposed action. As a result, site specific mitigation measures will be applied in these areas to reduce susceptibility to degradation and enhance reclamation potential.

Soil disturbances other than permanent facilities would be short term with expedient, successful interim reclamation and site stabilization. In locations of highly erosive soils, the operator will be required to stabilize the disturbed surface within 30 days of the initial disturbance. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, wing ditches, culverts, rip-rap, etc) would ensure land productivity/stability is regained and maximized. In addition, the operator will adhere to COAs which limit the surface disturbance allowable for construction and improvements.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

4.1.2. Vegetation

The construction associated with this project will disturb a total of 242.97 acres. To insure expedient reclamation that conforms to the Wyoming Reclamation Plan objectives, native seed mixes are recommended for use on the different ecological sites. Seed mixes for the Brook Trout POD were determined based on soil map unit types, the dominant ecological sites found within the project area, and the mixing of soil horizons in disturbed areas. A shallow loamy and sandy seed mix was created for the entire POD (see site specific COAs). These native species should adapt readily to each soil and ecological site in the POD area to ensure revegetation, with prompt and appropriate re-contouring and reclamation.

The construction of the access roads, pipelines and well locations will also disturb sagebrush. Wyoming big sagebrush has not been included in these mixes because direct seeding success has been marginal in the past. With expedient reclamation and re-spreading of the topsoil, sagebrush seed should be present in the seed base and should regenerate given proper environmental conditions.

4.1.3. Wetland/Riparian/Floodplains

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments has already allowed wetland-riparian species establishment. It remains to be seen whether the change in quality of the water being discharged to the impoundments causes significant or notable differences in the already established wetlands downstream of some of the existing dams.

Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table, which is already high in some areas such as Artesian and Davis draws, could rise closer to the surface from seepage flows caused by produced water discharges.

"Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas." (PRB FEIS Page 4-175).

Well developed floodplains are present along the lower reaches of the ephemeral draws in and near the project area. Discharge of produced water into these draws, especially continuous discharge or sustained discharge in winter, will have an adverse impact on these floodplains as ice builds in the channels, causing the water to spill over the banks and cover the land. There is potential that these overland flows can wet areas which, as they dry out, can wick salts and minerals to the surface creating dispersed soil conditions and "slick spots", reducing growth of desirable vegetation.

4.1.4. Invasive Species

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

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

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

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

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

4.1.5. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 19% of that total (see section 4.4.2.1). In the Antelope Creek watershed, the proportion of actual amount of cumulatively produced water and the total amount predicted is 25%.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the Fink Prong of Antelope Creek and into the Upper Powder River and to use their "Assimilative Capacity Credits" should discharge to the Powder River begin to occur.
- The WMP for the Brook Trout POD proposes that produced water will not contribute significantly to flows downstream.

Additional mitigation measures will be required should discharges into the Powder River watershed from the lowermost reservoirs become necessary.

4.2. Wildlife (Alternative C – Environmentally Preferred)

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter-yearlong and yearlong range for pronghorn and mule deer would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarizes the proposed activities. Items identified as long term disturbance would cause direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they may provide some habitat value as they 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 indicates 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 2004a). A multi-year study on the Pinedale Anticline suggests that, not only do mule deer avoid mineral activities, but, after three years of drilling activity, they had not become accustomed to the disturbance (Madson 2005).

Big game animals are expected to return to the project area following construction; however, populations will likely be reduced 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. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

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

4.2.1.1. Big Game Cumulative Effects

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

4.2.2. Aquatics Direct and Indirect Effects

19 existing and 11 proposed discharge points with 13 existing and 1 proposed stock water reservoirs within the Upper Powder River watershed and 3 existing discharge points with 3 existing stock water reservoirs within the Upper Cheyenne River watershed.

Produced water will be managed via a network of 19 existing and 11 proposed discharge points with 13 existing and 1 proposed stock water reservoirs within the Upper Powder River watershed and 3 existing discharge points with 3 existing stock water reservoirs within the Upper Cheyenne River watershed. If a reservoir were to discharge, it is unlikely that the produced water would reach a fish-bearing stream or that downstream species would be affected. If these streams were to become perennial, they will likely host species of fish, particularly non-native species.

4.2.2.1. Aquatics Cumulative Effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

losses (displacement) were much greater than the direct physical habitat losses.

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

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

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

4.2.3.1. Migratory Birds Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

4.2.4. Raptors Direct and Indirect Effects

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

The presence of overhead power lines may impact foraging raptors. Raptors forage opportunistically throughout the Powder River Basin. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, USFWS Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted, 31 were at power poles that were considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid-span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them. USFWS 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.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than 0.25 mile from occupied raptor nests.

Well 4S-13 is approimately 0.25 miles away from nests 3501 and 4489 (both golden eagle nests). Signs will be posted at each end of the primitive road across the canyon to prohibit any CBM traffic. Well 4S-3 was moved 53 ft N/NW out of line-of-sight of nests 4486 (last used by a red-tailed hawk) and 5425 (species unknown). Well 10S-1 was moved approximately 500 ft SE out of line-of-sight of nest 5330 (red-tailed hawk). Well 22S-15 was moved upslope, approximately 604 ft W/SW outside 0.25 miles of nest 5892 (last used by a red-tailed hawk) but still within line-of-sight. Well 22S-9 was moved approximately 580 ft E, outside 0.25 miles of nest 5887 (species unknown) but still within line-of-sight. Well 27S-15 is within 0.25 miles and line-of-sight of nest 3511 (ferruginous hawk). Well 27S-11 is within 0.25 miles and line-of-sight of nest 3510 (ferruginous hawk). Well 28S-5 is within 0.25 miles but out of line-of-sight of nests 3507 and 3508, both of which are ferruginous hawk nests. Well 15S-15 is within 0.25 miles and line-of-sight of nest 5333 (species unknown).

Table 5. Infrastructure within close proximity (0.5 mile) of documented raptor nests within the Pine Tree Brook Trout project area (Timing limitations will apply to surface-disturbance associated with this infrastructure)

BLMID	Infrastructure	Distance
1980	Well 19S-13	0.5 mi ENE
1981	Well 19S-13	0.5 mi ENE
1982	Well 19S-13	0.4 mi ENE
3501	Powerline	0.3 mi NE-SE
	Well 4S-13	0.2 mi ESE
	Well 4S-5	0.5 mi NNE
	Well 5S-9	0.2 mi NNW
3505	Outfall 008	0.5 mi SSE
	Powerline	0.4 mi E-NE
	Reservoir	0.4 mi SSW
3506	Outfall	0.5 mi SSE
	Powerline	0.4 mi E-NE
	Reservoir	0.4 mi SSW
3507	Well 28S-11	0.4 mi SE
	Well 28S-3	0.4 mi ENE
	Well 28S-5	0.2 mi SSE
3508	Outfall	0.5 mi SSE
	Well 28S-11	0.4 mi SE
	Well 28S-3	0.4 mi ENE
	Well 28S-5	0.2 mi SSE
3509	Well 28S-5	0.4 mi ESE
3510	Outfall	0.0 mi W
	Outfall	0.4 mi ESE
	Powerline	0.1 mi W-E
	Powerline	0.1 mi N
	Reservoir	0.1 mi S
	Well 27S-11	0.1 mi SSW
	Well 27S-13	0.4 mi SW
	Well 27S-16	0.4 mi SSE

BLMID	Infrastructure	Distance
	Well 27S-3	0.5 mi N
	Well 27S-9	0.5 mi E
3511	Outfall	0.4 mi ENE
	Outfall	0.5 mi ESE
	Outfall	0.3 mi SSE
	Outfall	0.3 mi NNW
	Powerline	0.4 mi NE-NW
	Reservoir	0.3 mi SSE
	Reservoir	0.2 mi NW
	Well 27S-11	0.3 mi NNW
	Well 27S-13	0.4 mi W
	Well 27S-16	0.1 mi E
	Well 27S-9	0.5 mi ENE
3512	Outfall	0.1 mi SSE
	Reservoir	0.3 mi N
	Reservoir	0.1 mi S
	Well 27S-11	0.4 mi NNW
	Well 27S-13	0.3 mi WNW
	Well 27S-15	0.3 mi NE
4484	Well 4S-1	0.5 mi SSE
4485	Well 3S-3	0.4 mi ESE
	Well 3S-5	0.5 SSW
	Well 4S-1	0.3 mi SW
4486	Well 4S-1	0.5 mi ESE
	Well 4S-3	0.2 mi SW
	Well 4S-5	0.5 mi SSW
	Well 4S-7	0.4 mi SE
4487	Powerline	0.3 mi SW-SE
	Pumping Station	0.3 mi SSE
	Well 3S-1	0.5 mi NE
	Well 3S-3	0.4 mi NNW
	Well 3S-5	0.4 mi WNW
	Well 3S-7	0.2 mi NE
4488	Powerline	0.1 mi SW-SE
	Powerline	0.3 mi SW-S
	Well 4S-13	0.4 mi WSW
	Well 4S-7	0.5 mi NNE
4489	Powerline	0.4 mi NE-SE
	Powerline	0.4 mi E
	Powerline	0.4 mi NW-SW
	Well 4S-13	0.3 mi ENE
	Well 5S-9	0.3 mi NNW
4490	Well 15S-15	0.3 mi SSE
	Well 15S-7	0.4 mi NNE
	Well 15S-9	0.4 mi E
	Well 22S-3	0.4 mi SSW
4491	Well 19S-15	0.4 mi SW

BLMID	Infrastructure	Distance
	Well 19S-11	0.5 mi WSW
	Well 19S-1	0.4 mi NNE
4492	Well 19S-1	0.5 mi NNE
	Well 19S-11	0.4 mi W
	Well 19S-15	0.3 mi SSW
4493	Outfall	0.4 mi SSE
	Powerline	0.2 mi NW-N
	Reservoir	0.2 mi S
4494	Well 19S-11	0.3 mi W
	Well 19S-15	0.3 mi SSW
4495	Well 19S-1	0.5 mi NW
4714	Well 4S-13	0.4 mi SSW
	Well 4S-3	0.4 mi N
	Well 4S-5	0.2 mi NW
	Well 4S-7	0.4 mi ENE
	Well 5S-9	0.5 mi WSW
4716	Powerline	0.5 mi SSW
4733	Well 19S-13	0.4 mi NE
4741	Powerline	0.3 mi SW-SE
	Well 3S-5	0.5 mi NE
	Well 4S-1	0.5 mi NNE
	Well 4S-7	0.3 mi NNW
4748	Powerline	0.4 mi NE-SE
	Powerline	0.4 mi NE
	Powerline	0.5 NW-SW
	Well 4S-13	0.4 mi NNE
4749	Powerline	0.4 mi NE-SE
	Powerline	0.5 mi NW-SW
4750	Powerline	0.5 mi NE-SE
	Powerline	0.5 mi SW-NW
4890	Powerline	0.0 mi NE-SE
4898	Powerline	0.4 mi SSW
5327	Well 3S-3	0.2 mi SE
	Well 3S-5	0.4 mi SSW
	Well 4S-1	0.4 mi SW
5328	Well 4S-3	0.1 mi NNE
	Well 4S-5	0.2 mi SW
	Well 4S-7	0.4 mi ESE
	Well 5S-1	0.4 mi WNW
5329	Well 4S-3	0.1 mi NNE
	Well 4S-5	0.2 mi SW
	Well 4S-7	0.4 mi ESE
	Well 5S-1	0.4 mi WNW
5330	Outfall	0.2 mi WSW
	Powerline	0.3 mi SW-NW
	Pumping Station	0.4 mi NW
	Well 10S-1	0.2 mi SSW

BLMID	Infrastructure	Distance
	Well 10S-3	0.5 mi W
	Well 10S-7	0.3 mi SW
5331	Outfall	0.4 mi NNW
	Powerline	0.3 mi WNW-NW
	Well 10S-1	0.2 mi N
	Well 10S-11	0.5 mi WSW
	Well 10S-7	0.3 mi WNW
	Well 10S-9	0.1 mi SSW
	Well 11S-13	0.4 mi SE
5332	Powerline	0.5 mi NW-NE
	Well 5S-9	0.5 mi WSW
5333	Well 15S-9	0.3 mi NE
	Well 22S-1	0.4 mi SE
	Well 15S-15	0.1 mi SSE
	Well 22S-3	0.4 mi SW
5334	Powerline	0.2 mi NE-SE
	Powerline	0.3 mi W-NE
	Powerline	0.4 mi W-SW
	Pumping Station	0.5 mi SSE
	Well 22S-9	0.5 mi SSE
5336	Outfall	0.2 mi SSW
	Outfall	0.3 mi WNW
	Reservoir	0.2 mi SSW
	Reservoir	0.3 mi WNW
	Well 27S-15	0.5 mi WSW
	Well 27S-9	0.3 mi NW
5424	Well 4S-1	0.4 mi ESE
	Well 4S-3	0.3 mi SW
	Well 4S-7	0.4 mi SSW
5425	Well 4S-1	0.5 mi ESE
	Well 4S-3	0.2 mi SW
	Well 4S-5	0.5 mi SSW
	Well 4S-7	0.4 mi SE
5426	Powerline	0.5 mi SW-SE
	Well 3S-5	0.2 mi ENE
	Well 4S-1	0.5 mi NNW
5427	Powerline	0.2 mi SW-SE
	Powerline	0.4 mi SW
	Well 4S-13	0.4 mi WSW
	Well 4S-7	0.4 mi NNE
5655	Well 19S-13	0.5 mi ENE
5886	Powerline	0.4 mi NE-SE
	Powerline	0.4 mi NE
	Powerline	0.5 mi NW-SW
	Well 4S-13	0.4 mi NNE
5887	Reservoir	0.5 mi NW
	Well 22S-1	0.5 mi NNW

BLMID	Infrastructure	Distance
	Well 22S-11	0.4 mi WSW
	Well 22S-9	0.2 mi WSW
5888	Powerline	0.0 mi NE-SE
5889	Well 4S-13	0.4 mi SSW
	Well 4S-3	0.4 mi N
	Well 4S-5	0.2 mi NW
	Well 4S-7	0.4 mi ENE
	Well 5S-9	0.5 mi WSW
5890	Well 19S-1	0.5 mi NNW
	Well 19S-16	0.4 mi SW
5891	Well 22S-11	0.3 mi WNW
	Well 22S-11	0.4 mi WNW
	Well 22S-15	0.3 mi SW
	Well 22S-15	0.2 mi SW
	Well 22S-3	0.5 mi SW
	Well 22S-3	0.4 mi SW
	Well 22S-7	0.4 mi NNW
	Well 22S-7	0.5 mi NNW
	Well 22S-9	0.3 mi NE
	Well 22S-9	0.4 mi NE
	Well 27S-1	0.3 mi SSE
	Well 27S-1	0.3 mi SSE
5892	Well 22S-9	0.3 mi NE
	Well 27S-1	0.3 mi SE
	Well 22S-15	0.2 mi SW
	Well 22S-3	0.4 mi SW
	Well 22S-11	0.3 mi NW
	Well 22S-7	0.5 mi NNW
5897	Powerline	0.0 mi NE-SE
6098	Outfall	0.3 mi ESE
	Powerline	0.3 mi NW-NE
	Reservoir	0.4 mi E
	Well 10S-1	0.4 mi ESE
	Well 10S-3	0.1 mi WSW
	Well 10S-7	0.4 mi SSE

With the additional amount of proposed development surrounding nest 3501, it is unlikely that golden eagles will attempt to rebuild this nest. Due to the sensitivity of ferruginous hawks to human-caused disturbance, it is not likely that this species will return to any of the nests they formerly used in the project area. Nests that have not been active in any year that surveys have been done, and for which at least two years of surveys were collected, may not be reoccupied as development occurs in the area.

Of the nests that have been active in the last three years or for which only one year of surveys were completed, raptors may abandon nests 3505, 3506, 4488, 4490, 4714, 5425, 5889, 5891, 5892, and 6098, as the proposed development surrounds them.

Nests 1980 and 1982 have limited proposed development within 0.5 mi and both may be rebuilt and re-occupied in the future. Nests 4484, 4486, 4489, 4493, 5327, 5330, 5332, 5426, 5427, 5886, 5887, 5888,

and 5890 will not be surrounded by development and may continue to be occupied by raptors as the proposed development occurs.

In order to mitigate impacts to nesting raptors, a timing limitation will be applied to all surface disturbing activities within 0.5 mile of all raptor nests within the project area. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Raptors Cumulative Effects

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

4.2.5. Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered Species

Table 6. Summary of Threatened and Endangered Species Habitat and Project Effects

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NS	NLAA	Suitable habitat of sufficient size.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	S	NLAA	Habitat suitable. Project close to known population.

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

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

4.2.5.1.1. Black-footed Ferret Direct and Indirect Effects

Suitable habitat is of sufficient size to support a black-footed ferret population and the project area is in the Linch prairie-dog complex, identified by WGFD as a potential black-footed ferret reintroduction site, and 7 miles from the Ross prairie-dog complex, also identified by WGFD as a potential black-footed ferret reintroduction site. It is extremely unlikely that any black-footed ferret is present in the project area. However, if any become present, the proposed action will most likely make portions of the project area unsuitable for ferret inhabitance. Implementation of the proposed development "***may affect, but is not likely to adversely affect***" the black-footed ferret.

4.2.5.1.2. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

The Ute ladies'-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants. Invasive weeds transplanted by vehicle and foot traffic in habitat could outcompete this fragile species. Restricting work from areas of Ute ladies'-tresses orchid habitat reduces these impacts.

Suitable habitat is present within the Pine Tree Brook Trout project area. Portions of two drainages that contain suitable habitat are likely to be affected by the Pine Tree Brook Trout project: the upland tributaries of Artesian Draw, a tributary of the Powder River, and sections of the Fink Prong of Wind Creek, a tributary of Antelope Creek. Areas predicted to receive water discharge (located in S3, 10-14, T41N R76W and S21, 22, 27, 28, 34 T41N R76W) were surveyed for the presence of ULT plants by Big Horn Environmental Consultants in 2008. Although their findings were negative, the orchid is difficult to identify because of its small size, small inconspicuous flowers, and because it does not flower every year. In addition, the 2008 surveys were conducted when nearby known populations were in their early flowering stage with only a few plants in bloom, making plants in adjacent areas likely even more difficult to detect. Three outfalls and two reservoirs in the Fink Prong of Wind Creek are directly upstream of the Wind Creek ULT population. Devon predicts that water will travel no more than 2.4 miles below these before infiltrating and will not reach the closet known population in Wind Creek, which is located approximately 9 miles away or 15 miles downstream.

Reservoir seepage may create additional suitable habitat if historically ephemeral drainages become perennial. Historic seed sources may be present within the project area due to its proximity to the North Fork of Wind Creek population. Due to the existence of suitable habitat, the potential for creation of additional habitat, the project's close proximity to known populations, but the lack of direct affects to any known plants, implementation of the proposed coal bed natural gas project "***may affect, but is not likely to adversely affect***" ULT.

4.2.5.2. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22Astates: "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

4.2.5.2.1. Prairie Dog Colony Obligates

Wells, roads, pipelines and other infrastructure associated with energy development constructed within prairie dog colonies will directly remove habitat for prairie dog colony obligate species. Activities that disturb these species could lead to temporary or even long-term or permanent abandonment. Direct loss of species may also occur from vehicle traffic. Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem.

4.2.5.2.2. Sagebrush Obligates

Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil

conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003)

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as a remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of shrub-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return for many years after reclamation activities are completed.

Table 7. Summary of Sensitive Species Habitat and Project Effects.

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

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

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

Presence
K - Known, documented observation within project area.
S - Habitat suitable and species suspected, to occur within the project area.
NS - Habitat suitable but species is not suspected to occur within the project area.
NP - Habitat not present and species unlikely to occur within the project area.
Project Effects
NI - No Impact.
MIIH - May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
WIPV - Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI - Beneficial Impact

4.2.5.2.3. Bald Eagle Direct and Indirect Effects

Activities associated with construction and maintenance of wells, pipeline corridors, outfalls, reservoirs, and roads may disturb roosting bald eagles in the winter and may also reduce the potential that they would use the area for breeding. Therefore, a timing restriction will be applied to reduce disturbance to these areas.

There are 2.5 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Devon Energy is proposing an additional 6.1 miles of overhead three-phase distribution lines There are currently 4.0 miles of improved roads within the project area, with 6.0 miles proposed.

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

Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water will be stored in 13 proposed reservoirs which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

Development of the POD will also impact the bald eagle prey base in the area. Prairie dogs and winter-killed sheep are most likely the main prey source for the bald eagles observed by Jones & Stokes in their winter roost surveys. Because development of the Brook Trout POD will directly impact black-tailed prairie dogs, there will be some loss of this component of their prey source.

4.2.5.2.4. Black-tailed Prairie Dog Direct and Indirect Effects

Wells 5S-1, 4S-3, and their associated corridors are proposed in black-tailed prairie dog colony E (refer to Table 2 for locations). Wells 19S-5, 19S-11, 19S-15; their associated corridors; and the corridors to wells 19S-1, 19S-13 are proposed in colony A. A proposed waterline goes through prairie dog colony C. A proposed outfall is adjacent to colony F. A reservoir and waterlines are proposed in and through colony B.

A waterline is proposed through colony H. Attempts were not made to move these facilities based on the landowner's request.

During construction of these facilities, there is the possibility that prairie dogs within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and will cause an increase in prairie dog mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover. Individuals that survive the excavation process but whose burrows were destroyed will be displaced. As the prairie dog town grows in size, prairie dogs move from an area of high population density to an area of low population density. Dispersal of prairie dogs occurs as single individuals. Both male and female prairie dogs prefer to move into an existing colony or one that has been abandoned rather than start a completely new colony. Coterie (small family group within the colony) members resist attempted invasions by conspecifics including immigrants. Dispersing prairie dogs have increased stress levels, higher exposure to predators, and are unlikely to be accepted by other colonies if they even encounter one. The end result is that very few displaced prairie dogs are likely to survive.

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

4.2.5.2.5. Western Burrowing Owl Direct and Indirect Effects

Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. Overhead power lines provide perch sites for larger raptors that could potentially result in increased burrowing owl predation. CBNG infrastructure such as well houses, compressors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. See Section 4.2.5.2.4 (Black-tailed Prairie Dog Direct and Indirect Effects) of this EA for direct loss of habitat due to surface-disturbing activities.

The USDAFS Thunder Basin National Grasslands in Campbell County, WY, who cooperated with the BLM in the creation of the 2003 PRB EIS, recommends a 0.25 mile timing restriction buffer zone for burrowing nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to "use the least restrictive stipulations that effectively accomplish the resource objectives or uses." Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to four and one half months (See Chapter 3 for breeding, nesting, and migration chronology) from six and one half months and from 0.5 mile to 0.25 mile.

4.2.5.2.6. Grouse

4.2.5.2.6.1. Greater Sage-grouse Direct and Indirect Effects

Ten leks are within four miles of the Pine Tree Brook Trout project area (Table 3). The proposed action will adversely impact breeding, nesting, brood rearing, late summer, and winter habitat. Proposed project elements that are anticipated to negatively impact grouse are approximately 50 CBNG wells on 50 locations, 30.3 miles of new roads, 34.6 miles of new pipelines, 6.1 miles of new overhead power, 13 new reservoirs, increased vehicle traffic on established roads and increased noise from compressor stations. Using 0.6 miles as a distance for impacts (Holloran et al. 2007, Aldridge and Boyce 2007) from overhead power, roads, and well locations, effective sage-grouse habitat loss will be approximately 24,319 acres.

Based on the best available science, which is summarized below, the proposed action will most likely contribute to the extirpation of the local grouse population and subsequent abandonment of at least the six leks that occur within two miles of the project area: Cottonwood Creek, Cedar Canyon, Collins, Collins North, Collins SW, and Cottonwood Creek 3.

Prior to the onsite, well 3S-7 was dropped due to its being proposed right at the Cottonwood Creek 3 sage-grouse lek location. Existing infrastructure and current construction related to fee actions have already caused significant disturbance to quality sage-grouse habitat in this area.

At the onsite, six wells were moved in order to mitigate impacts to sage-grouse habitat. Well 19S-1 was moved out of a good sage-grouse habitat and into a cheatgrass pocket. Well 3S-1 was moved out of good habitat into a new location where an existing road could be used for access and where less disturbance to sagebrush would occur. Well 22S-5 was originally located in high quality sage-grouse habitat. The location was moved along a main access road corridor, minimizing disturbance to the sagebrush stand. Well 22S-13 was moved out of a high quality sage-grouse habitat to a location along the main access road. Well 22S-15 was moved out of a sagebrush stand to avoid disturbance to the sagebrush. Well 22S-11 was moved out of a potential sage-grouse wintering area to a location closer to the access road and out of the sagebrush. A powerline that was originally proposed in an area where sage-grouse sign was frequent was moved along the main access road to minimize impacts to sage-grouse in that area. Perch inhibitors will be installed along this section of powerline; however sage-grouse tend to avoid vertical structures and therefore may avoid the area even after perch inhibitors are installed.

4.2.5.2.6.2. Greater Sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and associated infrastructure the project area contains existing fee, state, and federal fluid mineral development. Attendance at all six leks within two miles of the project area declined in 2008. Three leks were not attended at all in 2008. The amount of disturbance that has taken place in the vicinity of these leks may already have compromised the ability of sage-grouse that breed in this area to successfully rear their young. Significant disturbance to high quality sage-grouse breeding habitat has already taken place, especially within the vicinity of the Cottonwood Creek 3 lek and the Cedar Canyon lek. With the additional development of the Brook Trout POD, local sage-grouse populations are likely to continue to decline.

The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the Cedar Canyon, Collins SW, Cottonwood Creek 3, Collins Cottonwood Creek 1, Collins North, T-Chair, Bushwhacker Creek IV, Bushwhacker Creek V, and Cottonwood Creek 2 sage-grouse leks. As of 2008, all of the wells in the POD and most of its infrastructure are within four miles of the 10 leks - an area of 177 square miles. There are currently 734 wells (WOGCC 08/16/2008) within this area, at a density of approximately 4 wells per square mile. Due to this level of development there is a strong potential that the population(s) breeding at these leks may become extirpated without development of this POD.

There are 300 proposed wells (AFMSS 08/16/08) (50 are the wells from this project) within four miles of the 10 leks. With the addition of the 250 proposed wells that are not associated with this proposed action, the well density within four miles of the 10 leks increases to 984 wells at a density of 5.6 wells per square mile. With approval of alternative C (50 proposed well locations) the well density increases to 5.8 wells per square mile.

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 (WGFD 2004a). The PRB FEIS

estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

The Powder River Basin Oil and Gas Project FEIS (BLM 2003) concluded that "Activities associated with the proposed project would affect sage-grouse in several ways. These effects may include: (1) increased direct mortality (including legal hunting, poaching, and collision with power lines and vehicles); (2) the introduction of new perches for raptors and thus the potential change in rate of predation; (3) direct loss or degradation of habitats; (4) indirect disturbance resulting from human activity (including harassment, displacement, and noise); (5) habitat fragmentation (particularly through construction of roads); and (6) changes in population (pg. 4-257)." The FEIS goes on to state that "implementation of several mitigation measures would reduce the extent of each impact addressed by those measures. Despite these measures, the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270)."

The Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) included a Mitigation Monitoring and Reporting Plan (MMRP). The uncertainties as to where and at what level development was to proceed as well as the uncertainties associated with the assumptions that were used to predict impacts suggests that one-time determination of impacts that is included in the EIS may not occur as projected. The MMRP helps to continually assess the effects of the project and the adequacy of the mitigation. Such a plan/process provides a mechanism to continuously modify management practices in order to allow development while continuing to protect the environment (E-1)." In other words, development pace and patterns may not occur as predicted, and so the BLM may use the adaptive management process provided for in the BFO RMP.

Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (WGFD 2004a). Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure in the Powder River Basin (WGFD 2005, WGFD 2004a). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. In southwestern Wyoming, yearling female greater sage-grouse avoid nesting in areas within 0.6 miles of producing well pads (Holloran et al. 2007), and in southern Alberta, brood-rearing females avoid areas within 0.6 miles of producing wells (Aldridge and Boyce 2007). Doherty et al. (2008) demonstrated that sage-grouse in the Powder River Basin avoided otherwise suitable wintering habitats once they have been developed for energy production, even after timing and lek buffer stipulations had been applied. The WGFD feels a well density of four wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004a). As interpreted by coordinated effort with state fish and wildlife agencies from Montana, Colorado, Utah, South Dakota, North Dakota and Wyoming, (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008), research indicates that oil or gas development exceeding approximately 1 well pad per square mile with the associated infrastructure, results in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (Holloran 2005, Walker et al. 2007)

Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active drilling rigs within 5 km (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et al. documented approximately 200 CBNG facilities within one mile of sage-grouse leks. Sage-grouse numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct

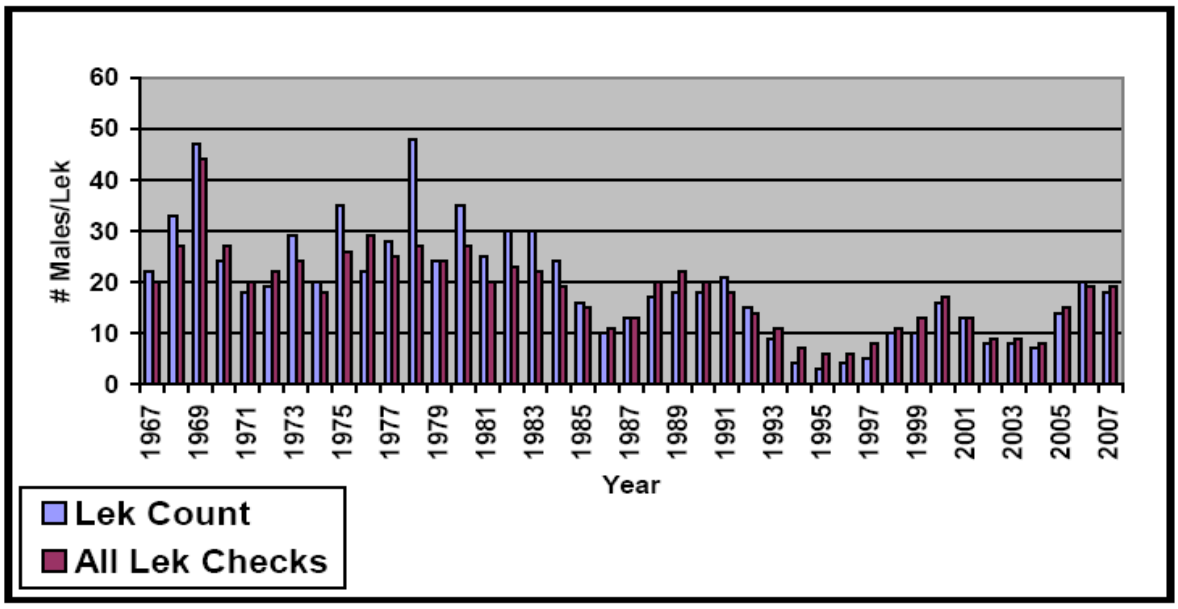
habitat losses from the facilities themselves, roads and traffic, and the associated noise were found to be the likely reason for this finding.

Vegetation communities within the Powder River Basin are naturally fragmented, as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within the Powder River Basin to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size has decreased by more than 63% in the past forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). The existing development within the cumulative impacts assessment area has further fragmented the sage-grouse habitat. Disturbance created by this project will contribute to additional fragmentation.

Another concern with CBNG development is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (WGFD 2004b). West Nile virus represents a significant new stressor, which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations including the Powder River Basin (Naugle et al. 2004). In northeastern Wyoming and southeastern Montana, West Nile virus-related mortality during the summer resulted in an average decline in annual female survival of 5% from 2003 to 2006 (Walker et al. 2007). Powder River Basin sage-grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. comm.).

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

Figure 2. Male sage-grouse lek attendance within northeastern Wyoming, 1967 - 2007



The BFO Resource Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA)

(BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage-grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found only 36% of their grouse nesting within 3 km of the capture lek. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. 2007). Habitat conditions and sage-grouse biology within the Buffalo Field Office are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

A two-mile timing limitation, given the long-term population decline and that less than 50% of sage-grouse are expected to nest within the limitation area, is insufficient to reverse the population decline. Moynahan and Lindberg (2004) like WAFWA (Connelly et al. 2000), recommend increasing the protective distance around sage-grouse leks. The BLM and University of Montana are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Thus far, this research suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008). Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007).

Walker et al, 2007 indicates the size of a no-development buffer sufficient to protect leks would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Also, rather than limiting mitigation to only timing restrictions, research suggests more effective mitigation strategies include, at a minimum, burying power lines (Connelly et al. 2000 b); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007).

The multi-state recommendations presented to the WGFD for identification of core sage grouse areas acknowledges there may be times when development in important sage grouse breeding, summer, and winter habitats cannot be avoided. In those instances they recommend, "…infrastructure should be minimized and the area should be managed in a manner that effectively conserves sagebrush habitats (State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development 2008).

4.2.5.2.7. Sharp-tailed Grouse Direct and Indirect Effects

Effects similar to sage-grouse.

4.2.5.2.8. Mountain Plover Direct and Indirect Effects

Suitable mountain plover habitat is present within the project area. The project may impact mountain plovers or their habitat. Refer to Section 4.2.5.2.1 (Black-tailed Prairie Dog Direct and Indirect Effects) for a discussion of impacts.

Mineral development has mixed effects on mountain plovers. Disturbed ground, such as buried pipeline

corridors and roads, may be attractive to plovers, while human activities within one-quarter mile may be disruptive. To reduce impacts to nesting mountain plovers, the BLM BFO requires a 0.25 mile timing limitation for potential nesting habitat prior to nest survey completion and a 0.25 mile timing limitation for all occupied nesting habitat for the entire nesting season.

Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. Limiting travel speed to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows mountain plovers sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest likely would still be destroyed. Overhead power lines provide perch sites for raptors that could result in increased mountain plover predation. CBNG infrastructure such as well houses, compressor stations, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

Mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat when loss or alteration of their natural breeding habitat (predominately prairie dog colonies) occurs, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there, lay eggs and hatch chicks; however, the young may not reach fledging age due to the poor quality of the habitat. Recent analysis of the USWFS Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf and Rupert 1995). An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.2.9. Swift Fox Direct and Indirect Effects

Suitable swift fox habitat is present within the project area. The project may impact swift foxes or their habitat. Refer to Section 4.2.5.2.1 (Black-tailed Prairie Dog Direct and Indirect Effects) for a discussion of impacts.

The construction of well pads, roads, pipelines and reservoirs causes direct habitat loss (i.e. loss of prairie dogs and prairie dog burrows). During construction of these facilities, there is the possibility that swift foxes may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and is likely to cause an increase in swift fox mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover. Mineral related traffic on the adjacent roads may result in swift fox road mortalities.

The BLM BFO has very little data on swift fox occurrence within the PRB associated with oil and gas PODs. The TBNG in Campbell County, WY whom cooperated with the BLM in the creation of the 2003 PRB EIS, has applied a standard condition to oil and gas activities in association with swift fox dens. Therefore, in order to adequately protect the species, the BLM BFO incorporated the following condition from the TBNG Land Resource Management Plan into this project: “To reduce disturbances to swift fox during the breeding and whelping seasons, prohibit the following activities within 0.25 miles of their dens from March 1 to August 31: Construction (e.g. roads, water impoundments, oil and gas facilities), reclamation, gravel mining operations, drilling of water wells, and oil and gas drilling.” This timing restriction, based on the best available science, will reduce direct impacts to swift foxes within the project area.

4.2.5.3. Sensitive Species Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River and Antelope Creek watersheds, and a commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in close consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategy.

The water management strategy involves the following infrastructure and strategy: 19 existing and 11 proposed discharge points with 13 existing and 1 proposed stock water reservoirs within the Upper Powder River watershed and 3 existing discharge points with 3 existing stock water reservoirs within the Upper Cheyenne River watershed.

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

The maximum water production is predicted to be 29.0 gpm per well or 1450.0 gpm (3.2 cfs or 2334 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 147,481 acre-feet in 2008 (maximum production was expected in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells, if all production were discharged to this watershed, is less than 2% of the total volume predicted for 2008. For the Antelope Creek drainage, the projected volume produced within the watershed area was 12,613 acre-feet in 2008 (maximum production was expected in 2004 at 17,685 acre-feet). As such, the volume of water resulting from the production of these wells, if all production were discharged to this watershed, is less than 19% of the total volume predicted for 2008.

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 and 28% in the Antelope Creek drainage (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 540 gpm would infiltrate at or near the discharge points and impoundments (950 acre feet per year) in the Powder River watershed. In the Antelope Creek drainage, only 406 gpm would infiltrate at or near the discharge points and impoundments (650 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.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 0 to 1200 feet below the ground surface compared to 1200-1600 feet to the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells. New data, however, suggests that the "circle of influence" may be much greater than the predicted ½ mile (anecdotal communication with Anadarko personnel).

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 analyses submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD boundary. The well will be capable of being sampled at the wellhead. A sample will be collected at the wellhead for analysis within sixty days of initial production. A copy of the water analysis will be submitted to the BLM Authorizing Officer.

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and was revised as the

"Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved in June, 2006. The Wyoming DEQ established an Impoundment Task Force which drafted an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments began in the spring of 2006.

Approximately 1774 impoundment sites have been investigated with over 1988 borings as of April, 2008. Of those impoundments, 259 met the criteria to provide compliance monitoring data if constructed and used for CBNG water containment. Only 109 monitored impoundments are currently in use. As of the 1st quarter 2008, only 16 monitored impoundments exceed groundwater class of use limits (Fischer, 2008). The BLM requires that operators comply with the DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. Pollutant constituent limits found in the POD's representative water sample are also listed. Pollutant constituent limits detailed in the WYPDES permits are listed on pages 78 and 79 below.

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 –			
Powder River		2	1000
Cheyenne River		10	2000
Least Restrictive Proposed Limit			
Powder River		10	3200
Cheyenne River		10	2500
Upper Powder River at Arvada, Wyoming			
Historic Data Average at Maximum Flow		4.76	1797
Historic Data Average at Minimum Flow		7.83	3400

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Antelope Creek near Teckla, Wyoming			
Historic Data Average at Maximum Flow		2.82	1800
Historic Data Average at Minimum Flow		2.60	2354
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		
WYPDES Permit Pollutant Constituent Limits See pages 78 and 79 below			
Predicted Produced Water Quality			
Big George	NP**	5.1-6.6	1700-2510

NP = Not Provided

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 TDS of the expected water quality for this POD was not provided. Therefore, no determination can be made concerning the "suitability" of the produced water for irrigation. However direct land application is not included in this proposal. The Kokanee POD, some of whose water management strategy is included in this plan, did include land application and it was analyzed and accepted, with proper safeguards.

The quality for the water produced from the Big George coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 29.0 gallons per minute (gpm) is expected to be produced from these 50 wells, for a total of 1450.0 gpm for the POD. See Table 4.5.

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

There are 11 proposed and 22 existing discharge points for this project. For the most part, they have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 15 impoundments (240 acre-feet) have been or would potentially be constructed within the project area. These impoundments will disturb a total of approximately 85 acres including the dam structures. All are on-channel impoundments. Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

Produced water can also be pumped over the divide into the Cheyenne River watershed. This will occur when Powder River watershed facilities (reservoirs) are full and cannot handle additional produced water. Water could also be pumped over the divide if the landowner decides that the three reservoirs on that side need additional flow to facilitate his livestock operations.

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 0.5 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from water storage. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian

species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as the impoundments are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 50 wells is anticipated to be a total of 1450.0 gpm or 3.2 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in tributaries to Powder River from this action (0.5 cfs) may add a maximum 0.4 cfs to the Upper Powder River flows, or 0.6% of the predicted total CBNG produced water contribution.

Alternative (2A) also states that the peak production of water discharged to the surface in the Antelope Creek drainage will occur in 2004 at a total contribution of 13 cfs (PRB FEIS pg 4-82). The predicted maximum discharge rate from these 50 wells is anticipated to be a total of 1450.0 gpm or 3.2 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment within the three reservoirs in the Fink Prong of Antelope Creek, the produced water re-surfacing in Fink Prong from this action (0.5 cfs) may add a maximum 0.4 cfs to Antelope Creek flows, or 3% of the predicted total CBNG produced water contribution.

These incremental flow rates are below the measurement capabilities for flows in surface streams without specialized equipment (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided a very limited analysis of the potential development in the watershed above the project area (WMP pages 2-3). However, as this POD is located along the divide between the Powder, Cheyenne and Belle Fourche rivers, and since the spacing of these wells has been maximized, it is reasonable to assume that no additional wells will be drilled "upstream" of this development area. The BLM agrees with the operator that the maximum flow rate of 1450 gpm is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 3 cfs, is much less than the volume of runoff estimated from the 2-year storm event for Davis, Collins, BT-2, Zephyr and BT-3 draws.

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

The operator has obtained several Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of water produced from this project from the WDEQ. Permit effluent limits are listed below for each permit:

WY0054259 Discharge to Collins Draw	Daily Max at the outfall
Chlorides, mg/l	150
Dissolved Iron, µg/l	1000
pH, standard units	6.5 - 9.0
Specific Conductance µS/cm	2800
SAR, calculated as unadjusted ratio	17
Total Recoverable Arsenic, µg/l	8.4
Total Recoverable Barium, µg/l	1800
Total Flow, Million Gallons per Day	0.57

WY0053911 Discharge to Dry Fork Powder River	Daily Max at the outfall
Chlorides, mg/l	150
Dissolved Iron, µg/l	1000
pH, standard units	6.5 - 9.0
Specific Conductance µS/cm	3570
Total Recoverable Arsenic, µg/l	8.4
Total Recoverable Barium, µg/l	1800

WY0040649 Discharge to Davis Draw	Daily Max at the outfall
Chlorides, mg/l	150
Dissolved Iron, µg/l	1000
pH, standard units	6.5 - 9.0
Specific Conductance µS/cm	7500
Total Recoverable Arsenic, µg/l	7
Total Recoverable Barium, µg/l	1800
TDS mg/l	5000
Total Flow MGD	0.0542

WY0055905 Discharge to Artesian Draw	Daily Max at the outfall
Chlorides, mg/l	150
Dissolved Iron, µg/l	1000
pH, standard units	6.5 - 9.0
Specific Conductance µS/cm	7500
Total Recoverable Arsenic, µg/l	8.4
Total Recoverable Barium, µg/l	1800
Total Flow MGD	1.68

WY0055581 Discharge to Fink Prong Antelope Ck	Daily Max at the outfall
---	
Chlorides, mg/l	46
Dissolved Iron, µg/l	1000
pH, standard units	6.5 - 9.0
SAR	10
Specific Conductance µS/cm	2000
Total Recoverable Arsenic, µg/l	2.4
Total Recoverable Barium, µg/l	1800
Total Flow MGD	2.1

The WYPDES permits also address existing downstream concerns, such as irrigation use, in the COAs for the permits. The designated point of compliance identified for these permits is at the outfalls.

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

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

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

In-channel downstream impacts are addressed in the WMP for the "Pine Tree Brook Trout" POD prepared by WWC Engineering for Devon Energy Production Company, LP.

4.4.2.1. Surface Water Cumulative Effects

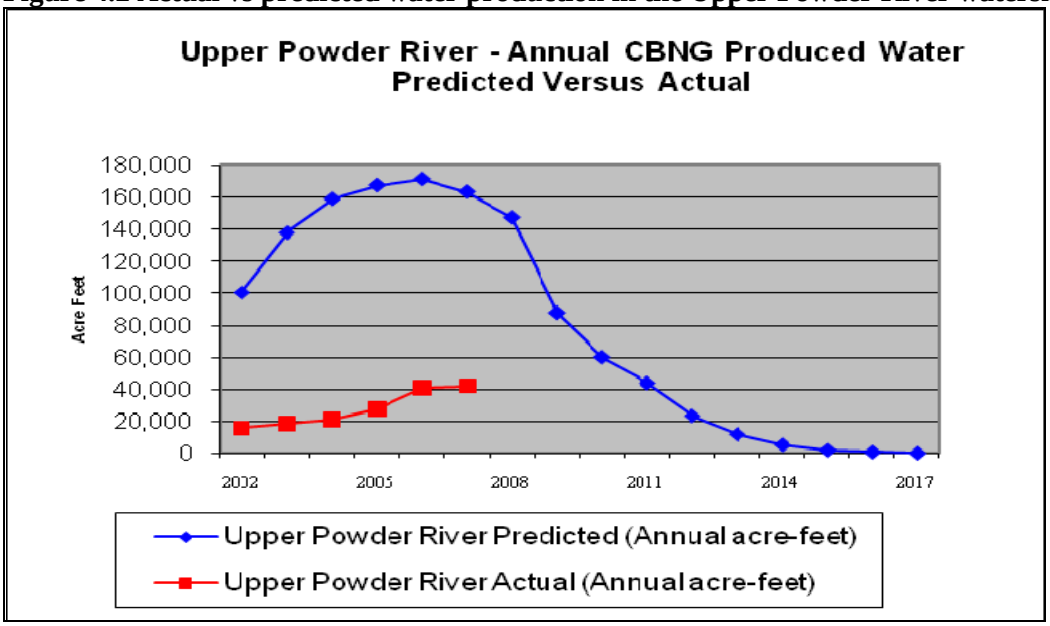
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River and Antelope Creek watersheds. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2007, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 19 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6 Actual vs predicted water production in the Upper Powder River watershed *2007 Data Update 3-08-08*

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	42,112	25.8	166,096	18.5
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				
Total	**1,285,233**		**166,096**			

Figure 4.2 Actual vs predicted water production in the Upper Powder River watershed



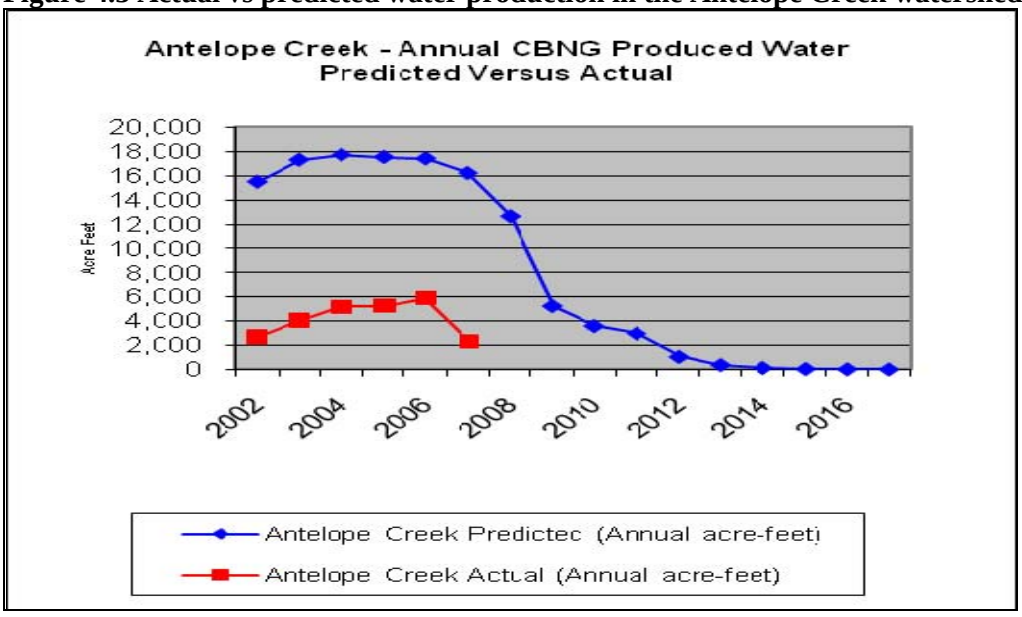
As of December 2007, all producing CBNG wells in the Antelope Creek watershed have discharged a cumulative volume of 25,321 acre-ft of water compared to the predicted 101,484 acre-ft disclosed in the

PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.2 and Table 4.7 following. This volume is 25 % of the total predicted produced water analyzed in the PRB FEIS for the Antelope Creek watershed.

Table 4.7 Actual vs predicted water production in the Antelope Creek watershed *2007 Data Update 3-08-08*

Year	Antelope Creek Predicted (Annual acre-feet)	Antelope Creek Predicted (Cumulative acre-feet from 2002)	Antelope Creek Actual (Annual acre-feet)		Antelope Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	15,460	15,460	2,668	17.3	2,668	17.3
2003	17,271	32,731	4,042	23.4	6,710	20.5
2004	17,685	50,416	5,181	29.3	11,891	23.6
2005	17,503	67,919	5,234	29.9	17,125	25.2
2006	17,385	85,304	5,869	33.8	22,994	27.0
2007	16,180	101,484	2,327	14.4	25,321	25.0
2008	12,613	114,097				
2009	5,226	119,323				
2010	3,574	122,897				
2011	2,956	125,853				
2012	1,041	126,894				
2013	363	127,257				
2014	124	127,381				
2015	40	127,421				
2016	13	127,434				
2017	**3**	**127,437**				
Total	**127,437**		**25,321**			

Figure 4.3 Actual vs predicted water production in the Antelope Creek watershed



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

The PRB FEIS states that "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim MOC (Memorandum of Cooperation) that the two DEQs (Wyoming and Montana 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 instream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117) However, this MOC expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR. Therefore the Wyoming DEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Litigation between Wyoming and Montana which was entered into after issuing the PRB FEIS ROD will now determine the water quality and quantity parameters which will be applied to CBNG produced water disposal into waters flowing from Wyoming into Montana.

Water produced in the Belle Fourche and Cheyenne River watersheds tends to be of higher quality than water produced in the Powder River watershed. As long as "End of Pipe" limits are met, there are no restrictions on the "Trans-basin diversion" of groundwater.

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 19% of that total (see section 4.4.2.1). In the Antelope Creek watershed, the proportion of actual amount of cumulatively produced water and the total amount predicted is 25%.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

Non eligible sites 48CA6707, 48CA6709, 48CA6862, 48CA6867, 48CA6932 and 48CA6924 will be impacted by the proposed project. No contributing portions of eligible sites 48CA264 (Bozeman Trail), 48CA1568 (Deadwood Road) and 48CA5494 (Ft. Fetterman to Ft. McKinney Telegraph Line) will be physically impacted. No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 9/17/08 that no historic properties exist within

the APE.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brad Rogers	Wildlife Biologist	US Fish & Widlife Service	Yes
Scot Covington	Wildlife Biologist	US Fish & Wildlife Service	Yes
Mary Hopkins	Interim Wyoming 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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