

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

**Williams Production RMT Co
West Bullwhacker**

ENVIRONMENTAL ASSESSMENT –WY-070-07-104

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Williams Production RMT Co’s West Bullwhacker Coal Bed Natural Gas (CBNG) POD comprised of the following 38 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	W Bullwhacker Bausch	32-1	SWNE	1	43N	78W	WYW146856
2	W Bullwhacker Bausch	34-1	SWSE	1	43N	78W	WYW146856
3	W Bullwhacker Bausch	41-1	NENE	1	43N	78W	WYW146856
4	W Bullwhacker Bausch	43-1	NESE	1	43N	78W	WYW146856
5	W Bullwhacker Bausch	41-12	NENE	12	43N	78W	WYW146856
6	W Bullwhacker BCU	12-6*	SWNW	6	43N	77W	WYW146834
7	W Bullwhacker Dry Fork	12-1	SWNW	1	43N	78W	WYW146856
8	W Bullwhacker Dry Fork	14-1	SWSW	1	43N	78W	WYW146856
9	W Bullwhacker Dry Fork	21-1	NENW	1	43N	78W	WYW146856
10	W Bullwhacker Dry Fork	23-1	NESW	1	43N	78W	WYW146856
11	W Bullwhacker Dry Fork	12-13	SWNW	13	43N	78W	WYW146858
12	W Bullwhacker Dry Fork	14-13	SWSW	13	43N	78W	WYW146858
13	W Bullwhacker Dry Fork	21-13	NENW	13	43N	78W	WYW146858
14	W Bullwhacker Dry Fork	23-13	NESW	13	43N	78W	WYW146858
15	W Bullwhacker Dry Fork	32-14	SWNE	14	43N	78W	WYW128635
16	W Bullwhacker Dry Fork	34-14	SWSE	14	43N	78W	WYW128635
17	W Bullwhacker Dry Fork	41-14	NENE	14	43N	78W	WYW128635
18	W Bullwhacker Dry Fork	43-14	NESE	14	43N	78W	WYW128635
19	W Bullwhacker Dry Fork	12-24	SWNW	24	43N	78W	WYW146859
20	W Bullwhacker Dry Fork	14-24	SWSW	24	43N	78W	WYW146859
21	W Bullwhacker Dry Fork	21-24	NENW	24	43N	78W	WYW146859
22	W Bullwhacker Dry Fork	23-24	NESW	24	43N	78W	WYW146859
23	W Bullwhacker Dry Fork	32-24	SWNE	24	43N	78W	WYW146859
24	W Bullwhacker Dry Fork	34-24	SWSE	24	43N	78W	WYW146859
25	W Bullwhacker Dry Fork	41-24	NENE	24	43N	78W	WYW146859
26	W Bullwhacker Dry Fork	43-24	NESE	24	43N	78W	WYW146859
27	W Bullwhacker Dry Fork	14-29	SWSW	29	44N	77W	WYW146847
28	W Bullwhacker Dry Fork	23-29	NESW	29	44N	77W	WYW146847
29	W Bullwhacker Dry Fork	32-31	SWNE	31	44N	77W	WYW146847
30	W Bullwhacker Dry Fork	41-31	NENE	31	44N	77W	WYW146847
31	W Bullwhacker Dry Fork	21-32	NENW	32	44N	77W	WYW146847
32	W Bullwhacker Dry Fork	12-32	SWNW	32	44N	77W	WYW146847
33	W Bullwhacker Federal	14-12	SWSW	12	43N	78W	WYW146856
34	W Bullwhacker Federal	21-12	NENW	12	43N	78W	WYW146856

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
35	W Bullwhacker Federal	23-12	NESW	12	43N	78W	WYW146856
36	W Bullwhacker Federal	12-12	SWNW	12	43N	78W	WYW146856
37	W Bullwhacker Federal	12-33	SWNW	33	44N	77W	WYW134240
38	W Bullwhacker Federal	21-33	NENW	33	44N	77W	WYW146847

The following impoundments were approved as part of the water management plan for this project:

	Impoundment Name / Number	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	42-5-4377	SENE	5	43	77	WYW146828
2	14-18-4377	SWSW	18	43	77	
3	23-1-4378	NESW	1	43	78	WYW146856
4	14-1-4378	SWSW	1	43	78	WYW146856
5	41-11-4378	NENE	11	43	78	WYW128634
6	44-11-4378	SESE	11	43	78	
7	34-11-4378	SWSE	11	43	78	
8	21-13-4378	NENW	13	43	78	WYW146858
9	23-13-4378	NESW	13	43	78	WYW146858
10	31-13-4378	NWNE	13	43	78	
11	11-13-4378	NWNW	13	43	78	WYW146858
12	33-13-4378	NWSE	13	43	78	
13	33-14-4378	NWSE	14	43	78	WYW128635
14	33-24-4378	NWSE	24	43	78	WYW146859
15	32-24-4378	SWNE	24	43	78	WYW146859
16	21-24-4378	NENW	24	43	78	WYW146859
17	22-25-4378	SENE	25	43	78	WYW137111
18	Spore	SWSE	29	43	78	
19	43-32-4477	NESE	32	44	77	
20	21-32-4477	NENW	32	44	77	WYW146847
21	33-32-4477A	NWSE	32	44	77	WYW134240
22	33-32-4477B	NWSE	32	44	77	
23	13-32-4477	NWSW	32	44	77	
24	12-32-4477	SWNW	32	44	77	WYW146847
25	44-31-4477	SWSW	32	44	77	

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

ROW Grant	Type	Sections	TWP/RNG
WYW-169781	Gas pipeline.	Section 33: Lot 4 Section 12 SW	T. 44 N., R. 77 W. T. 43 N., R. 78 W.
WYW-169782	Access road, water pipeline and buried power line	Section 6: Lots 8-10 NWSE Section 33: Lot 4, Section 12: SWNW,SW	T. 43N., R. 77 W. T. 44 N., R. 77 W. T. 43 N., R. 78 W.
WYW-169761	Reservoir	Section 33: Lot 12	T. 44 N., R. 77 W.

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
 Williams Production RMT Co
 West Bullwhacker
 PLAN OF DEVELOPMENT
 WY-070-07-104**

INTRODUCTION

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

1. PURPOSE AND NEED

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Williams Production RMT Company’s West Bullwhacker Plan of Development (POD) for 38 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 38 wells proposed within this POD, as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	W Bullwhacker Bausch	32-1	SWNE	1	43N	78W	WYW146856

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
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36	W Bullwhacker Federal	12-12	SWNW	12	43N	78W	WYW146856
37	W Bullwhacker Federal	12-33	SWNW	33	44N	77W	WYW134240
38	W Bullwhacker Federal	21-33	NENW	33	44N	77W	WYW146847

The following impoundments were proposed as part of the water management plan for this project:

	Impoundment Name / Number	Qtr/Qtr	Sec	TWP	RNG	Lease #
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2	14-18-4377	SWSW	18	43	77	

	Impoundment Name / Number	Qtr/Qtr	Sec	TWP	RNG	Lease #
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4	14-1-4378	SWSW	1	43	78	WYW146856
5	41-11-4378	NENE	11	43	78	WYW128634
6	44-11-4378	SESE	11	43	78	
7	34-11-4378	SWSE	11	43	78	
8	21-13-4378	NENW	13	43	78	WYW146858
9	23-13-4378	NESW	13	43	78	WYW146858
10	31-13-4378	NWNE	13	43	78	
11	11-13-4378	NWNW	13	43	78	WYW146858
12	33-13-4378	NWSE	13	43	78	
13	33-14-4378	NWSE	14	43	78	WYW128635
14	33-24-4378	NWSE	24	43	78	WYW146859
15	32-24-4378	SWNE	24	43	78	WYW146859
16	21-24-4378	NENW	24	43	78	WYW146859
17	22-25-4378	SENE	25	43	78	WYW137111
18	Spore	SWSE	29	43	78	
19	43-32-4477	NESE	32	44	77	
20	21-32-4477	NENW	32	44	77	WYW146847
21	33-32-4477A	NWSE	32	44	77	WYW134240
22	33-32-4477B	NWSE	32	44	77	
23	13-32-4477	NWSW	32	44	77	
24	12-32-4477	SWNW	32	44	77	WYW146847
25	44-31-4477	SWSW	32	44	77	

County: Johnson

Applicant: Williams Production RMT Co

Surface Owners: Dry Fork Land and Livestock, Brian W. Bausch

Project Description: The proposed action involves the following:

- Drilling of 1 CBNG well to the Big George coal zone, to an approximate depth of 1280 feet and drilling 37 CBNG wells in Lower Big George coal zones to depths of approximately 1344 to 1565 feet. These are single wells, vertically drilled, targeting single coal formations.
- APDs are valid for two years, the project should be completed within that time frame.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy within the Upper Powder River watershed: 20 discharge points and 25 stock water reservoirs that will initially contain approximately half of the CBNG discharge water from this project, while the rest will overflow into downstream channels to be to infiltrate into groundwater reservoirs and evaporate.

- An unimproved and improved road network.
- A buried gas, water and power line network, and 5 central gathering/metering facilities.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to reduce potential impacts to natural resources. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or minimize 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 West Bullwhacker POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. Williams moved the 21-33 location approximately 80 feet, outside of the prairie dog town.
2. The access road 21-33 was also re-staked to the east about 300’ up and around a knoll to keep the road out of sight of the Bozeman Trail.
3. Williams relocated the 14-29 location due to the proximity a raptor nest identified on the map from the wildlife database. The best location on the ground was 580 feet to the southeast of the original well site
4. A spot upgrade was added to the access road to the 34-14 location to mitigate erosion.
5. To reduce surface disturbance, an access road coming in from the west boundary of the POD to the 12-12 location was eliminated. Williams agreed that all access roads will come in from the 14-12 location, leaving a reclaimable utility corridor heading to their pod building.

6. Due to topography Williams put in a southeastern arc on the pipeline running from the 23-1 to the 14-1 locations.
7. The 23-12 location is within 2 miles of an active sage grouse lek. Brush hogging will be minimized around the 23-12 location to help conserve sagebrush habitat.
8. Due to the proximity of a nearby drainage, Williams will keep a 20' vegetated border between the edge of disturbance and drainage on the 41-31 location.
9. Due to the topography, the access to the 34-24 location was moved south of an existing access. To help mitigate surface disturbance, this old two track along with two other existing two track roads will be reclaimed; one near the 12-24, and another to northwest of the 31-14 location.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed 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. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

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.

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. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.
4. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
6. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.
7. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.
8. 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.

2.3.2.5. Threatened, Endangered, or Sensitive Species

2.3.2.5.1. Bald Eagle

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

5. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).
6. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.5.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.
2. If any black-footed ferrets are located, the USFWS will be consulted. Absolutely no disturbance will be allowed within prairie dog colonies inhabited by black-footed ferrets.
3. Additional mitigation measure may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to black-footed ferrets or their habitat. In the event that a mountain plover is located during construction or operation, the USFWS' Wyoming Field Office (307-772-2374) and the USFWS' Law Enforcement Office (307-261-6365) will be notified within 24 hours.

2.3.2.5.3. Mountain Plover

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

2.3.2.5.4. Ute Ladies'-tresses Orchid

1. Suitable habitat will be avoided wherever possible.
2. If suitable habitat for Ute ladies'-tresses cannot be avoided, surveys will be conducted in compliance with USFWS standards (USFWS 1995) by a BLM approved biologist or botanist. Surveys can only be conducted between July 20 and August 31.
3. 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.
4. Companies operating in areas identified with weed infestations or suitable Ute ladies'-tresses orchid habitat will be required to submit an integrated pest management plan prior to APD approval. Mitigation will be determined on a site-specific basis and may include such measures as spraying herbicides prior to entering areas and washing vehicles before leaving infested areas. Infestation areas

of noxious weeds have been identified through the county Weed and Pest Districts and are available at the Buffalo BLM office.

2.3.2.6. Visual Resources

1. The Companies will mount lights at 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.

2.3.2.7. Noise

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

2.3.2.8. Air Quality

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

2.3.3. Site specific mitigation measures

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

Surface Mitigation

1. Due to the placing the well location within 2 miles of an active sage grouse lek, the 23-12 location the area of brush hogging will be minimized to help conserve sagebrush habitat.
2. Williams will keep a 20' vegetated border between the edge of disturbance and nearby drainage at the 41-31 location.
3. To help mitigate surface disturbance, Williams will reclaim three existing two tracks; one near the 12-24, another north of the 34-24 and a third to northwest of the 31-14 location.
4. Scotch Thistle was present in a number of areas. The operator is responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance associated with this project (well locations, roads, water management facilities, etc.). Due to increased traffic affiliated with CBNG development, Williams will provide a Pesticide Use Permit for chemical treatment of weeds on BLM surface and will conduct continuing field inspections to provide effective treatment and control the spread of noxious weeds.
5. 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." To blend with soil, the color selected for the West Bullwhacker POD is Carlsbad Canyon, 2.5Y 6/2.
6. 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:

Clayey Soil Seed Mix at the following locations:

21-12, 14-13, 12-24, 12-12, 32-1, 34-1, 43-1, 21-1, 23-1, 12-6, 34-14, 21-32, 12-1, 41-12, 14-12, 12-13, 21-13, 23-13, 32-14, 41-14, 32-31, 41-31, 12-32, 41-1, 23-29

Clayey Ecological Site Seed Mix		
Species	% in Mix	Lbs PLS*
<i>Western Wheatgrass</i> (<i>Pascopyrum smithii</i>)	35	4.2
<i>Green needlegrass</i> (<i>Nassella viridula</i>)	30	4.8
<i>Slender Wheatgrass</i> (<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>)	20	1.2
<i>Prairie coneflower</i> (<i>Ratibida columnifera</i>)	5	0.6
<i>White or purple prairie clover</i> (<i>Dalea candidum</i> , <i>purpureum</i>)	5	0.6
<i>Rocky Mountain beeplant</i> (<i>Cleome serrulata</i>)/or <i>American vetch</i> (<i>Vicia americana</i>)	5	0.6
Totals	100%	12 lbs/acre

A Loamy Soils Seed Mix on all other locations in the West Bullwhacker POD:

Loamy Ecological Site Seed Mix		
Species	% in Mix	Lbs PLS*
<i>Western Wheatgrass</i> (<i>Pascopyrum smithii</i>)/or <i>Thickspike Wheatgrass</i> (<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>)	30	3.6
<i>Bluebunch Wheatgrass</i> (<i>Pseudoroegneria spicata</i> ssp. <i>Spicata</i>)	10	1.2
<i>Green needlegrass</i> (<i>Nassella viridula</i>)	25	3.0
<i>Slender Wheatgrass</i> (<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>)	20	2.4
<i>Prairie coneflower</i> (<i>Ratibida columnifera</i>)	5	0.6
<i>White or purple prairie clover</i> (<i>Dalea candidum</i> , <i>purpureum</i>)	5	0.6
<i>Rocky Mountain beeplant</i> (<i>Cleome serrulata</i>) /or <i>American vetch</i> (<i>Vicia americana</i>)	5	0.6
Totals	100%	12 lbs/acre

7. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following Reclamation Standards:
 1. The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 2. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 3. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 4. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

Civil Engineering

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

<u>Grade</u>	<u>Drainage Spacing</u>
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-16%	150 ft
2. The operator is responsible for having the licensed professional engineer(s) certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
3. Provide 4” of aggregate where grades exceed 8%.

Cultural mitigation

1. All earth moving activity in the following areas will be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits. The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of all monitoring work. All monitored areas must be plotted on a map provided with the monitoring report.
 - a. Excavation of the pit associated with the 43-14 well (due to it’s proximity to site 48CA946).
 - b. All earth moving activity associated with the construction of the 14-29 well and its associated access and utility corridor (due to alluvial deposits within Dry Fork Powder River). It is noted that some portions of this monitoring area may be outside the alluvial deposits within the creek bottom, the exact areas to be monitored are left to the discretion of the archeological monitor.

- c. All earth moving activity associated with the construction of the POD building in T 44N R 77W Section 32 NWNE (due to alluvial deposits within Dry Fork Powder River).
- d. All earth moving activity associated with the construction of the access and utility corridor between the POD building in T 44N R 77W Section 32 NWNE and the east end of the utility corridor and access for the 43-14 well (due to alluvial deposits within Dry Fork Powder River).
- e. All earth moving activity associated with the construction of the portion of the access and utility corridor between the 23-29 well and the POD building in T 44N R 77W Section 32 NWNE that is in the alluvial terrace of the Dry Fork Powder River. It is noted that the northwest 1/2 of this monitoring area may be outside the alluvial deposits within the creek bottom, the exact areas to be monitored are left to the discretion of the archeological monitor.

Wildlife Protective Measures

- 1. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, “The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time” (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Williams will coordinate with the BLM to determine if additional resurveys will be required.
- 2. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
- 3. No surface disturbing activities are permitted in suitable mountain plover habitat from March 15-July 31 annually, unless a mountain plover survey has been conducted during the current breeding season. **This timing limitation will affect the “Entire project area”.** This condition will be implemented on an annual basis for the duration of surface disturbing activities. The surveys will be conducted in suitable habitat (i.e. prairie dog colonies, roads, pipelines, reservoirs under construction and any short grass prairie area) throughout the entire project area.
 - a. Mountain plover surveys shall be conducted by a biologist following the most current U.S. Fish and Wildlife Service 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.
 - b. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15). **This timing limitation will affect the following wells for the 2007 breeding season (only 2 surveys have been done). However, if the final mountain plover survey shows more mountain plover observations, then this timing limitation will be amended to reflect the new locations.**

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
T44N R77W	31	Wells 42-31, 41-31, 32-31 and their associated infrastructure
T43N R77W	6	All of Section 6
T43N R77W	7	Main access road in the western ½ of Section 7.
T43N R78W	1	All of Section 1
T43N R78W	2	All of Section 2
T43N R78W	11	34-11 and 41-11 reservoirs and their associated

infrastructure		
T43N R78W	12	Wells 14-12, 23-12, 12-12, 21-12, 41-12 and their associated infrastructure.
T43N R78W	13	Wells 12-13, 14-13, 23-13, 31-13 and their associated infrastructure; 21-13 and 23-13 reservoirs.
T43N R78W	14	Wells 31-14, 32-14, 43-14, 41-14 and their associated infrastructure; 34-11 reservoir.
T43N R78W	23	Discharge point 44-23
T43N, R78W	24	Well 21-24 and infrastructure

4. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
T44N, R77W	31	41-31 well and infrastructure; 32-31 well and infrastructure; buried powerline from 41-31 well to 12-32; roads/pipelines from 41-31 well to 21-32 well; 44-31 reservoir.
T44N, R77W	33	21-33 well and infrastructure; 12-33 well and infrastructure.
T44N R77W	32	21-32 reservoir; main infrastructure in the northern half of Section 32; buried powerline running from north to south through the middle of Section 32; 21-32 well and infrastructure; Wells 12-32A & B and infrastructure; wells 33-32A&B and infrastructure; 12-32 reservoir; 13-32 reservoir and 44-31 reservoir
T43N R77W	6	12-6 well and infrastructure; access road from BCU 43-6 well to 12-6 well.

- a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
- b. Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. Nests to be checked are within a ½ mile or less of the proposed development. The nests are listed below:

BLM ID #	UTM N	UTM E	Legal
3776	4844560	407132	T44N, R77W, NW Sec 31
New	4843814	409196	T44N, R77W, SESE Sec 6

New	4843814	409196	T44N, R77W, SESE Sec32
3770	4844530	407135	T44N, R77W, NW Sec 31
New	4843446	407051	T44N, R77W, SE Sec 31

- c. 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 and timing limitations will be applied.
 - d. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.
5. No surface disturbing activities are permitted within 2 miles of the following leks: Rhodes, Rhodes 2, East Holler, Mengal, Beecher Draw North and Beecher Draw, between March 1 and June 15, prior to completion of a greater sage-grouse lek survey. This timing limitation will affect the following wells and infrastructure:

Township/Range	Section	Affected Wells and Infrastructure
T44N, R77W	29	All of Section 29
T44N, R77W	31	All of section 31
T44N, R77W	32	21-32 well and infrastructure; 12-32 well and infrastructure; 21-32 reservoir; 12-32A&B wells and infrastructure
T44N, R77W	33	21-33 well and infrastructure; 12-33 well and infrastructure.
T43N, R78W	1	All of Section 1
T43N, R77W	6	All of Section 6
T43N, R78W	11	All of Section 11
T43N, R78W	12	All of Section 12
T43N, R77W	7	Proposed resource running north and south through the western half of Section 7; proposed buried power and water lines that run east and west through the middle of Section 7.
T43N, R78W	14	332-14 well and infrastructure; access road from the 32-14 well to the 41-14 well.
T43N, R78W	13	11-13 reservoir; access road from the 41-14 well to 12-13 well; 21-13 reservoir; 21-13 well and infrastructure.
T43N, R78W	23	All of Section 23
T43N, R78W	24	14-24 well and infrastructure
T43N, R78W	25	22-25 reservoir and infrastructure

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

survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

- b. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse and sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
6. If a sharp-tailed grouse lek is identified during the survey, the 0.67 mile timing restriction (March 1 to June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the buffer until the following breeding season. The required survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
7. No surface disturbing activity shall occur within 1 mile of bald eagle roosting habitat from November 1 through April 1, annually, prior to a bald eagle roost survey (CM9). No surface disturbing activity shall occur within 1 mile of bald eagle nesting habitat from February 1 through August 15 (CM8) prior to a bald eagle nest survey. This condition will be implemented on annual basis for the duration of the surface disturbing activities. **This timing limitation will affect the following wells and infrastructure:**

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
T44N, R77W	29	All of Section 29
T44N, R77W	31	All of Section 31
T44N, R77W	32	All of Section 32
T44, R77W	33	All of Section 33

- a. If bald eagles are observed using the area on a consistent basis, all activity will stop and the 1 mile timing limitation will apply. “Consistent use” is defined as one or more bald eagles (adult or immature) using the same general area multiple times in the same year or in consecutive years. According to the BLM and Wyoming Game and Fish Department databases, bald eagles use area around the West Bullwacker project area on a regular basis for winter roosting and foraging.
 - b. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile and a seasonal (November 1 - April 1) minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites. Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
 - c. 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).
 - d. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.
8. No surface disturbing activities are permitted in suitable burrowing owl habitat (i.e. prairie dog colonies) from April 15 to August 31, annually, unless a burrowing owl survey has been conducted during the current breeding season. Survey period is April 15 to June 15. This

condition will be implemented on an annual basis for the duration of surface disturbing activities. **This timing limitation will affect all prairie dog colonies within project area.** The surveys will be conducted in active and inactive prairie dog colonies throughout the entire project area.

- a. If a burrowing owl is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between April 15 and August 31. If no burrowing owls are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season.
9. No surface disturbing activities are permitted in suitable swift fox habitat (i.e. prairie dog colonies) from March 1 to August 31, annually, unless a survey for swift foxes has been conducted during the current breeding season. Survey period is April 15 to June 15. This condition will be implemented on an annual basis for the duration of surface disturbing activities. **This timing limitation will affect all prairie dog colonies within the project area.** The surveys will be conducted in active and inactive prairie dog colonies throughout the entire project area.
- a. If a swift fox den is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 1 to 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).

2.4. Alternatives considered but not analyzed in detail

The following water management strategies were analyzed for this POD in addition to infiltration and containment reservoirs.

Direct Discharge

Direct discharge to tributaries of Wild Horse Creek is used as part of the water management strategy, but sole use of this strategy is not feasible because the amount of water produced would overwhelm the infiltration and evapotranspiration capacity of the downstream tributaries. Limits imposed by the WDEQ discharge permit for this POD specify that CBNG water may not reach the Powder River.

Re-injection

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

Land Application

Land application of produced water within the West Bullwacker POD has also been considered. Land application would involve applying the water to cropland at agronomic rates through an irrigation system. Land application is at best a seasonal approach and would require the construction of several reservoirs to store produced water during the non-irrigation season. Due to the high construction and operating costs and lack of landowner interest, land application is not a primary strategy, but several sites are available and the landowner may consider using water from reservoirs for this purpose in the future.

Treatment of Produced Water

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

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 07/03/06. Field inspections of the proposed West Bullwhacker CBNG project were conducted on the following dates with listed attendees:

November 14 – Randee Jespersen - Williams; Jim Adams - Windmill; David Platt – Windmill; Guymen Easdale Wildlife Biologist-BLM; and Jennifer Spegon Natural Resource Specialist-BLM

January 16 – Kristine Mackey-Williams; Doug McAdams-Williams; Steve Hoserland Hydrologist-WWC, Chris Williams Hydrologist-BLM; Larry Gerard Wildlife Biologist-BLM; Lee Harrelson Civil Engineer-BLM; and Jennifer Spegon Natural Resource Specialist-BLM

January 30 – Randee Jespersen – Williams; Buck Damone Archeologist-BLM; and Jennifer Spegon Natural Resource Specialist-BLM.

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Guymen Easdale
Floodplains		X		Chris Williams
Wilderness Values		X		Jennifer Spegon
ACECs			X	Jennifer Spegon
Water Resources	X			Chris Williams

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Air Quality		X		Jennifer Spegon
Cultural or Historical Values		X		G.L. "Buck" Damone III
Prime or Unique Farmlands			X	Jennifer Spegon
Wild & Scenic Rivers			X	Jennifer Spegon
Wetland/Riparian		X		Chris Williams
Native American Religious Concerns			X	G.L. "Buck" Damone III
Hazardous Wastes or Solids		X		Jennifer Spegon
Invasive, Nonnative Species	X			Jennifer Spegon
Environmental Justice		X		Jennifer Spegon

3.1. Topographic Characteristics of Project Area

The West Bullwhacker POD is located in Johnson County, approximately 5 miles north of Linch, Wyoming in Township 43N, Range 78W sections 1, 11, 12, 13, 14, 23, and 24; Township 43N, Range 77W sections 5, 6, 7, 18, and 19; and Township 44N, Range 77W sections 29, 31, 32, and 33. Much of the surrounding area is currently being developed for CBNG production: the Jepson Draw I POD covers the area to north and east of this project, the Bullwhacker 3 POD is on the southeast, and the Big Bend PODs I, II, and III are located on the south and west sides of the West Bullwhacker POD. Livestock production and grazing is the predominant land use in the area.

Elevation in the area ranges in elevation from 4,450 to 4,700 feet above sea level. The Dry Fork of the Powder River runs to the north dissecting a portion of the development area. House Creek also drains to the north converging with the Dry Fork. These major drainages appear to be ephemeral, although portions of Dry Fork of the Powder may have intermittent flows. The West Bullwhacker POD area falls within a 10-14" precipitation zone, with most of the precipitation falling during late winter and spring. The topography varies from a rugged pine ridge complex in the south to flat rolling terrain in the main portion of the development area.

3.2. Vegetation & Soils

To determine the appropriate Ecological Sites for this proposed action, BLM specialists analyzed and field verified data from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) published soil survey Technical Guides. Technical Guides are the primary scientific references for the NRCS, they contain technical information about the conservation of soil, water, air, and related plant and animal resources.

The NRCS Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains in the 10-14" Northern Plains precipitation zone, was used for determining soils information for each Ecological site and to further determine resource identification and management recommendations. The ecological sites occurring within the proposed POD are found to be predominantly Clayey and Loamy Soils with Mixed Sagebrush/Grass Plant Communities.

Clayey Soils with Mixed Sagebrush/Grass Plant Community occurs at the following locations: 21-12, 14-13, 12-24, 12-12, 32-1, 34-1, 43-1, 21-1, 23-1, 12-6, 34-14, 21-32, 12-1, 41-12, 14-12, 12-13, 21-13, 23-13, 32-14, 41-14, 32-31, 41-31, 12-32, 41-1, 23-29. The landforms and the soils of the clayey ecological site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability and may develop severe cracks. The layers of a clayey soil having the most influence on plants vary from 4 to 8 inches thick. The main clayey soil limitations include low organic matter content and soil droughtiness. The low annual precipitation should be considered when planning a seeding. The clayey site occurs on nearly

level to 30% slopes.

Clayey sites in the West Bullwhacker project area are made up of a Mixed Sagebrush Plant Community. Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, this plant community is found under moderate, season-long grazing by livestock, in the absence of fire or brush control. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs.

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

Loamy Soils with a Mixed Sagebrush/Grass Plant Community appeared on all other locations. The soils of the loamy ecological site are deep to moderately deep (greater than 20" to bedrock), well drained & moderately permeable. Layers of the loamy soil most influential to the plant community varies from 3 to 6 inches thick. The main loamy soil limitations include low organic matter content and soil droughtiness. The low annual precipitation should be considered when planning a seeding. The loamy site occurs on gently undulating rolling land.

Loamy soil sites in the West Bullwhacker project area are made up of a Mixed Sagebrush Plant Community. Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush management. Wyoming big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs.

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

When compared to the Historic Climax Mixed Sagebrush/Grass Plant Community, field visits in the West Bullwhacker POD found the entire area had been heavily grazed, the sagebrush canopy was browsed off, and there was a considerable amount of bare soil. The entire area has been in a decade long drought. The lack of precipitation along with continuous grazing has created optimal conditions for numerous prairie dog towns.

This state is not stable. During field visits it was apparent the soil was not protected from wind erosion. The biotic integrity of this plant community is at risk. Due to the conditions such as drought and grazing a shift has occurred in plant composition toward weeds and bare ground. The watershed can become at risk when bare ground increases.

For more detailed soil information, see the NRCS Soil Survey WY619.

3.2.1. Wetlands/Riparian

Wetland vegetation is generally sparse in the area, with the exception of narrow riparian strips along channel reaches recently perennialized by CBNG discharge and reservoirs holding CBNG water. A few

cottonwood trees can be found on House Creek and stands of cottonwoods exist on Dry Fork Powder River.

3.2.2. Invasive Species

Scotch thistle was discovered during the field onsite and was verified by a search of inventory maps. In addition, the proposed project proponent also listed Scotch thistle as a potential threat, as well as noting musk thistle, buffalo burr, cocklebur, Canada thistle, salt cedar and wild licorice in their Integrated Pest Management Plan.

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 Wildlife Resources. Wildlife Resources performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006. On August 22, 2006 Wildlife Resources conducted a survey for Ute ladies-tresses orchids within the West Bullwhacker project area.

A BLM biologist conducted field visits on November 14, 2006 and January 16 -17, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.3.1. Big Game

Big game species expected to be within the West Bullwhacker project area include mule deer and pronghorn antelope. The project area is part of the Pumpkin Butte mule deer herd unit. The 2004 estimated population of this herd was 14,800 with a population objective of 11,000 (Wyoming Game and Fish Department 2004). The project area is part of the Pumpkin Butte pronghorn antelope herd unit. The 2004 population estimate for this herd was 27,109 animals with a herd objective of 18,000 (WGFD 2004). The population of each herd unit has been increasing since 1998. The Wyoming Game and Fish Department has designated 90% of the project area as winter-yearlong range and 10% yearlong range for mule deer; the entire project area has been designated as winter-yearlong range for pronghorn antelope. Populations for both species within their respective hunt areas are at or slightly above Wyoming Game Fish Department (WGFD) objectives.

Crucial Range is any particular seasonal range or habitat component, but describes that component which has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level. **Summer or Spring-Summer-Fall** use is when a population or portion of a population of animals uses the documented habitats within this range annually from the end of previous winter to the onset of persistent winter conditions. **Severe Winter Relief** is a documented survival range, which may or may not be considered a crucial range area as defined by crucial range. It is used to a great extent, only in occasionally extremely severe winters. It may lack habitat characteristics that would make it unattractive or capable of supporting major portions of the population during normal years but is used by and allows at least a significant portion of the population to survive the occasional extremely severe winter. **Winter** use is when a population or portion of a population of animals uses the documented

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

3.3.2. Aquatics

The Dry Fork of the Powder River dissects a portion of the project area, running from south to north. House Creek drains from south to north, converging with the Dry Fork of the Powder River. These major drainages appear to be ephemeral, although portions of Dry Fork of the Powder River may have intermittent flows. An occasional spring/seep occurs within the House Creek drainage located SESE Section 14, Township 43 North, Range 78 West. House Creek is a deeply incised ephemeral drainage with steep channel banks and is associated upland vegetation (Brown 2006). The West Bullwhacker project area is approximately five miles from the Powder River. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

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

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

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

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information

available for them.

3.3.3. Migratory Birds

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

3.3.4. Raptors

Nineteen raptor nest sites were identified by Wildlife Resources and BLM within 0.5 mile of the project area. Five nests were active in 2007.

Table 3.2. Documented raptor nests within the West Bullwhacker project area in 2007.

<i>BLM ID#</i>	<i>Species</i>	<i>UTM (NAD 83)</i>	<i>Legal location</i>	<i>Substrate</i>	<i>Condition</i>	<i>Status</i>
3776	GOEA	407132E 4844560N	T44N, R77W, NW Sec 31	CTL	Good	Active
3777	GOEA	409120E 4843840N	T44N, R77W, SE Sec 32	CTL	Good	Inactive
3778	GHOW	407832E 4844700N	T44N, R77W, NE Sec 31	Nest gone	Nest gone	Nest gone
New	BUOW	404060E 4835708N	T43N, R78W, NESE Sec 26	Prairie dog burrow	NA	Inactive
New	BUOW	405033E 4840328N	T43N, R78W, NESW Sec 12	Prairie dog burrow	NA	Inactive
New	BUOW	403536E 4836525N	T43N, R78W, NWNE Sec26	Prairie dog burrow	NA	Inactive
New	BUOW	406551E 4843404N	T43N, R77W, NESW Sec 6	Prairie dog burrow	NA	Inactive
New	BUOW	405033E 4840328N	T43N, R78W, NESW Sec12	Prairie dog burrow	NA	Inactive
2846	BUOW	407069E 4843925N	T44N, R77W, NWNE Sec31	Prairie dog burrow	NA	Inactive
New	GOEA	409196E 4843814N	T44N, R77W, SESE Sec32	CTL	Good	Active
New	RTHA	407206E 4841815N	T43N, R77W, SESE Sec6	CTL	Good	Active
3770	GOEA	407135E 4844530N	T44N, R77W, NW Sec31	CTL	Fair	Active
3771	UNK	407160E 4844520N	T44N, R77W, NW Sec31	CTL	Fair	Inactive
3772	UNK	407500E 4844520N	T44N, R77W, NE Sec 31	CTL	Fair	Inactive
3773	UNK	407400E 4844550N	T44N, R77W, NE Sec 31	CTL	Fair	Inactive
2843	UNK	407134E 4844120N	T44N, R77W, NE Sec 31	CTL	Fair	Inactive
New	UNK	407051N 4843446N	T44N, R77W, SE Sec 31	CTL	Fair	Active
2834	GOEA	409747E 4843850N	T44N, R77W, SWSW Sec33	CTL	Nest Gone	Nest Gone
New	UNK	409842E 4843515N	T44N, R77W, SWSW Sec33	CTL	Poor	Inactive

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1000 acres of black-tailed prairie dog colony separated by no more than 1.5 kilometers for its survival (USFWS 1989).

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

Wildlife Resources identified seven active and densely populated prairie dog colonies within and adjacent to the West Bullwhacker project area. One large and continuous colony totaling 3,092 acres covers approximately 60% of the project area. The total acreage of the seven colonies is 4,417 acres. An additional 26 active and densely populated prairie dog colonies are within six miles of the project area. The total acreage of active prairie dog colonies within six miles of the project area equals 6,950 acres (Brown 2206). The colonies range in size from 10 to 3,092 acres and the average distance between the colonies is 0.65 miles (1.05 kilometers). The project area is located within the Midwest potential reintroduction area. Black-footed ferret habitat is present within and around the West Bullwhacker project area. A map of the prairie dog colonies within and adjacent to the West Bullwhacker project area is located in the project file.

The largest colony (3,092 acres) is located in western half of Section 6, the northwestern quarter of Section 7, Township 43 North, Range 77 West, the southern half of Section 1, the eastern half of Section 11, all of Section 12, the western 2/3 of Section 13, the eastern half of Section 14, the eastern half of Section 23, the western quarter of Section 24, Township 43 North, Range 78 West.

The second largest colony (621 acres) is located on and near the eastern boundary of the main project area. It covers the southeastern quarter of Section 8, the middle portion of Section 17, and the eastern half of Section 19, Township 43 North, Range 77 West.

On the southeast boundary of the main project area there is a colony 280 acres in size, it covers the eastern half of Section 30, Township 43 North, Range 77 West.

Within the northern portion of the project area there are four colonies and they range in size from 10 to 265 acres. The colony size and location is listed below:

Species	Legal Location Township, Range and Section	Size (acres)	Location to Project Area
Prairie dog town	Central portion of	265	Occurs within the project area.

	Sec 31, T44N, R77W		
Prairie dog town	Northeastern quarter of Sec 32, T 44N, R77W	53	Occurs within the project area.
Prairie dog town	Southeastern quarter Sec33, T44N, R77W and the northwest quarter Sec 3, T43N, R77W		Occurs adjacent to the project area.
Prairie dog town	Southwest quarter Sec 4, T43N, R77W	10	Occurs adjacent to the project area.

3.3.5.1.2. Bald eagle

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

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

Cottonwood forest habitat exists along the Dry Fork of the Powder River in the northern portion of the project area. Single cottonwood trees or small groups of trees (2-5 trees) exist within some of the drainages. Four large cottonwood trees occur at an existing reservoir in SESE quarter of Section 14, Township 43 North, Range 78 West. Approximately 2.5 miles south of the project area exists large stands of ponderosa pine trees, they are located in Sections 1, 2, 3, 4, 11, and 12, Township 42 North, Range 78 West (Brown 2006).

The project area has a reliable year round prey base in the form prairie dogs, sheep, lagomorphs (hares and rabbits), and waterfowl. Within and adjacent to the project area there are 4,417 acres of active and densely populated prairie colonies. During the onsite on November 14, 2006, flocks (10 to 20) of geese and ducks were observed at 2 existing reservoirs within the project area. With 25 proposed and 6 existing reservoirs there is the potential to have waterfowl in the project area year round. Within the project area the land owner raises sheep and cattle. According to the landowner, the sheep herd size using the project area ranges from 600 to 1,000 animals.

During the onsite conducted on November 14, 2006, two adult bald eagles flushed from a group of four cottonwood trees at an existing reservoir located in SESE quarter of Section 14, Township 43 North, Range 78 West. Refer to the map shown below for bald and golden eagle observations within and adjacent to the project area.

3.3.5.1.3. Ute’s Ladies Tresses Orchid

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

The Dry Fork of the Powder River dissects a portion of the project area, running from south to north. House Creek drains from south to north, converging with the Dry Fork of the Powder River. These major drainages appear to be ephemeral, although portions of Dry Fork of the Powder River may have intermittent flows. An occasional spring/seep occurs within the House Creek drainage located SESE Section 14, Township 43N, Range 78 West. House Creek is a deeply incised ephemeral drainage with steep channel banks and is associated with upland vegetation. The Dry Fork of the Powder River, House Creek and their tributaries are associated with dry upland vegetation and the soil has high alkaline deposits (Brown 2006). Ute ladies-tresses orchid habitat does not exist within the project area.

3.3.5.2. Sensitive Species

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

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

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

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.

Wildlife Resources identified two active swift fox dens within the West Bullwhacker project area during the 2006 wildlife surveys. One adult fox and 3 pups were observed at the den located in the NWNW of Section 30, Township 43N, Range 77 West, (UTMs 405900E, 4836450N) and two adult foxes and two pups were observed in the SWSE Section 19, Township 43 North, Range 77 West (UTMs 406670E, 4836733N). The first fox den is located approximately 0.5 miles from three large active prairie dog colonies, and the second den is located within an active prairie dog colony and is 0.3 miles from another

active prairie dog colony. The three prairie dog colonies associated with the two fox dens range in size from 280 to 3092 acres.

Since the 2007 wildlife survey has not yet been completed, swift fox occupation within the West Bullwhacker project area is unknown at this time.

3.3.5.2.1. Black-tailed prairie dog

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

The black-tailed prairie dog is a burrowing rodent that feeds primarily on grasses. The black-tailed prairie dog is the only species of prairie dog that is found on the short and mid-grass plains east of the Rockies. Black-tailed prairie dogs avoid areas with tall grass, heavy sagebrush and other thick vegetative cover which interfere with detection of predators (Krueger 1986, Clark and Stromberg 19987).

Early historical records suggest black-tailed prairie dogs may have been the most abundant mammals in North America at the time of the first Euro-American explorations of the west. Merriam calculated that prairie dogs occupied some 700 million acres of the West in the late 1800's (Cully 1989). Since the turn of the century, it is estimated that prairie dog numbers have been reduced 98-99% of their former numbers across the West (Miller 1994).

Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented, and isolated (Miller1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations and other problems that affect long term population viability (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994). An additional threat is posed by Sylvatic plague (Cully1989) which, combined with other human-caused mortality, may hasten the extirpation of the rodent from the Great Plains.

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. Mapping conducted by the Wyoming Game and Fish Department between 1982 and 1987 indicated a minimum of 131,000 acres of black-tailed prairie dog colonies with a maximum estimate of 204,000 acres. 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 all known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2005).

There are seven active densely populated prairie dog colonies within and adjacent to the West Bullwhacker project area. One large and continuous colony (3,092 acres) covers approximately 60% of the project area. The total acreage for the seven colonies is 4,417 acres. An additional 26 active and densely populated black-tailed prairie dog colonies are within six miles of the project area. The total acreage of active and densely populated prairie dog colonies within six miles of the project area equals 6,950 acres. The colonies range in size from 10 to 3,092 acres. A map of prairie dog colonies within and around the West Bullwhacker project area is located in the project file.

3.3.5.2.2. Greater sage-grouse

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

The core of the project area is within a large prairie dog complex. Much of the herbaceous/forb and shrub component within the prairie dog colony is limited, sagebrush is sparse (0 to 3% cover) and is less than ten inches tall and grass height is than six inches tall. However, within the project area there are small pockets of sagebrush 2 to 10 acres which are of moderate density (10-15 % cover), these pockets provide cover for nesting sage grouse. In areas outside of the prairie dog colony, the sagebrush canopy cover ranges from sparse (0-5% cover) to moderate (10-15% cover). Sparse sagebrush grassland landscape is dominated by grasses. Moderate sagebrush grassland has a canopy cover of 10-15%, and the sagebrush height ranges from 6-35 inches tall. Adjacent to the project area there exists large stands of moderate (10-15% cover) to dense (15-25% cover) stands of sage brush, thus providing nesting habitat.

Within prairie dog colonies insect density and diversity is much higher than in adjacent grasslands. Numerous draws exist within the project area, thus there is the potential for an increase in forb abundance and diversity. With an increase in forb and insect density and diversity, the area provides early and late brood rearing habitat for sage grouse.

The West Bullwhacker project area is close to four lek complexes. A lek complex is a group of leks in close proximity between which male sage grouse may be expected to interchange from one day to the next. Wyoming Game and Fish Department records identified nine sage grouse leks within 3.0 miles of the West Bullwhacker project area. These lek sites are identified below (Table 6).

Table 3.3 Sage-grouse leks surrounding the West Bullwhacker project area.

Lek Name	Legal Location	Status In 2007 (Peak Males)	Distance From Project Area
Beecher Draw	T43N, R77W NESW Sec2	4	2.1 miles
Bushwhacker Creek	T43N, R77W NESE Sec22	Unknown	3.3 miles
Beecher North	T44N, R77 NWNE Sec34	7	0.98 miles
Mengal	T44N, R77W SWNE Sec19	32	1.4 miles
Rhodes	T43N, R78W SENE Sec34	14	1.4 miles
Rhodes 2	T43N, R78W NESE Sec 35	29	1.2 miles
East Holler	T43N, R78W SWNE Sec2	4	0.3 miles
Garrett 2	T44N, R78W SWSW Sec 23	Unknown	2.3 miles
Garrett	T44N, R78W SESW Sec 27	Unknown	1.9 miles

3.3.5.2.3. Mountain plover

The mountain plover originated on the plains, nesting solely on arid, level terrain (0-5% slope) with short vegetation and plenty of bare ground-the kind of habitat typically found in prairie dog colonies. According to Dinsmore (1995-2000) more food exists on prairie dog colonies than on adjacent grasslands. Prairie dogs produce lots of feces, which attracts the insects plovers like to eat. Consequently, prairie dog colonies long ago became prime nesting grounds for mountain plovers. According to the U.S. Geological Survey, prairie dogs currently exist on less than one percent of their former range, and their

numbers have declined by 98 percent (Turbak 2004). Mountain plover numbers have declined-possibly from millions-to only about 10,000 birds today (Turbak 2004).

Once a common breeder in the short-grass prairie habitat of the Great Plains, the species is now absent from most of the eastern edge of its former range in South Dakota, Nebraska, Kansas, and Oklahoma. Numbers have also dropped considerably in the heart of its range in Montana, Wyoming, Colorado and New Mexico.

In September 2003, the U.S. Fish and Wildlife Service withdrew their proposal to list the mountain plover. However, the mountain plover remains an agency-designated Sensitive Species within both the Bureau of Land Management and the Forest Service.

Topography varies in the area from a rugged pine ridge to the south to flat/rolling terrain in the main portion of the project area. In general the slope ranges from 0-9% within the project area. The project area is dominated by prairie dog influenced sagebrush grasslands. The core of the project area is within a large prairie dog complex. Much of the herbaceous/forb and shrub component within the prairie dog colony is limited, with increased bare soils and prickly pear cactus (*Opuntina spp.*) present. The grass height within the majority of the project area is less 6 inches tall.

Based on topography, poor grazing practices and the abundance of active and densely populated prairie dog colonies approximately 90% of the project area is mountain plover habitat. There are seven active densely populated prairie dog colonies within and adjacent to the West Bullwacker project area. One large and continuous colony (3,092 acres) covers approximately 60% of the project area. The total acreage of the seven colonies is 4,417 acres. An additional 26 active and densely populated black-tailed prairie dog colonies are within six miles of the project area. The total acreage of active and densely populated prairie dog colonies within six miles of the project area equals 6,950 acres. The colonies range in size from 10 to 3,092 acres. A map of mountain plover habitat is located in the project file.

Mountain plover observations for the 2006 and 2007 breeding season for the West Bullwacker project area are listed below.

Table 3.4 Mountain plover observations within and adjacent to the West Bullwacker project area (May 8, 10, and May 24, 2007-two of three surveys).

Legal Location	UTMS	Number of Adult Mountain Plovers	Distance From Project Area
T43N, R77W, SWSW Sec 6	406242E, 4841364N	1	Within project area
T43N, R77W, SWSW Sec 6	406150E, 4841450N	1	Within project area
T43N, R78W SW Sec 1	405767E, 4841777N	1	
T43N, R78W, SWNW Sec13	404640E, 4839115N	2	Within project area
T43N, R 78W, NESW Sec13	404859E, 4838850N	2	Within project area
T43N, R78W, NWNE Sec23	403705E, 4838061N	1	Within project area
T43N, R77W, NW Sec 6	406619E, 4842205	1 and 3 eggs	Within project area
T43N, R77W NENE Sec 19	407298E, 4837699N	1	Within project area
T44N, R77W, Sec 30/31	407043E, 4844359N	1 and 3 eggs	Within project area
T44N, R77W, Sec30/31	406839E, 4844613N	1	Within project area
T44N, R77W, Sec 31	406712E, 4844484N	2	Within project area
T43N, R77W, NWSW Sec6	406201E, 4841708N	1	Within project area
T43N, R78W, NESW Sec 12	404743E, 4840275N	2	Within project area
T43N, R78W, SWSE Sec14	403693E, 4838632N	1	Within project area

Legal Location	UTMS	Number of Adult Mountain Plovers	Distance From Project Area
T43N, R78W, NWNE Sec23	403644E, 4837554N	2	Within project area
T43N, R78W, SWNE Sec 23	403584E, 4837454N	1	Within project area
T43N, R78W, NWSE Sec 23	403504E, 4836964N	1	Within project area
T44N, R77W Sec 31	407258E, 4843792N	1	Within project area
T44N, R77W Sec 31	406546E, 4843792N	2	Within project area
T44N, R77W Sec 7	404168E, 4838855N	1	Within project area
T44N, R77W NWNE Sec 26	403680E, 4836515N	3	Within project area
T44N, R77W Sec 31	406964E, 4843699N	1	Within project area
T43N, R77W Sec 6	406342E, 4841593N	1	Within project area
T43N, R78W Sec13	404438E, 4838432N	2	Within project area

Table 3.5. Mountain plover observations within and adjacent to the West Bullwhacker project area (2006).

Legal Location	UTMS	Number of Adult Mountain Plovers	Distance From Project Area
T43N, R78W, SWSE Sec 14	403612E, 4838466N	1	Within project area
T43N, R78W, SWSW Sec12	404499E, 4839930N	1	Within project area
T43N, R78W, NESE Sec1	405810E, 4841723N	1	Within project area
T43N, R77W, NWSW Sec6	406122E, 4841860N	2	Within project area
T43N, R 77W, NESW Sec 6	406288E, 4841689N	1	Within project area
T43N, R77W, Sec 6	406596E, 4841773N	1	Within project area
T43N, R77W, NWNE Sec 31	406698E, 4844295N	1	Within project area
T43N, R77W, NWSW Sec 6	406258E, 4841820N	2	Within project area
T43N, R78W, NESE Sec 1	405975E, 4841493N	1	Within project area
T43N, R78W, SWSE Sec 14	403738E, 4838595N	1	Within project area
T43N, R78W NWSE Sec 23	403508E, 4837015N	2	Within project area
T43N, R77W, Sec 6	4062990E, 4841617N	1 and 3 eggs	Within project area
T43N, R77W, Sec 6	406280E, 4841510N	4 and 6 young	Within project area
T43N, R78W, Sec23	403639E, 4837399N	1 and 2 young	Within project area
T44N, R77W, Sec31	406794E, 48444506N	1 and 1 young	Within project area
T43N, R78W, SESE Sec23	403761E, 4836609N	1	Within project area
T43N, R78W, SESE Sec 1	405958E, 4841443N	1	Within project area
T43N, R77W, SWSW Sec 6	406382E, 4841275N	1	Within project area
T43N, R78W, SWSW 12	404804E, 4839979N	1 and 3 eggs	Within project area
T43N, R78W, NWNW Sec 13	404602E, 4839208N	1 and 3 eggs	Within project area
T43N, R78W, SWSW 13	404567E, 4838280N	1	Within project area
T43N, R78W, SWSW 13	404380E, 4838260N	2	Within project area
T43N, R77W, SWSW Sec6	406376E, 4841250N	1 and 3 eggs	Within project area
T43N, R78W, NWSW Sec13	404380E, 4838768N	1	Within project area
T43N, R78W, NWNW Sec13	404574E, 4839226N	1	Within project area
T43N, R78W, NENW Sec 13	404975E, 4839450N	1	Within project area

The entire West Bullwhacker project area is suitable mountain plover habitat.

3.4. West Nile Virus

West Nile virus (WNV) is a mosquito-borne disease that can cause encephalitis or brain infection.

Mosquitoes spread this virus after they feed on infected birds and then bite people, other birds, and animals. WNV is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

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

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

Table 3.4 Historical West Nile Virus Information

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

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

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

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

control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

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

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

3.5. Water Resources

The project area is within the Upper Powder River drainage system. House Creek and several smaller unnamed tributaries (named in WMP as BWW-1, -2, -3, and -4) to Dry Fork Powder River drain the POD area.

3.5.1. Groundwater

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

The ROD includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation.

Specifically relative to groundwater, the plan identified the following (PRB FEIS ROD page E-4):

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the Basin to quantify these impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

The BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is

approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 15 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 98 to 1,025 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Dry Fork Powder River drainage which is tributary to the Upper Powder River watershed. All drainage channels in the POD are naturally ephemeral, but House Creek and the Dry Fork now display intermittent or perennial flow character. House Creek courses through the west side of the POD and the Dry Fork runs through the northern portion of the POD.

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 CBNG produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River watershed, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, WY, Station ID 06317000 (PRB FEIS page 3-49).

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the West Bullwhacker project prior to on-the-ground project work (BFO project no. 70060259). SWCA Environmental Consultants conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. 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 cultural resources are located in or near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48JO134	Bozeman Trail	Listed on NRHP

Site Number	Site Type	Eligibility
48JO933	Lithic Scatter	Not Eligible
48JO944	Lithic Scatter	Not Eligible
48JO945	Lithic Scatter	Not Eligible
48JO946	Lithic Scatter	Eligible
48JO947	Lithic Scatter	Eligible
48JO948	Lithic Scatter	Not Eligible
48JO949	Lithic Scatter	Not Eligible
48JO950	Lithic Scatter	Unevaluated
48JO951	Lithic Scatter	Not Eligible
48JO952	Lithic Scatter	Not Eligible
48JO953	Lithic Scatter	Not Eligible
48JO954	Lithic Scatter	Unevaluated
48JO955	Lithic Scatter	Not Eligible
48JO956	Lithic Scatter	Not Eligible
48JO957	Lithic Scatter	Not Eligible
48JO960	Lithic Scatter	Not Eligible
48JO961	Lithic Scatter	Not Eligible
48JO2387	Lithic Scatter	Not Eligible
48JO2388	Historic Trash/Lithic Scatter	Not Eligible
48JO2391	Lithic Scatter	Not Eligible
48JO2392	Historic Trash/Lithic Scatter	Not Eligible
48JO2393	Historic Trash/Lithic Scatter	Not Eligible
48JO2394	Lithic Scatter	Not Eligible
48JO2442	Lithic Scatter	Not Eligible
48JO2446	Lithic Scatter	Not Eligible
48JO2836	Historic Trash	Not Eligible
48JO3059	Telegraph Line	Eligible
48JO3074	Lithic Scatter	Not Eligible
48JO3092	Historic Trash	Not Eligible

Site Number	Site Type	Eligibility
48JO3093	Historic Trash	Not Eligible
48JO3225	Lithic Scatter	Not Eligible
48JO3226	Historic Trash/Lithic Scatter	Not Eligible
48JO3314	Historic Trash	Not Eligible
48JO3315	Lithic Scatter	Not Eligible
48JO3316	Historic Trash/Lithic Scatter	Not Eligible
48JO3317	Historic Trash/Lithic Scatter	Not Eligible
48JO3318	Historic Trash	Not Eligible
48JO3319	Lithic Scatter	Not Eligible
48JO3320	Lithic Scatter	Not Eligible
48JO3321	Lithic Scatter	Not Eligible
48JO3322	Historic Trash/Lithic Scatter	Unevaluated
48JO3323	Historic Trash/Lithic Scatter	Eligible
48JO3665	Black and Yellow Trail/Sussex Variant	Not Eligible
48JO3687	Lithic Scatter	Not Eligible
48JO3688	Lithic Scatter	Not Eligible
48JO3689	Lithic Scatter	Not Eligible
48JO3690	Lithic Scatter	Not Eligible
48JO3691	Lithic Scatter	Not Eligible
48JO3697	Lithic Scatter	Not Eligible
48JO3698	Lithic Scatter	Not Eligible
48JO3699	Lithic Scatter	Eligible
48JO3700	Lithic Scatter	Not Eligible
48JO3701	Historic Trash/Lithic Scatter	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's

plans and BLM applied mitigation. All of the 38 proposed well locations can be drilled without a well pad being constructed. Surface disturbance associated with the drilling of the wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 45 x 25 feet), and compaction (from vehicles driving/parking at the drill site). Estimated long term disturbance associated with these 38 wells would involve approximately 0.1 acre/well for 3.8 total acres. The estimated short term disturbance of mowing, brush hogging, and compacting vegetation for all 38 locations would be 0.25 acres/location for a total of 9.5 acres. This would be a short-term impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 16.2 miles of improved roads would be constructed to provide access to various well locations. Approximately 7.8 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 2.8 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 etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings and culverts are shown on the MSUP and the WMP maps. These structures would be constructed in accordance with sound, engineering practices and BLM standards.

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	38	0.1/acre	0.1	Long Term
Gather/Metering Facilities	5	Site Specific	1.1	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments	25		129.53	Long Term
On-channel	25	Site Specific	128.93	
Off-channel	0	Site Specific	0.0	
Water Discharge Points	20	Site Specific or 0.01 ac/WDP	0.6	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Improved Roads No Corridor With Corridor	16.2	80' Width	157.1	Long Term
2-Track Roads No Corridor With Corridor	7.8	35' Width	33.1	Long Term
Pipelines No Corridor With Corridor	2.8	35' Width	11.9	Short Term
Buried Power Cable No Corridor	3.9	35' Width	16.7	Short Term
Overhead Powerlines	0.0	15' Width	0	Long Term

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

4.1.1. Wetland/Riparian

CBNG discharge from this POD may contribute to the perennialization of Dry Fork Powder River and House Creek. Such contributions could raise shallow groundwater levels and potentially contribute to cottonwood tree mortality.

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that “(they) may be lost by bank undercutting caused by the increased surface water flows in channels.” Included in the ROD is programmatic mitigation “which *may be* appropriate to apply at the time of APD approval if site specific conditions warrant.”(ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: “To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.”(ROD Page A-32).

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

Channels in and downstream of the POD area are perennialized by sustained CBNG discharge. As the hydrologic regime of these channels change, riparian species composition may change to those that are more adept to inundated root zones. Existing riparian vegetation may be impacted by the influx of these

more water resistant species, such as salt grass, foxtail barley and salt cedar (tamarisk). Undesireable species may outcompete more desirable grazing species such as western wheatgrass. Also, soil chemistry may change due to exposure to CBNG discharge which can influence species success. Specifically, salts can become elevated in the riparian soils, thus favoring salt tolerant plant species for growth.

4.1.2. Invasive Species

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt Scotch thistle, musk thistle, buffalo burr, cocklebur, Canada thistle, salt cedar and wild licorice, as the operator listed in their Integrated Pest Management Plan (IPMP).

In the IPMP the operator incorporates weed control measures which include use of weed-free mulch, weed-free road surfacing, and use of weed-free seed during reclamation. The operator is responsible for prevention and control of noxious weeds and weeds of concern on all areas of surface disturbance associated with this project (well locations, roads, water management facilities, etc.)

Due to the increased traffic due to CBNG development, a condition of approval will require the operator to provide a Pesticide Use Proposal (PUP). The PUP is to provide details of effective treatment to ensure the operator conducts continuing field inspections to control the spread of noxious weeds. Mitigation, as required by BLM in the applied condition of approvals, and as listed in the operator's IPMP, will reduce potential impacts from noxious weeds and invasive plants.

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter yearlong and yearlong range for mule deer and winter yearlong range for pronghorn antelope would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long

term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be discharged into 25 proposed and 6 existing on-channel impoundments. Produced water is to be fully contained within the impoundments. If a reservoir were to discharge due to a major storm event or due to dam failure, it is likely that produced water will reach a fish-bearing stream. It is likely that downstream species may be affected.

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

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

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

Change in Water Quality

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

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

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

Change in Water Quantity

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

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately (1.3 cfs per day) of project treated water to an average flow of 30 cfs into the Powder River is unlikely to affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

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

4.2.2.1. Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long

term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

Existing and newly constructed reservoirs may have either a positive or negative affect on waterfowl. The reservoirs may provide winter forage and nesting habitat for migrating waterfowl and shore birds. Concentrations of salts and metals, particularly barium and selenium, may increase in the containment reservoirs receiving coalbed natural gas produced water discharges, as water evaporates overtime. Direct effects (toxicity) to waterfowl could occur, depending on the quality of the produced water. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-226-235).

With the creation of more reservoirs within the sagebrush and prairie communities more avian species are being exposed to the West Nile virus. Mortality rates are likely to increase and reproductive success is likely to decrease in susceptible bird species within the region.

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to over heating or chilling of eggs or chicks. The prolonged disturbance can also lead to the abandonment of the

nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

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

<i>BLM ID#</i>	<i>Species</i>	<i>UTM (NAD 83)</i>	<i>Status</i>	<i>Well / PIT NUMBER</i>	<i>DISTANCE</i>
3776	GOEA	407132E 4844560N	Active	43-31 well	0.27 miles from nest
				32-31 well	0.37 miles from nest
				Infrastructure for 32-31 & 41-31 wells	0.10 miles from nest
3777	GOEA	409120E 4843840N	Inactive	12-33 well	0.31 miles from nest
3778	GHOW	407832E 4844700N	Nest gone	14-29 well and infrastructure	0.13 miles from old nest location- nest is gone.
New	BUOW	404060E 4835708N	Inactive	22-25 reservoir	0.38 miles from nest location
New	BUOW	405033E 4840328N	Inactive	21-12 well	0.4 miles from nest location
				12-12 well	0.4 miles from nest location
New	BUOW	403536E 4836525N	Inactive	14-24 well	0.55 miles from nest location
				44-23 discharge point	0.3 miles from nest location
New	BUOW	406551E 4843404N	Inactive	32-31 well	0.44 miles from nest location
				23-12 well	0.07 miles from nest location
				21-12 well	0.43 miles from nest location
				12-12 well	0.4 miles from nest location
2846	BUOW	407069E 4843925N	Inactive	14-12 well	0.43 miles from nest location
				32-31 well	Approximately 100 feet from nest location
				41-31 well	0.35 miles from nest location
				12-32 A&B wells	0.42 miles from nest location
New	GOEA	409196E 4843814N	Active	12-33 well	0.27 miles
				Buried powerline	0.47 miles
				33-22 A&B reservoirs	0.45 miles
New	RTHA	407206E 4841815N	Active	Buried power line	0.11 miles
				Proposed road	0.4 miles
3770	GOEA	407135E 4844530N	Active	41-31 well	0.27 miles
3771	UNK	407160E 4844520N	Inactive	32-31 well	0.38 miles
				41-31 well	0.27 miles
3772	UNK	407500E 4844520N	Inactive	32-31 well	0.38 miles
				41-31 well	0.15 miles (nest location not available at the time of onsite)
3773	UNK	407400E 4844550N	Inactive	14-29 well	0.35 miles
				41-31 well	0.15 miles (nest location not available at the time of onsite)
2843	UNK	407134E 4844120N	Inactive	14-29 well	0.35 miles
				32-31 well	0.16 miles (nest location not available at onsite)
New	UNK	407051N	Active	41-31 well	0.24 miles (nest location not available at onsite)
				32-31 well	0.30 miles

<i>BLM ID#</i>	<i>Species</i>	<i>UTM (NAD 83)</i>	<i>Status</i>	<i>Well / PIT NUMBER</i>	<i>DISTANCE</i>
		4843446N		12-32 B well	0.47 miles
				13-32 reservoir	0.4 miles
				44-31 reservoir	0.36 miles
2834	GOEA	409747E	Nest Gone	12-33 well	0.20 miles – nest is gone
		4843850N		21-33 well	0.32 miles – nest gone
New	UNK	409842E	Inactive	12-33 well	0.41 miles
		4843515N			

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

The Buffalo BLM data base shows raptor nest BLM ID# 3778 is within 0.13 miles of the 14-29 well. During the onsite the area was searched thoroughly for the nest, the nest was not found. Since no raptor nests were found within 0.25 miles of the well, the 14-29 well was not moved. The 2007 raptor survey conducted by Wildlife Resources confirmed that the nest was gone and no new nesting attempts were made within this area.

The 41-31 well is located 0.15 miles from two raptor nests (BLM ID# 3772 and BLM ID# 3773). The 32-31 well is located 0.16 miles from raptor nest BLM ID# 2843. At the time of the onsite the nest locations were unknown. During the onsite the area was surveyed for raptor nests, no nests were identified within 0.25 miles of the well. During the 2007 raptor survey conducted by Wildlife Resources the three raptor nests were found to be inactive.

According to the BLM Buffalo Field Office data base the 12-33 well is 0.20 miles from a golden eagle nest (BLM ID# 2834), during the onsite the area was searched thoroughly and no nest was found. Well 12-33 was not moved. The 2007 raptor survey conducted by Wildlife Resources confirmed that the nest was gone and no new nesting attempts were made within this area.

The 23-12 well is 0.07 miles from a burrowing owl nest (UTMs 405033E, 4840328N) and the 32-31 well is located approximately 100 feet from a burrowing owl nest. Surrounding the 23-12 well is 575 acres of active and densely populated prairie dog colony. Section 12 is part of a much larger and continuous active and densely populated prairie dog colony. This colony totals 3,092 acres. The 32-31 well is surrounded by 265 acres of active and densely populated prairie dog colony. With 4,417 acres of prairie dog colony within the project area, good burrowing owl habitat exists throughout. Therefore, no wells were moved.

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment and a summary is provided in Table 4.3. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered and Sensitive Species

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NS	NLAA	Suitable habitat of sufficient size exists within the project area and within 1.5 kilometers of the project area.
Threatened				
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	K	LAA	Project includes overhead power within suitable habitat.
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

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

Effect Determinations

Listed Species

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

4.2.5.1.1. Black-footed ferret

Black-tailed prairie dog colonies within the West Bullwhacker project area are of sufficient size for supporting ferrets and are located within the Midwest potential reintroduction area.

There are 21 proposed wells, associated infrastructure, and 9 reservoirs within active prairie dog colonies. The wells and reservoirs are listed below:

Township/Range	Section	Affected Wells and Infrastructure
T44N, R77W	31	32-31 well and associated infrastructure
T44N, R77W	32	road /pipeline in the NENE quarter of Section 32
T43N, R78W	1	43-1, 34-1, 14-1, 23-1, 32-1 wells and their associated infrastructure; 23-1, 14-1 reservoirs
T43N, R77W	6	12-6 well and associated infrastructure
T43N, R78W	11	41-11, 44-11, 34-11 reservoirs and main access road through Section 11
T43N, R78W	12	21-12, 41-12, 12-12, 23-12, 14-12 wells and their associated infrastructure
T43N, R78W	13	21-13, 12-13, 14-13, 14-13, 23-13 wells; 23-13, 21-13, 31-13 reservoirs
T43N, R78W	14	41-14, 32-14, 43-14, 34-14 wells and their associated infrastructure; 11-13, 33-14, 34-11 reservoirs
T43N, R78W	24	21-24, 12-24, 14-24 wells and their associated infrastructure;
T43N, R78W	25	22-25 reservoir

Approximately 208 acres of black-footed ferret habitat will be lost due to well pad, road/pipeline and reservoir construction. The construction of well pads, roads, pipelines and reservoirs causes direct prairie dog mortalities and an immediate loss of prairie dog burrows, thus causing direct habitat loss for the black-footed ferret.

Because suitable habitat is of sufficient size to support a black-footed ferret population and the project area is in and adjacent to the Midwest potential reintroduction area, but it is highly unlikely ferrets are present, implementation of the proposed development ***“may affect, but is not likely to adversely affect”*** the black-footed ferret. However, if any ferrets become present, the proposed action will most likely make portions of the project area unsuitable for inhabitation.

4.2.5.1.2. Bald eagle

Bald eagle nesting and winter roosting habitat exists in the northern portion of the project area along the Dry Fork of the Powder River. Based on the BLM Buffalo Field Office data base, bald eagles have been observed within and around the West Bullwhacker project area. Construction, drilling activity and human presence along the Dry Fork of the Powder River in the northern portion of the West Bullwhacker project area may cause bald eagles to avoid suitable nesting and winter roosting habitat. With 4,417 acres of active and densely populated prairie dog colonies within and around the project area and with 25 proposed and 6 existing reservoirs within the project area, bald eagles are likely to be found foraging within the project area between October and April feeding on prairie dogs, waterfowl, and sheep carcasses. The proposed project is likely to adversely affect bald eagle winter roosting and possibly nesting.

Within and adjacent to the West Bullwhacker project area is extensive natural gas development. Bullwhacker, Bullwhacker 2 & 3 occur within, east, southeast and south of the West Bullwhacker project area. East Bullwhacker occurs to the east and south east of the project area.

There are approximately 5.5 miles of existing overhead three-phase distribution lines within and near the project boundaries. 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. At this time Williams is not proposing new overhead power lines within the West Bullwhacker project area.

The presence of overhead power lines may adversely affect foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking, such as the West Bullwhacker project area. 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.

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

Produced water will be stored in 25 proposed and 6 existing 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.

4.2.5.1.3. Ute's Ladies Tresses Orchid

All wells and infrastructure are located in dry upland vegetation with no perennial water. Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area.

Suitable habitat is not present, therefore the proposed development of the West Bullwhacker project will have **"no effect"** on the Ute Ladies'-tresses Orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

Table 4.4 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

Presence

K Known, documented observation within project area.

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

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

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

Project Effects

NI No Impact.

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

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

BI Beneficial Impact

4.2.5.2.1. Black-tailed prairie dog

There are 21 proposed wells, associated infrastructure, and 9 reservoirs within active prairie dog colonies. The wells and reservoirs are listed below:

Township/Range	Section	Affected Wells and Infrastructure
T44N, R77W	31	32-31 well and associated infrastructure
T44N, R77W	32	road /pipeline in the NENE quarter of Section 32
T43N, R78W	1	43-1, 34-1, 14-1, 23-1, 32-1 wells and their associated infrastructure; 23-1, 14-1 reservoirs
T43N, R77W	6	12-6 well and associated infrastructure
T43N, R78W	11	41-11, 44-11, 34-11 reservoirs and main access road through Section 11
T43N, R78W	12	21-12, 41-12, 12-12, 23-12, 14-12 wells and their associated infrastructure
T43N, R78W	13	21-13, 12-13, 14-13, 14-13, 23-13 wells; 23-13, 21-13, 31-13 reservoirs
T43N, R78W	14	41-14, 32-14, 43-14, 34-14 wells and their associated infrastructure; 11-13, 33-14, 34-11 reservoirs
T43N, R78W	24	21-24, 12-24, 14-24 wells and their associated infrastructure;
T43N, R78W	25	22-25 reservoir

Approximately 208 acres of black-tailed prairie dog colony will be destroyed due to well pad, road/pipeline and reservoir construction. The construction of well pads, roads, pipelines and reservoirs causes direct prairie dog mortalities and an immediate loss of prairie dog burrows. When construction begins on reservoirs, roads, pipelines and pads the earth moving equipment can remove anywhere from an inch to over several feet of dirt at one time destroying prairie dog burrows and foraging habitat.

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 will likely be displaced. Male prairie dogs resort to either long-distance dispersal to new colonies (mostly as yearlings, rarely as adults) or short distance within the home colony. Female prairie dogs disperse over long distances to other colonies (as either yearlings or adults). Short-distance dispersal of females within the home colony almost never occurs (Hoogland 1995). 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. Both males and females actively protect their coterie territories from invading males and females (Hoogland 1995).

Nine of the reservoirs occur in the middle of densely populated active prairie dog colonies. Mass immigration to surrounding colonies from those destroyed by the reservoirs would expose the prairie dogs to a higher rate of predation and an increase in stress resulting in higher mortality rate. Depending on when the construction occurs, the prairie dogs may be forced to disperse at the wrong time of the year when their body condition is below peak health levels, thus creating more stress on the animals and

resulting in a higher mortality rate. Another problem with displacement of the prairie dogs into the surrounding area is that the soil and vegetation may not be conducive to prairie dog survival.

Unlike roads and pipelines, 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 well house and nearby power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog road mortalities.

4.2.5.2.2. Greater sage-grouse

There are nine sage grouse leks within 3.0 miles of the West Bullwhacker project area, the leks are the Beecher Draw, Bushwhacker Creek, Beecher North, Mengal, Rhodes, Rhodes 2, East Holler, Garrett 2 and Garrett.

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

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

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

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

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

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

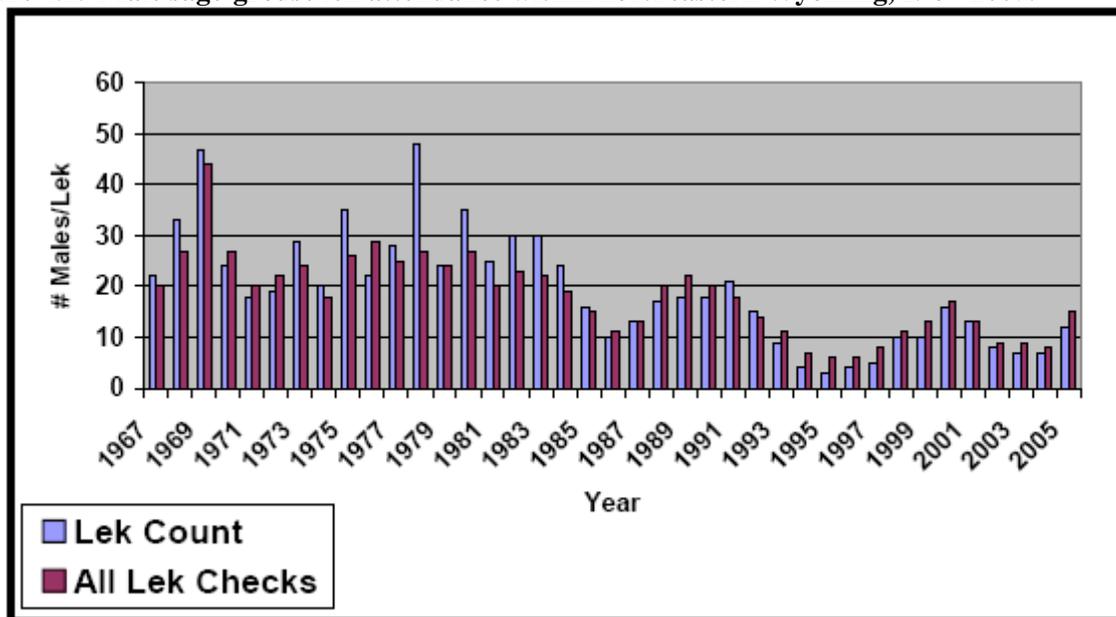
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

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

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

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

Figure 4.1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



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

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

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

4.2.5.2.3. Mountain plover

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

potentially result in increased mountain plover predation. CBNG infrastructure such as well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

With the loss or alteration of their natural breeding habitat (predominately prairie dog colonies), mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat. 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 and 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 US Fish and Wildlife Service (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 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).

Approximately 208 acres of mountantain plover habitat will be destroyed due to well pad, road/pipeline and reservoir construction.

4.2.5.3. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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 CBNG operations.

Cumulatively, there are many sources of standing water, beyond CBNG 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. With 6 existing and 25 proposed reservoirs within the project area and 46 existing reservoirs within 2.5 miles of the project area, the potential for mosquito breeding areas will increase.

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and

landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies.

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

The maximum water production is predicted to be 35 gpm per well or 1,330 gpm (2.96 cfs or 2,145 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 CBNG Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006 (maximum estimated production year). As such, the volume of water resulting from the production of these wells is 1.2% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 532 gpm will infiltrate at or near the discharge points and impoundments (858 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is impacts to the groundwater. “The effects of development of CBNG 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 98 to 1025 feet compared to 1,500 to 1,590 feet to the Big George coal unit. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

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

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a

reference well within the POD. The reference well will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st 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.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

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

Table 4.5 Comparison of Regulated Water Quality Parameters to Predicted Water

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Upper Powder River Watershed at Arvada, WY USGS #06317000 Gauging Station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	

Predicted Values	TDS, mg/l	SAR	EC, μ mhos/cm
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirements for WYPDES Willow Creek General Watershed Permit			
At discharge point	5,000	na	7,500
At Irrigation Compliance point	na	na	na
Predicted Produced Water Quality Big George Coal	1,630	13.7	2,820

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1630.0 mg/l TDS which is/is not within the WDEQ criteria for agricultural use (2000 mg/l TDS).

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 35.0 gallons per minute (gpm) is projected is to be produced from these 38 wells, for a total of 1,330 gpm for the POD. See Table 4.5 .

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

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

To manage the produced water, 25 impoundments (447.7 acre-feet) would potentially be constructed within the project area. These impoundments will disturb approximately 128.9 acres including the dam structures. All 25 impoundments would be on-channel reservoirs disturbing 128.9 acres. The off-channel impoundments would result in evaporation and infiltration of CBNG water. Criteria identified in “Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming” (WDEQ, 2002) will be used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004). Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.44 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge

rate from these 38 wells is anticipated to be a total of 1,330 gpm or 2.96 cfs to impoundments. The WYPDES permit allows for discharge into downstream channels, therefore assuming approximately 50% containment and a conveyance loss of 20% (PRB FEIS pg 4-74) this project has the potential to contribute approximately a maximum 1.18 cfs to the Upper Powder River flows, or 1.7% of the predicted total CBNG produced water contribution. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 4). Based on the area of the House Creek watershed (21.2 sq mi) and an assumed density of one wells per location every 80 acres, the potential exists for the development of 169 wells which could produce a maximum flow rate of 5,915 gpm (13.1 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 13.1 cfs, is much less than the volume of runoff estimated from the 2-year storm event for the House Creek drainage at 319 cfs. Therefore, the estimated flow rate of water produced from the full development in the watershed above the project area is significantly less than the natural runoff from the area.

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

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES page 6):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	650 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated point of compliance identified for this permit is end of pipe.

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 spring may affect the flow rate or water quality of the spring.

In-channel downstream impacts are addressed in the WMP for the West Bullwhacker POD prepared by WWC Engineering for Williams Production RMT Company.

4.4.2.1. Surface Water Cumulative Effects

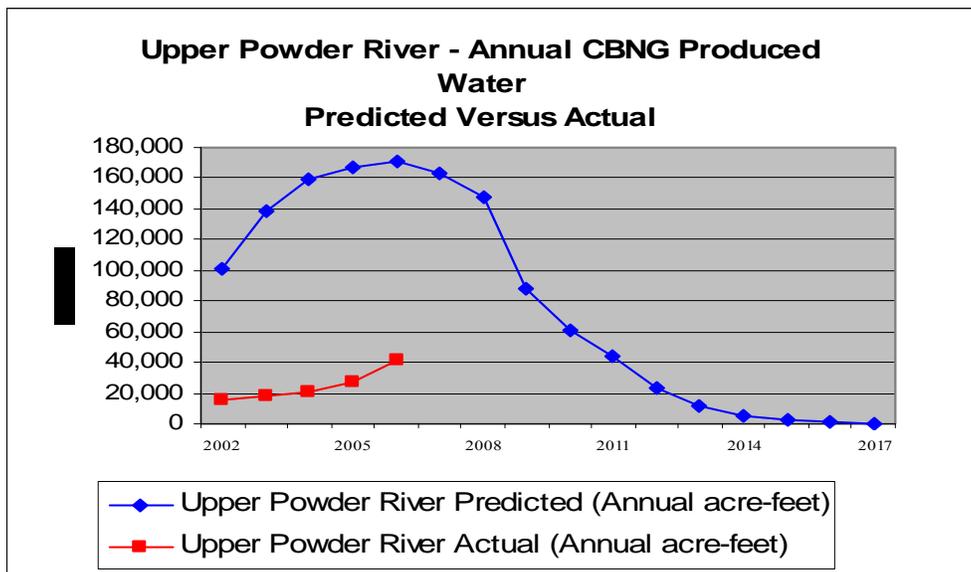
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2006, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 736,519 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Table 4.6 and Figure 4.1 following. This volume is 16.8% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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

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

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



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

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

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 16.8% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES 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

Following the Wyoming State Protocol Section VI (B)(4) the Bureau of Land Management consulted the Wyoming State Historic Preservation Officer (SHPO) on a finding of “no adverse effect” to 48JO134, the Bozeman Trail. The project was heavily modified to reduce physical and visual impacts to a contributing trail segment. The SHPO concurred with the Bureaus finding of no adverse effect to 48JO134. There are no other eligible sites within the APE of the proposed project. Non eligible sites 48JO944, 48JO945, 48JO952, 48JO960, 48JO961, 48JO2399, 48JO2391, 48JO2392, 48JO2446, 48JO3074, 48JO3321, 48JO3665, 48JO3687, 48JO3688, 48JO3690 and 48JO3697 will be impacted by the project.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim SHPO	Wyoming SHPO	No
Penny Bellah	Project Manager	Williams	No
Randee Jespersen	Landman	Williams	Yes
Doug McAdams	Drilling Supervisor	Williams	Yes
Kristine Mackey	Project Planning	Williams	Yes
Steve Hoserland	Hydrologist	WWC	Yes
David Platt	Project Manager	Windmill	Yes
Jim Adams	Pre-planning	Windmill	Yes
Dee Johnson	Landowner	Dry Fork Land & Livestock, LLC	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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