

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

Yates Petroleum Corporation
Carson POD

ENVIRONMENTAL ASSESSMENT –WY-070-07-187

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Yates Petroleum Corporation’s Carson POD Coal Bed Natural Gas (CBNG) POD comprised of the following 26 Applications for Permit to Drill (APDs).

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	CARSON DUGOUT CS	1	NENE	3	53N	73W	WYW130064
2	CARSON BRIDGER CS	13	SWNW	3	53N	73W	WYW130064
3	CARSON BRIDGER CS	14	NENW	3	53N	73W	WYW130064
4	CARSON BRIDGER CS	15	SWNE	3	53N	73W	WYW130064
5	CARSON BRIDGER CS	16	NESE	3	53N	73W	WYW130064
6	CARSON BRIDGER CS	17	SWSE	3	53N	73W	WYW130064
7	CARSON BRIDGER CS	18	NENW	4	53N	73W	WYW130064
8	CARSON BRIDGER CS	19	SWSE	4	53N	73W	WYW130064
9	CARSON DUGOUT CS	2	NENE	10	53N	73W	WYW130064
10	CARSON BRIDGER CS FEDERAL	20	SWNE	10	53N	73W	WYW130064
11	CARSON BRIDGER CS	21	NESE	29	54N	73W	WYW130064
12	CARSON BRIDGER CS	22	SWSE	29	54N	73W	WYW130064
13	CARSON BRIDGER CS FEDERAL	23	NESW	32	54N	73W	WYW145131
14	CARSON BRIDGER CS	24	NENE	32	54N	73W	WYW130064
15	CARSON BRIDGER CS	25	NESE	32	54N	73W	WYW130064
16	CARSON BRIDGER CS	26	SWNE	32	54N	73W	WYW130064
17	CARSON BRIDGER CS	27	SWSW	32	54N	73W	WYW145131
18	CARSON BRIDGER CS	28	SWSE	32	54N	73W	WYW130064
19	CARSON BRIDGER CS	29	SWNW	33	54N	73W	WYW130064
20	CARSON BRIDGER CS	30	NENW	33	54N	73W	WYW130064
21	CARSON BRIDGER CS	31	NENE	33	54N	73W	WYW130064
22	CARSON BRIDGER CS FEDERAL	32	NESW	33	54N	73W	WYW130064
23	CARSON BRIDGER CS COM	33	SWSE	33	54N	73W	WYW130064
24	CARSON BRIDGER CS COM	34	NESE	33	54N	73W	WYW130064
25	CARSON BRIDGER CS	35	SWNE	33	54N	73W	WYW130064
26	CARSON BRIDGER CS	36	SWSW	33	54N	73W	WYW130064

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Ac-ft)	Surface Dist. (Acres)	Lease Number
1	HEINRICH # 10	SESE	32	54	73	19	5.25	WYW130064
2	HEINRICH # 15	SWSW	32	54	73	7.2	1.35	WYW145131
3	HEINRICH # 16	NESW	33	54	73	17	3.3	WYW130064
4	HEINRICH # 17	NWSE	32	54	73	17	4.8	WYW130064
5	HEINRICH # 18	SWSE	29	54	73	9.5	1.65	WYW130064
6	JACK	NESE	33	54	73	9.8	1.95	WYW130064

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
Yates Petroleum Corporation
Carson POD
PLAN OF DEVELOPMENT
WY-070-07-187**

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 2 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: Yates Petroleum Corporation’s Carson Plan of Development (POD) for 26 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 26 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with one well per location. Each well will produce from 4 coal seams. Proposed well house dimensions are 10 ft wide x 10 ft length x 10 ft height.

	Well Name / Utility Color	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	CARSON DUGOUT CS	1	NENE	3	53N	73W	WYW130064
2	CARSON BRIDGER CS	13	SWNW	3	53N	73W	WYW130064
3	CARSON BRIDGER CS	14	NENW	3	53N	73W	WYW130064
4	CARSON BRIDGER CS	15	SWNE	3	53N	73W	WYW130064
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23	CARSON BRIDGER CS COM	33	SWSE	33	54N	73W	WYW130064
24	CARSON BRIDGER CS COM	34	NESE	33	54N	73W	WYW130064
25	CARSON BRIDGER CS	35	SWNE	33	54N	73W	WYW130064
26	CARSON BRIDGER CS	36	SWSW	33	54N	73W	WYW130064

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease Number
1	HEINRICH # 10	SESE	32	54	73	19	5.25	WYW130064
2	HEINRICH # 15	SWSW	32	54	73	7.2	1.35	WYW145131
3	HEINRICH # 16	NESW	33	54	73	17	3.3	WYW130064
4	HEINRICH # 17	NWSE		54	73	17	4.8	WYW130064
5	HEINRICH # 18	SWSE		54	73	9.5	1.65	WYW130064
6	JACK	NESE		54	73	9.8	1.95	WYW130064

County: Campbell

Applicant: Yates Petroleum Corporation

Surface Owners: Randy and Gail Bulkley, Donna H. Tarver Trust, Dean and Joy Hall Trust

Project Description:

The proposed action involves the following:

- Drilling of 26 total federal CBM wells in following coal zones; Canyon, average depth 300 feet; Cook, average depth 470 feet; Wall, average depth 820 feet; and the Pawnee coal zone, to a average depth of approximately 810 feet. Multiple seams will be co-mingled, drilling a single well per location, to produce gas from multiple coal seams.

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

- Well metering shall be accomplished by telemetry.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: discharge points and 6 stock water reservoirs within the Little Powder River primary watershed and 6 discharge points.
- An unimproved and improved road network.
- An above ground power line network, to be constructed by a utility provider Powder River Energy Corporation. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. If the power line network is not complete before the wells are in production, then temporary diesel generators shall be placed at the power drops.
- A buried gas, water and power line network.
- Gathering, metering facilities, and compression facilities are located outside of this project area.

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 Water Management Plan (WMP) in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

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

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

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

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

2.3. Alternative C – Environmentally Preferred

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

2.3.1. Changes as a result of the on-sites

Well Name	Well #	Changes Made
CARSON BRIDGER CS	13	Yates requested 50ft wide disturbance corridor to the Bridger 13 location.
CARSON BRIDGER CS	18	Retained the 30 x 60 foot slotted pad. Extended the road through the pad. The engineer added that 30 ft radius turnouts be provided at STA 19+50 to the Bridger 18 well.
CARSON BRIDGER CS	19	Pad diagram was resubmitted with reduction to pad size for the Bridger 19 location. May use a closed pit on this location.
CARSON BRIDGER CS FEDERAL	20	Revised plan by removing an access road to the northeast of the Bridger 20 well location, it will be a utility line only. The Bridger 20 is sited on a dry hole location. Yates proposed to smooth out the old access road, need about 35 ft for construction, and will bring it back to 12 ft seeded two-track.
CARSON BRIDGER CS	22	Changed the pipeline between the Bridger 19 and 20 well locations.
CARSON BRIDGER CS FEDERAL	23	Yates will use the spoil pile to level the rig on the Bridger 23 location.
CARSON BRIDGER CS	26	Yates added a culvert on the access road to the Bridger 26 location.
CARSON BRIDGER CS	28	Landowner prefers crown and ditched road between the 27 and the 28
CARSON BRIDGER CS	31	Need a slotted pad on the Bridger 31 location.
CARSON BRIDGER CS FEDERAL	32	On the Bridger 32, the 2-track corridor may be up to 35ft wide disturbance, brought back to 12 ft running surface after reclamation.
CARSON BRIDGER CS	36	No scoria. Will put aggregate through the braided channel to Bridger 36 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 and revised a guidance document, "Compliance Monitoring and siting Requirements for Unlined Impoundments Containing Coalbed Methane Produced Water" (September, 2006) which can be accessed on their website. For all WYPDES permits the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

1. Channel Crossings:
 - a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
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 operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to or better than that which existed before it was disturbed. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.
2. 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. 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.
2. 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 Sundry Notices.
2. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.5.2. Black-footed Ferret

1. Prairie dog colonies will be avoided wherever possible.

2.3.2.6. 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.

2.3.2.7. 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

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's plan of development.
2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The colors selected are in the table below; 18 sites are to be painted Covert Green, the remaining 8 locations are to be painted Carlsbad Canyon. Colors were selected to blend with the surrounding vegetation.

Well Name	Well #
Carlsbad Canyon	
CARSON DUGOUT CS	1
CARSON BRIDGER CS	13
CARSON DUGOUT CS	2
CARSON BRIDGER CS	21
CARSON BRIDGER CS	22
CARSON BRIDGER CS FEDERAL	23
CARSON BRIDGER CS	25

CARSON BRIDGER CS COM	33
Covert Green	
CARSON BRIDGER CS	14
CARSON BRIDGER CS	15
CARSON BRIDGER CS	16
CARSON BRIDGER CS	17
CARSON BRIDGER CS	18
CARSON BRIDGER CS	19
CARSON BRIDGER CS FEDERAL	20
CARSON BRIDGER CS	24
CARSON BRIDGER CS	26
CARSON BRIDGER CS	27
CARSON BRIDGER CS	28
CARSON BRIDGER CS	29
CARSON BRIDGER CS	30
CARSON BRIDGER CS	31
CARSON BRIDGER CS FEDERAL	32
CARSON BRIDGER CS COM	34
CARSON BRIDGER CS	35
CARSON BRIDGER CS	36

3. A one-way check valve must be installed in the water trunk line north of Dugout 1, which would only allow water to move southward into Heinrich 15 Reservoir. A Right of Way will be required if the check valve is not constructed for discharge of produced water into the Jack Reservoir from the Dugout 1 and Dugout 2 wells. A second valve may be required to control the amount of water for the rest of the project discharged into the Heinrich 15 Reservoir.
4. To reduce sagebrush habitat loss, brush hogging on the Bridger 17 access corridor will be a maximum width of 25'.
5. On the Bridger 32, the 2-track corridor may have a disturbance width of up to 35ft disturbance. The 2-track will be brought back to a 12 ft running surface during interim reclamation.
6. Per landowner request, rock surfacing is to be utilized on Dean and Joy Hall Trust lands:
 - There will be a crowned and ditched road between the Bridger 27 and the Bridger 28.
 - No scoria is to be used as aggregate through the braided channel to the Bridger 36 location.
7. Verify that all sight distances (both horizontal and vertical) on higher use roads meet BLM standards.
8. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

<u>Grade</u>	<u>Drainage Spacing</u>
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
9. 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.
10. Provide 4" of aggregate where grades exceed 8%.
11. 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 Seed Mix Bridger 13 and the Bridger 18		
Species	% in Mix	Lbs PLS*
<i>Western Wheatgrass</i> (Pascopyrum smithii)	35	4.2
<i>Green needlegrass</i> (Nassella viridula)	30	4.8
<i>Slender Wheatgrass</i> (Elymus trachycaulus ssp. trachycaulus)	20	1.2
<i>Prairie coneflower</i> (Ratibida columnifera)	5	0.6
<i>White or purple prairie clover</i> (Dalea candidum, purpureum)	5	0.6
<i>Rocky Mountain beeplant</i> (Cleome serrulata)	5	0.6
Totals	100%	12 lbs/acre

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

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

12. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:
Reclamation Standards:
 - C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 - C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 - C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 - C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

Wildlife

1. If any dead or injured threatened, endangered, proposed, or candidate species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374) and law enforcement office (307-261-6365) and BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
2. Observations of any threatened, endangered, proposed, or candidate species within the project area shall be reported to the BLM Buffalo Field Office (307-684-1100).
3. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly re-vegetated if construction activities impact the vegetation in these areas. Re-vegetation will be designed to avoid the establishment of noxious weeds.
4. Native seed mixes will be used to re-establish short grass prairie vegetation, where appropriate, during reclamation.
5. All other conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion WY07F0075 shall be complied with.
6. If any dead or injured sensitive species is located during construction or operation, the BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
7. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time" (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Yates will coordinate with the BLM to determine if additional resurveys will be required.
8. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
9. No surface disturbing activities are permitted in suitable mountain plover habitat (i.e. prairie dog colonies) from March 15-July 31 annually; unless a mountain plover survey has been conducted during 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:

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
T54N, R73W	33 SWSW	Road and pipeline corridor.

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 nesting 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).
10. 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:

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
54/73	33	19 BRID, 20BRID, 22 BRID road and utility corr. and powerline
54/73	32	14 BRID, 1DUGO, road and utility corr.
54/73	32	1DUGO, 2 DUGO, Heinrich15 reservoir, road and utility corr.
53/73	3	27 BRID, 29 BRID road and utility corr.
53/73	10	35 BRID, 36 BRID, road and utility corr, proposed overhead power
53/73	4	29BRID road and utility corr.

- 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 disturbance 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 disturbance 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.
 - 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.
11. No surface disturbing activity shall occur within 0.25 miles of all identified burrowing owl nests from April 15 through August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities within the prairie dog town(s). This timing limitation will affect the following proposed wells and their associated infrastructure:

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
54/73	33	25 BRID road and utility corr., Heinrich #10 reservoir and temporary storage yard.

12. The following conditions will reduce impacts to sage grouse:

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

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
54/73	29	17 BRID road and utility corr.
54/73	32	15 BRID, Heinrich #10 reservoir, road and utility corr.
54/73	33	19 BRID, 20 BRID, 21 BRID, 22 BRID, 23 BRID, 24 BRID, 25 BRID, 26 BRID, Heinrich 16 reservoir, Jack reservoir, all road and utility corr., proposed overhead powerline.
54/73	34	Proposed road and utility corr.
53/73	3	27 BRID, 28 BRID, 29 BRID, 30 BRID, 31 BRID, 32 BRID, all road and utility corr.
53/73	4	33 BRID, 34 BRID, all road and utility corr., proposed overhead powerline.
53/73	10	35 BRID, 36 BRID, all road and utility corr and proposed overhead powerline.

- b. 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 disturbance 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 disturbance 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.
 - c. 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.
13. If a new sharp-tailed grouse lek is identified during the sage grouse 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.

2.4. Alternatives considered but not analyzed in detail

Land Application:

- a. Suitable irrigation sites were not readily available
- b. Substantial soil remediation would have been required
- c. Costs would be substantially increased over the proposed alternative of full-containment in reservoirs, due to ongoing operational and monitoring costs
- d. Land application is not a year-round strategy, and as such storage would be required for the non-

irrigation season

Re-Injection into Disposal Wells and/or Aquifer Storage and Retrieval:

- a. No geologic formation could be found that could economically receive the quantities of water anticipated
- b. Surface disturbance associated with drilling of injection wells, construction of tank batteries, and additional ditching for burial if high pressure water lines was not desirable

Water Treatment:

- a. At each individual discharge outfall, produced CBM water will undergo a limited water treatment process developed to reduce concentrations of certain targeted water quality parameters regulated by WDEQ
- b. Large-scale water treatment strategies have been researched, and with the current technology available, costs were prohibitive for this project and/or sufficient water treatment capacity could not be economically established with current technology
- c. Treatment technologies considered were Counter Current Ion Exchange, Reverse Osmosis, Capacitive Ion Removal, and Freeze-Thaw Technology
- d. Treatment methods which produce a waste stream require either that waste stream to be disposed of in a commercial injection well or further treatment by evaporation on site. These additional costs and/or disturbance detracted from their viability fro this project

Artificial Wetlands:

- a. This alternative was not chosen as the preferred alternative as it does not effectively address dissolved solids or the volume needs of the project
- b. Private Landowner/Lessee did not desire production of large wetland areas.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on April 12, 2007. Field inspections of the proposed Carson POD CBNG project were conducted on 7/19/2007 by: Jennifer Spegon BLM Natural Resource Specialist, Mike McKinley BLM Hydrologist, Larry Gerard BLM Biologist, Bob Irwin Yates Regulatory Specialist, Dennis Camino Yates Landman, Donna Tarver Private Surface Owner, David Tate Private Surface Owner and Jim Wolff Private Surface Owner.

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		Larry Gerard
Floodplains		X		Mike McKinley
Wilderness Values			X	Jennifer Spegon
ACECs			X	Jennifer Spegon
Water Resources	X			Mike McKinley
Air Quality		X		Jennifer Spegon

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
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		Mike McKinley
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 project area is located 7.7 miles southeast of Recluse, Wyoming in Campbell County, Township 53 North, Range 73 West, Sections 3, 4, and 10, and Township 54 North, Range 73 West, Sections 29, 32 and 33. The project area contains both private and federal surface overlaying federal minerals. There is currently natural gas development within the project area; Pinnacle's Noah Draw on the southeast, and Thomas Operating's Dugout Draw to the north.

Elevations within the project area range from 3980 to 4250 feet above sea level. The topography ranges from flat topography to prominent ridgelines cut by numerous draws. The project area is drained by ephemeral tributaries of Wildcat Creek on the south end, and Horse Creek on the north end. Both creeks are ephemeral (Thunderbird Jones and Stokes, 2007).

The project area also contains flat areas along the floodplain of Wildcat Creek and Horse Creek. The floodplain has been converted to upland grasses and agricultural fields. Native sagebrush grassland occurs throughout the area.

3.2. Vegetation & Soils

Land cover within the project area consists of sagebrush and native grasses. This vegetation type includes a combination of sparse, light, moderately dense and dense big sagebrush crown closure with a variety of understory grasses and forbs. Common species associated with this vegetation type include Wyoming big sagebrush (*Artemisia tridentate wyomingensis*), silver sagebrush (*Artemisia cana*), western wheat grass (*Pascopyrum smithii*), junegrass (*Koeleria macrantha*), needle and thread grass (*Hesperostipa comata*), Sandberg blue grass (*Poa secunda*), prickly pear cactus (*Opuntia* spp.), scarlet globemallow (*Sphaeralcea coccinea*), and rabbit brush (*Chrysothamnus* spp.) (Wilsey 2006).

Cottonwood, golden willow, and juniper trees occur within the project area. The largest concentration of trees, approximately 30 cottonwoods and 60 willows, occurs in Section 29 along Horse Creek. A stand of 25 cottonwoods occurs along Homestead Draw in NSW Section 11. There are individual and small groups of cottonwoods distributed throughout the area. Historic land uses within the project area include livestock grazing, oil and gas development and wildlife habitat.

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

Dominate Ecological Sites and Plant Communities identified in this POD and its infrastructure include: Clayey 15-17" Precipitation Zone, Norther Rolling High Plains with Mixed Sagebrush/Grass

Plant Community occurs at the Bridger 13 and the Bridger 18 locations. This site occurs on land nearly level to 30% slopes on landforms which include hill sides, alluvial fans, and stream terraces, in the 15-17 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium or alluvium over residuum derived from calcareous shale. These soils have slow permeability and may occur on all slopes.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses, Green needleandthread Plant Community. The potential vegetation is about 80% grasses or grass-like plants, 10% forbs, and 10% woody plants. A mix of cool season mid-grasses and warm season grasses dominate the state.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, sagebrush and blue grama have increased. Production of the cool season grasses have decreased.

Dominant grasses include rhizomatous wheatgrasses, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, sideoats grama, and Sandberg bluegrass. Forbs commonly found in this plant community, include Louisiana sagewort (cudweed), 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. Dominant

Loany 15-17 “ Precipitation Zone, Northern Rolling High Plains with a Mixed Sagebrush/Grass Plant Community occurs on all other locations. This site occurs on land nearly level up to 50% slopes on landforms which include hill slopes and the associated alluvial fans and stream terraces, in the 15-17 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from unspecified sandstone. These soils have moderate permeability and may occur on all slopes.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses/Needleandthread/Big Bluestem Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. A mix of warm and cool season mid-grasses dominate the state.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, sagebrush and blue grama have increased. Production of the cool season grasses have decreased.

Dominant grasses include needleandthread, western wheatgrass, little bluestem 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.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from rock layers on ridges to 8 inches in bottomlands. Erosion potential varies from slight to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area.

For more detailed soil and vegetation information, see the NRCS Soil Survey WY705.

3.2.1. Wetlands/Riparian

No wetland/riparian areas were noted during the onsite within the POD boundary. The channels within the project area are well vegetated grassy swales of dry land species, generally without defined bed and bank and therefore are not indicative of a riparian environment.

3.2.2. Invasive Species

The operator confirmed the following Wyoming Energy Resource Information Clearinghouse (www.weric.info) identified infestations during field investigations: Leafy Spurge, Canadian thistle, buffalo bur, Perennial pepperweed, and salt cedar, Scotch Thistle, Russian Knapweed, field bindweed in addition to buffalobur, burdock, cocklebur and jointed goatgrass listed by Campbell County.

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

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Thunderbird-Jones and Stokes (TJS) in 2006. Three bald eagle surveys were conducted in 2005 and 2006. TJS conducted surveys for sage and sharp-tailed grouse on April 4, 13, and 22, 2006, and on 2, 10, and 21 April, 2007. A ground survey for sage grouse was conducted for the Williams lek on 26 May 2007 but access was restricted to the Dugout lek. A habitat assessment was conducted on 6, 22 May, and June 5, 2006. During this time TJS verified the location of known raptor nests and conducted mountain plover surveys. TJS conducted a ground survey for sage and sharp-tailed grouse on May 6, 2006. Raptors surveys were conducted on May 6, and 22, 2006, and on May 26 and June 19, 2007. Mountain plover surveys were conducted on 22 May and June 5, 2006 but not completed in 2007 due to habitat conditions. Burrowing owl and prairie dog surveys were conducted on 22 May and June 5, 2006 and on May 26 and June 19, 2007.

TJS conducted a habitat assessment for Ute ladies'-tresses orchid on 6 and 22 May and 5 June 2006.

A BLM biologist conducted field visits on June 19 and 20, 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. The biological assessment for the Carson project is being incorporated into this environmental assessment document.

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 project area include pronghorn, mule deer, and white-tailed deer. The WGFD has determined that the project area contains Winter/Yearlong range and Yearlong for mule deer and white-tailed deer and Winter range, Winter/Yearlong and Yearlong range for pronghorn antelope. The antelope are part of the Gillette herd unit estimated to be 17, 457 in 2005. The population objective for the unit is 11,000. Mule deer are part of the Powder River herd unit estimated to be 54,495 in 2005. The herd objective is 52,000.

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. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of Wildcat and Horse Creek which are tributaries to the Little Powder River. Wildcat and Horse Creek are ephemeral and flow primarily in response to snow melt and rain fall. Fish that have been identified in the Little Powder River watershed are listed in the PRB FEIS (3-156-159).

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151). Species observed by TJS include Brewer’s sparrow, ferruginous hawk, and greater sage-grouse.

3.3.4. Raptors

Fourteen raptor nests were identified within the Carson project area. In 2007, there were 4 active nests. Ten nests were inactive in 2007. Seven nests are located within the project boundaries.

Table 3.3.4.1. Documented raptor nests within the Carson project area in 2007 (UTM Zone 13, NAD83).

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
4777	FEHA	446684 4941236	NWNW 32, 54-73	ROCK	REMNANTS	INAC
4778	FEHA	448797 4941235	NWNE 33, 54-73	ROCK	POOR	INAC
4779	FEHA	446950 4941015	SESW 32, 54-73	ROCK	POOR	INAC
4780	FEHA	446952 4941015	SESW 32, 54-73	ROCK	POOR	INAC
4781	RTHA/ GHOW	446293 4940594	NESE 31, 54-73	CTL	GOOD	ACT
Buow77	BUOW	447893 4940146	SESE 32, 54-73	PRAIRIE DOG BURROW	NA	INAC
4782	RTHA/ GHOW	450671 4940130	SWSE 34, 54-73	CTL	GOOD	ACT
827	GHOW	450954 4940028	SESE 34, 54-73	CTL	POOR	INAC
4783	FEHA	450440 4937604	SWNE 10, 53-73	GRD	FAIR	INAC
4166	GOEA	451098	SENE 10, 53-73	CTL	GOOD	ACT

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS
		4937562				
4784	SWHA	448769 4937548	SWNE 9, 53-73	CTL	GOOD	INAC
4785	UNK	446384 4942163	NWSW 29, 54-73	CTL	GOOD	INAC
4786	FEHA	448905 4941362	NWNE 4, 54-73	ROCK	REMNANT	INAC
4787	RTHA	449392 4939162	NESE 4, 53-73	POWER POLE	GOOD	ACT

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

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

3.3.5.1.1. Black-footed ferret

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

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

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

Two active prairie dog colonies were identified by TJS (2007) within the Carson project area, total acreage is 2.8 acres. The closest ferret reintroduction area is 30 miles north of the Carson POD. Suitable black-footed ferret habitat is not present within the Carson project area.

3.3.5.1.2. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (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 project is located within the Little Powder River Watershed. Wildcat and Horse Creek and its tributaries are ephemeral drainages that flow to the Little Powder River, (TJS 2007). There are no springs within the project area (George 2007). A draw in SW Section 32 contained 3 inches of standing water and a filled reservoir with upland vegetation along the banks. No disturbance is planned in the draw. The project area consists of upland vegetation. Suitable orchid habitat is not present within the Carson 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*), long-billed curlew (*Numenius americanus*).

3.3.5.2.1. Bald eagle

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

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

No bald eagles were observed near the project area during the 2005 and 2006 winters. BLM records indicate a historic bald eagle winter roost location 0.7 miles northeast of the POD along Horse Creek.

The majority of trees capable of supporting roosting and nesting bald eagles in SESE Sec 2, NWSW Sec 11 and along Horse Creek are located approximately 0.5 miles and greater outside of the POD.

The project area has a limited year round prey base in the form of prairie dogs, and lagomorphs (hares and rabbits). Within the project area there are 2.8 acres of active prairie dog colonies. There is a large 300 + acre reservoir northeast of the POD. As the reservoirs are developed and begin taking water, waterfowl will likely be attracted to the project area and provide an additional prey source for bald eagles.

3.3.5.2.2. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog’s Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS.

Two small active black-tailed prairie dog colonies were identified during site visits TJS within the project area.

Prairie Dog Colonies Located Within the Carson Project Area and Near the Boundaries.

Legal Location Township, Range and Section	Size Acres	Location to Project Area
SWSW 33 54-73	2	within project area.
SWNW 11 53-73	.8	outside project area.

3.3.5.2.3. Greater sage-grouse

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

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). A group of sage grouse hens and chicks were observed along a seep area created from CBNG reservoir storage.

Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), the primary shrub, occurs throughout the project area in a patchy mosaic of sparse (0-5% cover), low (5-10% cover), moderate (10-15% cover), and dense (15-25% cover) stands. On average, the sagebrush ranged in size from 15 to 20 inches tall. Suitable sage-grouse habitat is present throughout the project area. BLM records identified two sage grouse leks within 3.0 miles of the Carson project area. These lek sites are identified below (Table 6).

Table 6. Documented sage-grouse leks within 3 miles of the project in 2007.

Lek ID	UTM NAD83	Legal Location	Status (Peak Males)	Distance From Project Area (Miles)
Dugout	451827 4943217	SESW 23 T54N, R73W	2007 0 males 2006 1 males	1.8 miles from project area.
Williams	449972 4941025	NWSE 34 T54, R73W	2007 8 males 2006 0males	.45 miles from project area

Sharp-tailed grouse

Multiple surveys were conducted by TJS and found no sharp-tailed grouse using the area. The closest known sharp-tailed grouse lek is 8.3 miles southwest of the POD.

3.3.5.2.4. Mountain plover

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

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. 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).

Suitable mountain plover habitat is limited to 2 small prairie dog towns (2.8 acres), and a few level ridge tops with sparse grass cover (TJS 2005).

3.3.5.2.5. Burrowing owl

Burrowing owl nesting habitat consists of open areas with mammal burrows. Individual Burrowing Owls have moderate to high site fidelity to breeding areas and even to particular nest burrows (Klute et al. 2003). Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully during the previous year. Favored nest burrows are those in relatively sandy sites (possibly for ease of modification and drainage), areas with low vegetation around the burrows (to facilitate the owl's view and hunting success), holes at the bottom of vertical cuts with a slight downward slope from the entrance, and slightly elevated locations. The nesting season within the Powder River Basin typically runs from April 15 to August 31.

Burrowing owls use a wide variety of arid and semi-arid environments, with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground. Primary threats across the North American range of the burrowing owl are habitat loss and fragmentation primarily due to intensive agricultural and urban development, and habitat degradation due to declines in populations of colonial burrowing mammals (Klute 2003). Murphy et al. (2001) found that burrowing owls were greatly reduced or completely extirpated from northwest and central North Dakota.

One inactive burrowing owl nest was identified in a small 2 acre prairie dog colony within the project area.

3.4. West Nile Virus

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

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

WNv.

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

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3
2006	65	0	2	2
2007	119	20	None reported	1

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 Horse Creek, a tributary to the Little Powder River drainage system. Horse Creek has an average slope of 605 feet/mile. Average bank full widths are 40 feet with average channel depths of 1.6 feet. Channels are generally stable, grass-covered and gently sloping. Vegetation includes native grasses, sage, and some prickly pear cactus.

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 19 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 20 to 1,039 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 Horse Creek which is tributary to the Little Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Little Powder River Watershed, the EC ranges from 1,785 at Maximum monthly flow to 3,300 at Low monthly flow and the SAR ranges from 4.44 at Maximum monthly flow to 6.94 at Low monthly flow. These values were determined at the USGS station located at Dry Creek near Weston, WY (PRB FEIS page 3-49).

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the Carson POD project prior to on-the-ground project work (BFO project no. 070070102). ACR Consultants conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. 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	National Register Eligibility
48CA6512	Historic Site	Not Eligible
48CA6513	Prehistoric Site	Not Eligible
48CA6514	Prehistoric Site	Not Eligible
48CA6515	Historic Site	Not Eligible

Site Number	Site Type	National Register Eligibility
48CA6516	Historic and Prehistoric Site	Not Eligible
48CA6517	Historic and Prehistoric Site	Not Eligible
48CA6518	Historic and Prehistoric Site	Not Eligible
48CA6519	Historic and Prehistoric Site	Not Eligible

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 26 proposed well locations, 1 is on an existing or reclaimed conventional well pad, 22 can be drilled without a well pad being constructed and 3 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling the 22 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 100 x 130 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 22 wells would involve approximately 0.1 acre/well for 2.2 total acres. The other 3 wells (2 slotted pads 120 x 30 feet .1 acre each) and 1 requiring cut & fill pad construction would disturb approximately .3 acres/well pad for a total of .5 acres. The total estimated disturbance for all 26 wells would be 2.7 acres.

Approximately 5.7 miles of improved roads would be constructed to provide access to various well locations. Approximately 11.6 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. There would not be any pipeline constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	22	0.1/acre	2.2	Long Term
Constructed Pad	3	or Site Specific	0.5	
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	2	0.01/acre	0.02	Long Term
Impoundments				Long Term
On-channel	6	Site Specific	19.65	
Off-channel		Site Specific		
Water Discharge Points	6	Site Specific or 0.01 ac/WDP	0.06	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads				Long Term
No Corridor	1.7	45' Width	9	
With Corridor	4	75' Width	32	
2-Track Roads				Long Term
No Corridor	.6	20' Width	1.5	
With Corridor	3.8	45' Width	21	
Pipelines				Short Term
No Corridor	0		0	
With Corridor	12.7	30' Width	46.1	
Buried Power Cable				Short Term
No Corridor	.5	25' Width	1.5	
Overhead Powerlines	1.5	15' Width	2.8	Long Term
Additional Disturbance				
4 Storage Yards	200 x 200 ft	.92 acres	3.6	Short 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”.

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

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

- Loss of soil vegetation cover, biologic crusts, organic matter and productivity.
- Soil Erosion would also affect soil health and productivity. Erosion rates are site specific and are dependant on soil, climate, topography and cover.
- Soil Compaction is the collapse of soil pores resulting in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Modification of hill slope hydrology.

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

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

4.1.1. Wetland/Riparian

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment.

4.1.2. Invasive Species

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

1. Education, through communication with the landowners to address their concerns for weed treatment. Provide weed training for construction foreman on weed identification and prevention.
2. Inspection will be ongoing from preplanning staking to maintenance of the project.
3. Prevention will be incorporated by pre-treating prior to construction.
4. Control by cleaning equipment between job locations. A Pesticide Use Proposal (PUP) has been submitted with the POD. In addition the operator has included a list of herbicides and has stated hand pulling will be used also in the Management Plan for Noxious Weeds in the proposed Surface Use Plan of Operations.
5. Reclamation will incorporate minimizing soil movement and seeding and mulching with weed free products.

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

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

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Little Powder River drainage, which is approximately 43.2% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Little Powder River and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Little Powder River Watershed.
- The WMP for the Carson POD proposes that produced water will not contribute significantly to flows downstream due to full-containment water management strategy.

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 ranges for mule deer, yearlong range for white-tailed deer, and winter and yearlong ranges for 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 contained in 6 on-channel reservoirs (5 existing and 1 proposed). If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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.

With numerous existing reservoirs surrounding the project area and one proposed reservoir within the

project area, the potential for mosquito breeding areas will increase. With the creation of more reservoirs within the sage brush community more species are being exposed to the West Nile virus. Mortality rates are likely to increase and reproductive success is likely to decrease in most bird species using the region. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

Table 5. Infrastructure within close proximity to documented raptor nests within the Carson project area (Timing limitations will apply to this infrastructure).

BLM ID#	SPECIES	UTM (NAD 83)	STATUS/CONDITION	WELL / PIT NUMBER
4778	FEHA	448797 4941235	INAC POOR	19 BRID, 20BRID, 22 BRID road and utility coor. and powerline
4779	FEHA	446950 4941015	INAC POOR	14 BRID, 1DUGO, road and utility coor.
4780	FEHA	446952 4941015	INAC POOR	14 BRID, road and utility coor.
4781	RTHA/GHOW	446293 4940594	ACTI GOOD	1DUGO, 2 DUGO, Heinrich15 reservoir, road and utility coor.
Buow77	BUOW	447893 4940146	INAC NA	25BRID, road and utility coor., temporary yard
4782	RTHA/GHOW	450671 4940130	ACTI GOOD	27 BRID, road and utility coor.
827	GHOW	450954 4940028	INAC POOR	27 BRID, road and utility coor.
4783	FEHA	450440 4937604	INAC FAIR	36 BRID, road and utility coor.
4166	GOEA	451098 4937562	ACTI GOOD	36 BRID, road and utility coor. proposed overhead power
4787	RTHA	449392 4939162	ACTI GOOD	29BRID road and utility coor.

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 project area is primarily sagebrush grassland habitat type; therefore nesting substrates (i.e. cliffs and trees) for many raptor species are sparse. A few scattered cottonwood trees are found in the draws throughout the project area. Although nine of the fourteen nests were inactive in 2007, some or all of them may become active in the future. Despite commitments such as telemetry metering to limit well visits, well visits during the nesting season would likely be necessary which could lead to nest failure through nest abandonment or predation.

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 two species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1.

4.2.5.1. Threatened and Endangered and Sensitive Species

Table 4.2 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.	NP	NE	2 prairie dog colonies within project area, (2.8 acres).
Threatened				
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

LAA Likely to adversely affect

NE No Effect.

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

4.2.5.1.1. Black-footed ferret

Because suitable habitat of sufficient size does not exist within the project area as acreage is less than the 1,000 acres capable of supporting a black-footed ferret population and the project area is not within or adjacent to a potential reintroduction area, it is highly unlikely ferrets are present. Implementation of the proposed development will have “no effect” on the black-footed ferret.

4.2.5.1.2. Ute’s Ladies Tresses Orchid

Produced water will be stored in 6 reservoirs (5 existing and 1 proposed). The reservoirs are on-channel and are located within dry upland drainages. No springs have been identified within the Carson project area (TJS 2007). Suitable habitat is not present within the Carson project area.

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. Implementation of the proposed coal bed natural gas project should have “no effect” on the Ute ladies’- tresses orchid as neither suitable habitat nor a seed source are present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

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

Table 4.3 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	NP	NI	Habitat not present
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	MIH	Sagebrush/grassland habitat will be affected.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body.	K	MIH	Project includes overhead power.
Brewer's sparrow (<i>Spizella breweri</i>)	Basin-prairie shrub	K	MIH	Sagebrush cover will be affected.
Burrowing owl (<i>Athene cunicularia</i>)	Grasslands, basin-prairie shrub	K	MIH	Loss prairie dog burrows.
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	S	MIH	Inactive nest present.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIH	Sagebrush cover will be affected.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	S	MIH	Sagebrush and grassland habitat will be lost.
Mountain plover (<i>Charadrius montanus</i>)	Short-grass prairie with slopes < 5%	S	MIH	Prairie dog colonies and short grass prairie may be lost.
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	K	MIIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIIH	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	MIIH	Prairie dog towns will be affected.
Fringed myotis (<i>Myotis thysanodes</i>)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (<i>Myotis evotis</i>)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (<i>Euderma maculatum</i>)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (<i>Vulpes velox</i>)	Grasslands	S	MIIH	Sagebrush and grassland habitat will be lost.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Caves and mines.	NP	NI	Habitat not present.

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

Presence

K Known, documented observation within project area.

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

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

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

Project Effects

NI No Impact.

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

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

BI Beneficial Impact

4.2.5.2.1. Bald eagle

The Carson project area is surrounded by extensive natural gas development, existing 3-phase overhead power lines can be found surrounding the project area. There are 1.84 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Yates will be using existing 3 phase overhead power lines within the project area, and plan to construct 1.52 miles of new overhead power lines within the Carson project area.

The presence of overhead power lines and roads may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking, such as the Carson project area. From May 2003, through August 14, 2007, Service Law Enforcement salvage records for northeast Wyoming identified that 180 raptors, including 1 bald eagle, 106 golden eagles, 1 unidentified eagle, 28 hawks, 44 owls and 8 unidentified raptors and 1 great-blue heron were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2007). Of the 180 raptors electrocuted 58 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with power lines (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.

Improved private roads access the project area on the north, east, and south and are in close proximity to groups of cottonwood and willow trees. With the increase in gas development in the area, vehicle size and traffic volume will also increase.

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 six reservoirs (5 existing and 1 proposed) 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.

4.2.5.2.2. Black-tailed prairie dog

There is an existing 2 track road and a proposed utility corridor within an active prairie dog colony. There would be a minimal effect to prairie dog colonies from this surface disturbance unless the prairie dog colonies grow in size. Mineral related traffic on the adjacent road may result in prairie dog road mortalities. The access road and corridor was the landowner and operator preference.

4.2.5.2.3. Greater sage-grouse

Suitable sage-grouse habitat is present through out the Carson project area, except in hay meadows.

Well Bridger 17- the disturbance corridor will be kept to 25 feet with minimum brush hogging to minimize the loss of sage-grouse nesting habitat.

One well and the associated infrastructure go through moderately dense (10-15% cover) sagebrush, resulting in the loss of approximately 1 acre of good sage-grouse nesting and early brood rearing habitat. Four wells and their associated infrastructure go through low density (5-10% cover), resulting in the loss of 5 acres of early brood rearing habitat and protective cover. No better alternatives were available.

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

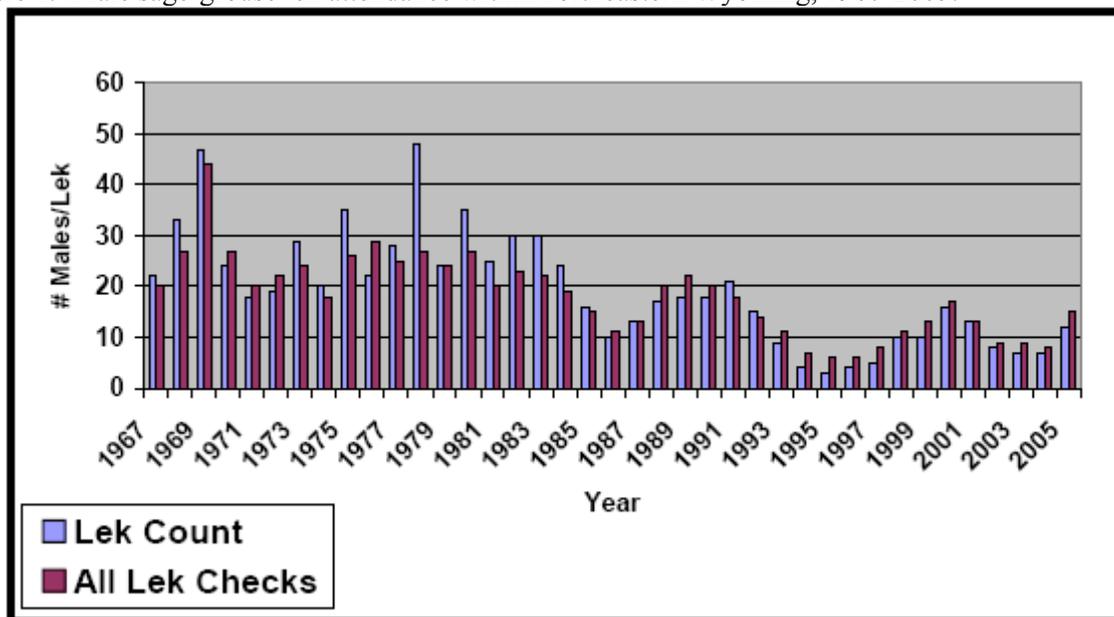
prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. In press).

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 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).

4.2.5.2.4. Mountain plover

The majority of the Carson project area is unsuitable mountain plover habitat. There are two small active prairie dog colonies within the project area that are potential mountain plover habitat. One road and pipeline corridor is planned through a 2 acre prairie dog colony. The access road and corridor was the landowner and operator preference.

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 (USFWS) 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).

4.2.5.2.5. Burrowing Owl

An inactive burrowing owl nest was located in a small 2 acre prairie dog colony within the Carson POD. Use of roads and pipe line corridors may increase burrowing owl vulnerability to vehicle collision. Overhead power lines provide perch sites for raptors that could potentially result in increased burrowing owl predation. CBNG infrastructure such as roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

A .25 mile buffer zone will be placed on active burrowing nest locations within the Carson POD during the nesting season, April 15 – August 31.

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 CBM operations.

Cumulatively, there are many sources of standing water, beyond CBM discharge, throughout the PRB that would add to the potential for mosquito habitat. Sources include; natural flows, livestock watering

facilities, coal mining operations, and outdoor water use and features in and around communities.

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Little 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 full-containment 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 15.0 gpm per well or 390.0 gpm (0.87 cfs or 629 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Little Powder River drainage, the projected volume produced within the watershed area was 21,330 acre-feet in 2006 (maximum production is estimated in 2005 at 22,427 acre-feet). As such, the volume of water resulting from the production of these wells is 2.9% 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 34% to groundwater aquifers and coal zones in the Little Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 132.6 gpm will infiltrate at or near the discharge points and impoundments (214 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 20 to 1,039 feet compared to 490-700 feet to the lower and upper Canyon, Cook, Wall, and Pawnee coal seams. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to “...resaturate and repressurize the

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

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

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

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

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

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

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

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

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		3	1,000
Least Restrictive Proposed Limit		10	3,000
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
Predicted Produced Water Quality Co-mingled Canyon Cook, Wall Pawnee Coal Zones	1,050	8.7	1,630

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1,050 mg/l TDS which is (Klute, 2003) within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The co-mingled quality for the water produced from the Upper and Lower Canyon, Cook, Wall, and Pawnee target coal zones from these wells is predicted to be similar to the sample water quality collected from outfall 002 at the Bulkley Playa location (T54N, R73W, Sec 34) near the POD. A maximum of 15.0 gallons per minute (gpm) is projected is to be produced from these 26 wells, for a total of 390.0 gpm for the POD. See Table 4.5.

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

There are 6 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, 6 impoundments (79.5 acre-feet) would potentially be constructed within the project area. These impoundments will disturb approximately 19.65 acres including the dam structures of which all 6 would be on-channel reservoirs. 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 0.13 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 2005 at a total contribution to the mainstem of the Little Powder River of 13 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 26 wells is anticipated to be a total of 390.0 gpm or 0.87 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Little Powder River from this action (0.13 cfs) may add a maximum 0.1 cfs to the Little Powder River flows, or 0.8% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Little Powder River Watershed (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

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

The operator has applied for a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ. The WYPDES permit will also address existing downstream concerns, such as irrigation use, in the COA for the permit.

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

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

In-channel downstream impacts are addressed in the WMP (page 6) for the Carson POD prepared by Gene R. George & Associates, Inc. for Yates Petroleum Corporation.

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 Little Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

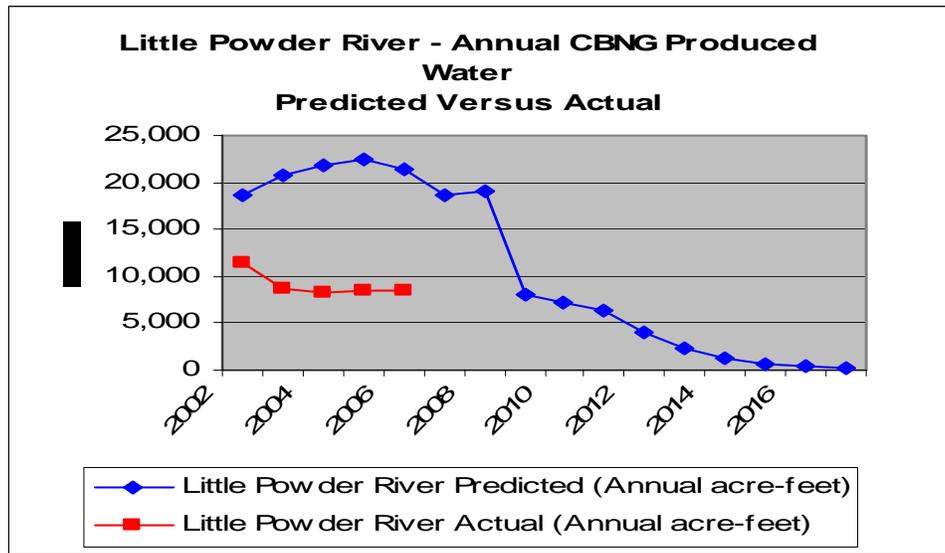
As of March 2007, all producing CBNG wells in the Little Powder River watershed have discharged a cumulative volume of 45,336 acre-ft of water compared to the predicted 105,024 acre-ft disclosed in the

PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 43.2 % of the total predicted produced water analyzed in the PRB FEIS for the Little Powder River watershed.

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

Year	Little Powder River Predicted (Annual acre-feet)	Little Powder River Predicted (Cumulative acre-feet from 2002)	Little Powder River Actual (Annual acre-feet)		Little Powder River Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	18,613	18,613	11,391	61.2	11,391	61.2
2003	20,822	39,435	8,767	42.1	20,158	51.1
2004	21,832	61,267	8,266	37.9	28,424	46.4
2005	22,427	83,694	8,529	38.0	36,953	44.2
2006	21,330	105,024	8,383	39.3	45,336	43.2
2007	18,607	123,631				
2008	19,121	142,752				
2009	8,016	150,768				
2010	7,124	157,892				
2011	6,439	164,331				
2012	3,930	168,261				
2013	2,340	170,601				
2014	1,335	171,936				
2015	699	172,635				
2016	350	172,985				
2017	133	173,118				
Total	173,118		45,336			

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



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

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

As referenced above, the PRB FEIS did disclose that cumulative impacts 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 Little Powder River drainage, which is approximately 43.2% 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 Little Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

Non eligible sites 48CA6518 and 48CA6519 will be impacted by the project. There are no eligible sites within the APE of the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 9/5/07 that no historic properties exist within the APE.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim Wyoming SHPO	Wyoming SHPO	No
Bob Irwin	Yates	Regulatory Specialist	Yes
Dennis Camino	Yates	Landman	Yes
Donna Tarver	Rancher	Private Surface Owner	Yes
David Tate	Rancher	Private Surface Owner	Yes
Jim Wolff	Rancher	Private Surface Owner	Yes

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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