FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Williams Production RMT
Playa POD
ENVIRONMENTAL ASSESSMENT –WY-070-EA10-124

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Williams Production RMT's Playa Coal Bed Natural Gas (CBNG) POD comprised of the following 6 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Playa Litton	14-25	SWSW	25	42N	72W	WYW105937
2	Playa Litton	43-25	NESE	25	42N	72W	WYW105937
3	Playa Litton	12-26	SWNW	26	42N	72W	WYW105937
4	Playa Litton	23-26	NESW	26	42N	72W	WYW105937
5	Playa Litton	32-26	SWNE	26	42N	72W	WYW105937
6	Playa Litton	43-26	NESE	26	42N	72W	WYW105937

The following impoundments were inspected and approved for use in association with the primary water management strategy for the Playa POD. Impoundments marked with an asterisk (*) are approved secondary containment structures and will only be used in the event that additional storage capacity is needed. The operator will be required to inform the BLM via sundry notice and ensure that the appropriate bonds are in place prior to utilizing these facilities.

IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
Peasely #1 Pit	SENW	26	42	72	12.11	Playa	WYW105937
Litton 43-26	NESE	26	42	72		Playa	WYW105937
*Litton 24-25	SESW	25	42	72	15.34	4.73	WYW105937
*Bowers 44-25	SESE	25	42	72	.27	.27	WYW105937

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 Final 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 Landowners.
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. I have further determined that there are no significant impacts beyond those analyzed in the PRB FEIS to which this Environmental Assessment EA is tiered.

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: 3/16/2010

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Williams Production RMT
Playa POD
PLAN OF DEVELOPMENT
WY-070-EA10-124

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose and need of the proposed action is to determine how and under what conditions to allow the operator to exercise lease rights granted by the United States to develop the oil and gas resources on federal leaseholds.

Development of the Playa POD wells would return royalties to the federal Treasury as well as stimulate local economies.

The BLM recognizes the extraction of natural gas is essential to meeting the nation's future needs for energy. As a result, private exploration and development of federal gas reserves are integral to the agencies' oil and gas leasing programs under the authority of the Mineral Leasing Act of 1920, as amended, and the Federal Land Policy Management Act (FLPMA) of 1976. The oil and gas leasing program managed by BLM encourages the development of domestic oil and gas reserves and reduction of the U.S. dependence on foreign sources of energy.

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

This alternative would consist of no new federal wells. The Department of Interior's authority to implement a "no action" alternative that precludes development is limited. 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." The No Action Alternative is further described in the PRB FEIS, Volume 1, pages 2-54 through 2-62.

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Williams Production RMT's Playa POD Plan of Development (POD) for 6 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 6 wells proposed within this POD; the wells are vertical bores proposed on a 160 acre spacing pattern with 1 well per location. Each well will produce from Wyodak coal seams. Proposed well house dimensions are 6 ft wide x 6 ft length x 6 ft height. Well house color is Covert Green, selected to blend with the surrounding vegetation. Proposed wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Playa Litton	14-25	SWSW	25	42N	72W	WYW105937
2	Playa Litton	43-25	NESE	25	42N	72W	WYW105937
3	Playa Litton	12-26	SWNW	26	42N	72W	WYW105937
4	Playa Litton	23-26	NESW	26	42N	72W	WYW105937
5	Playa Litton	32-26	SWNE	26	42N	72W	WYW105937
6	Playa Litton	43-26	NESE	26	42N	72W	WYW105937

Water Management Proposal: The following two playas are proposed for use in association with the primary water management strategy for the Playa POD. Two on-channel impoundments listed, which are marked with an asterisk (*), will only be used as secondary containment structures and will not be part of the primary water management strategy.

IMPOUNDMENT Name / Number	Qtr/Qtr	Section	TWP	RNG	Capacity (Acre Feet)	Surface Disturbance (Acres)	Lease #
Peasely #1 Pit	SENW	26	42	72	12.11	Playa	WYW105937
Litton 43-26	NESE	26	42	72		Playa	WYW105937
*Litton 24-25	SESW	25	42	72	15.34	4.73	WYW105937
*Bowers 44-25	SESE	25	42	72	.27	.27	WYW105937

County: Campbell

Applicant: Williams Production RMT

Surface Owners: Gene and Patrica Litton

Project Description:
The proposed action involves the following:

- Drilling of 6 total federal CBM wells in Wyodak coal zone to depths of approximately 895 feet.

- 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, central metering facility and well visitation. Metering of any particular site is dependent upon circumstances such as:

    - Meter calibration by measurement personnel (initial setup plus one visit per quarter maximum).
    - Well work (pump replacement work as needed that requires a rig on location)

- Stimulations (typical water enhancement generally done in conjunction with well repair)
- Other Repairs/Maintenance (water meters, electrical, leaks, fencing, weeds, etc.)
    - Generally these repairs, if they are not large in magnitude, are handled during routine visits by lease operators.
- Generators (temporary in nature but need to be re-fueled and serviced accordingly)
    - Generators typically provide power for 4 – 8 wells from one location and sometimes are needed for water transfer stations until permanent power is installed.
- Stormwater Pollution Prevention Plan monitoring
    - Visits are required at a minimum once every two weeks to ensure proper function of stormwater controls until successful revegetation and stabilization have occurred.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 4 discharge points, 2 natural playas, and 2 on-channel stock water reservoirs within the Antelope Creek primary watershed. The playas will be the primary water management strategy and the on-channel reservoirs will be secondary, used only in the event that additional storage is needed.

- An unimproved and improved road network.

- An above ground power line network to be constructed by a contractor. The proposed route has been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction has not been scheduled and will not be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the electrical drop sites: SWNE sec 26 T42N R72W and NESE sec 25 T42N R72W.

- A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 60 months or less. Noise level is expected to be 68 decibels at 23 feet distance.

- A buried gas, water and power line network, and 1 central gathering/metering facility.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP in the POD and individual APDs. Also see the subject POD and 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 0.5 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. 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 Playa POD POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

- Access to well Playa Litton 14-25 will come from a primitive road to the north. The existing primitive road to the east will be closed and signed off. This change will minimize a loop system of road and will allow utilities to be corridored.

- Williams will use the existing reservoir: Bowers 44-25 located SESE section 25 T42N R72W, instead of constructing the proposed Litton 44-25 reservoir. This action will minimize new disturbance.

- Original proposed plan for the Playa POD had two entrances off Highway 59 into the east side of the POD. Access has been changed to enter only from the northern location where the Playa Litton 32-26 well sits. A culvert will be needed. The road to the south is an existing primitive road that will be closed and signed off so Williams will not use. This change will minimize a loop system of roads and will allow utilities to be corridored.

- The header station will be moved approximately 500 feet northwest to the 32-26 well location. Utility lines will be in the road corridor and run in a southeast direction following the primitive road. Moving the header will change the amount of needed improved road from 2.25 acres to 0.48 acres.

- Access to the Playa Litton 43-26 well location will come from a primitive road to the north. The existing primitive road to the east will be closed and signed so Williams will not to use. This change will minimize a loop system of roads and will allow utilities to be corridored.

Description of Mitigation Measures (applied as Conditions of Approval):
The operator is responsible for the COAs attached to this EA and will be issued an Incident of Non-Compliance if found to be in violation of any COA.

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. Wildlife

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

2. 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.

2.3.2.2. Threatened, Endangered, or Sensitive Species

2.3.2.2.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the APD/POD or 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.

2.3.2.2.2. Ute Ladies'-tresses Orchid

1. If suitable habitat for Ute ladies'-tresses cannot be avoided, surveys will be conducted in compliance with USFWS standards (USFWS 1995) by a BLM approved biologist or botanist. Surveys can only be conducted between July 20 and August 31.

2. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid the establishment of noxious weeds.

2.3.3. Site specific mitigation measures

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

Surface Use

1. All pit spoil must be placed back in the pit once dry. If necessary, the pit area should be mounded slightly or restored to the original contour to allow for settling and positive surface drainage.

2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the Playa POD is Covert Green.

3. The operator will seed on the contour to a depth of no more than 0.5 inch to maintain quality and purity, 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:

10-14" Precipitation Zone
Loamy Ecological Site

Seed Mix

Species	**% in Mix**	Lbs PLS*
Western Wheatgrass (Pascopyrum smithii)	20	2.5
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1
Green needlegrass (Nassella viridula)	25	3.0
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	10	1
Prairie coneflower (Ratibida columnifera)	4	0.5
White or purple prairie clover (Dalea candidum, purpureum)	4	0.5
Rocky Mountain beeplant (Cleome serrulata) /or ***American vetch***(Vicia americana)	3	0.5
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax***(Linum lewisii)	4	0.5
Indian ricegrass (Achnatherum hymenoides)	20	2.5
Totals	**100%**	**12 lbs/acre**

*PLS = pure live seed
*Northern Plains adapted species
*Double this rate if broadcast seeding

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. A site-specific inventory will allow the resource specialist to suggest the most appropriate species, percent composition, and seeding rate for reclamation purposes.

Wildlife
The following conditions will minimize impacts to sage-grouse:

1. No surface disturbing activities are permitted for the well locations, facilities, access roads, and impoundments between March 1-June 15. This condition will be implemented on an annual basis for the duration of surface disturbing activities. This timing limitation will affect the entire Playa POD.

2. If a previously unknown lek is identified during surveys, additional areas may be included in the above referenced timing restriction (March 1-June 15). 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.

A sage-grouse survey will be conducted for all known leks within 2 miles of the POD by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist no later than July 31of the current year. Currently, this applies to the 36-59 lek.

3. The low volume generator will be located near county road 59 (SWNE S26 T42N R72W).

4. Generator noise measured at the 36-59 lek will be kept below 49 dBA.

5. Central metering facility will be established at (SENE S26 T42N R72W)

Water Management

1. Water discharged into playas will not exceed the existing identified vegetative green line.

2. In an effort to demonstrate that no adverse impacts will affect the playas, the operator will supply a copy of the baseline soil investigation prior to discharging effluent into the playas.

3. If additional storage is needed from the approved secondary containment reservoirs, the operator will submit to the BLM a sundry notice, appropriate WSEO permits and ensure the appropriate bond amount is in place, prior to discharging effluent.

4. Submit a copy of the approved WYPDES permit as it is issued from the WDEQ. If there are additional monitoring wells (containment unit, water quality monitoring stations) the operator will submit updated maps with the locations identified.

2.4. Alternatives considered but not analyzed in detail

Treatment of CBNG water by reverse osmosis, sulfur burning, freeze-thaw, or ion exchange is useful in bringing discharged water into compliance with permit effluent limits. In the case of the Playa POD, Williams has chosen to currently not pursue treatment options. Williams has also chosen not to pursue land application or other managed irrigation options within the Playa POD.

2.5. Summary of Alternatives

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

Table 2.5 Summary of the Alternatives

Facility	**Alternative A (No Action) Existing Number or Miles**	**Alternative B (Original Proposal) Proposed Number or Miles**	**Alternative C (Environmental Alt.) Revised Number or Miles**
Total CBNG Wells	0	6	6
Well Locations Nonconstructed	0	0.6 acres	0.6 acres
Gather/Metering Facilities	0	0.005 acres	0.005 acres
Ancillary (Staging/Storage Areas)	0	2 staging areas	2 staging areas

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
		(200'x 200') 1.8 acres	(200'x 200') 1.8 acres
Engineered Roads No Corridor With Corridor	 0 0	 2.07acres 0.18acres	 0.29acres 0.19acres
Primitive Roads No Corridor With Corridor	 9.01 acres 0	 2.34 acres 10.39 acres	 0.29 acres 12.94 acres
Buried Utilities No Corridor With Corridor	 0 0	 2.29acres 0.26 acres	 0.32 acres 1.13 acres
Overhead Powerlines	0	1.51 acres	1.51 acres
Impoundments On-channel Off-channel Lined Unlined	 0 0 0	 0 17.7 acres 0	 0 17.7 acres 0
Water Discharge Points	0	0.06 acres	0.06 acres
Channel Disturbance Headcut Mitigation Channel Modification	0	.08 acres	.08 acres
TOTAL ACRES DISTURBANCE		39.29 acres	36.91 acres

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 5/22/2008 Field inspections of the proposed Playa POD CBNG project were conducted on 10/13/2009 by:

NAME	AGENCY
Meleah Corey	BLM
Scott Jawors	BLM
Ardeth Hahn	BLM
Ray Stott	BLM
Nathan Lopez	Williams
Eric Sanders	Williams
Randee Jespersen	Williams
Jenna Foss	GMEC
Bill Bellah	GMEC

NAME	AGENCY
Duane Joslyn	Williams
Charlie Bolerjack	Williams
Penny Bellah	Williams
Gene Litton	Land 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.

3.1. Topographic Characteristics of Project Area

The wells are located in Campbell County, Wyoming. The project area ranges in elevation from 4,760 to 5,084 feet above sea level. The topography of the area is flat to rolling grasslands with minimal sagebrush inclusion. The area falls within a 12-16" precipitation zone, with most of the precipitation falling during late winter and spring. The surface ownership in the general area is a mixture of private, State, and BLM surface, with cattle grazing, coal mining, and oil and gas development being the primary surface uses.

3.2. Vegetation & Soils

The map unit symbols for the soils identified and the associated ecological sites for the identified soil map unit symbols found within the POD boundary are listed in table 3.3 below. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and NRCS published soil survey soils information. Dominate Ecological Sites identified in this POD, including wells, facilities, and infrastructure, are predominately Sandy, Clayey, and Loamy sites.

Sandy Site

This site occurs on nearly level to 50% slopes. Landforms include alluvial fans, hillsides, plateaus, ridges and stream terraces. The soils of this site are moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have moderate, moderately rapid, or rapid permeability. The surface soil will vary from 3 to 6 inches deep and have one of the following textures: fine sandy loam, sandy loam, or loamy very fine sand. Coarser topsoils may be included if underlain by finer textured subsoil. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. The main soil limitations include depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high wind erosion potential. The low annual precipitation should be considered when planning a seeding.

The predominant plant community is: Needleandthread/ Threadleaf sedge/ Fringed sage.

This plant community is the result of moderate season long grazing. The understory of grass includes needleandthread, threadleaf sedge, and prairie junegrass. Fringed sagewort has increased. When compared to the Historic Climax Plant Community, prairie sandreed and Indian ricegrass have decreased and Threadleaf sedge, needleandthread and fringed sagewort have increased. This community is well suited to grazing by both domestic livestock and wildlife, during the spring, summer and fall.

The communities' soil biotic integrity and watershed is intact, although more than normal runoff may occur due to the sod forming vegetation.

Loamy Sites
This site occurs on gently undulating rolling land. Landforms include hill sides, alluvial fans, ridges and stream terraces. The soils of this site are deep to moderately deep (greater than 20" to bedrock), well drained & moderately permeable. Layers of the soil most influential to the plant community varies from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture. The main soil limitations include: low organic matter content and soil droughtiness. The low annual precipitation should be considered when planning a seeding.

The plant community for loamy ecological sites is: Western Wheatgrass/Cheatgrass.

This plant community is created when the Mixed Sagebrush/Grass Plant Community or the Heavy Sagebrush Plant Community is subjected to fire or brush management not followed by prescribed grazing. Rhizomatous wheatgrasses and annuals will eventually dominate the site.

Compared to the HCPC, cheatgrass has invaded with western wheatgrass and thickspike wheatgrass maintaining at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low.

This plant community is relatively stable with the rhizomatous wheatgrasses being somewhat resistant to overgrazing and the cheatgrass effectively competing against the establishment of perennial cool-season grasses.

An increase in bare ground reduces water infiltration and increases soil erosion. The watershed is usually functioning. The biotic integrity is reduced by the lack of diversity in the plant community.

Clayey sites
This site occurs on nearly level to 30% slopes. Landform: Hill sides, alluvial fans & stream terraces. The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The layers of soil having the most influence on plants vary from 4 to 8 inches thick. The surface soil will vary from 2 to 5 inches deep and have one of the following textures: silty clay, sandy clay, clay, and the finer portions of silty clay loam, clay loam, and sandy clay loam. These soils may develop severe cracks. The main soil limitations include: low organic matter content and soil droughtiness. The low annual precipitation should be considered when planning a seeding.

The plant community for clayey ecological sites is: Mixed Sagebrush/Grass.

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

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

When compared to the Historic Climax Plant Community, sagebrush and blue grama have increased.

Green needlegrass has decreased, often occurring only where protected from grazing by the sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community, which will support domestic livestock and wildlife such as mule deer and antelope.

This state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward blue grama, big sagebrush, and/or cheatgrass. The watershed is usually functioning. However, it can become at risk when blue grama sod, and/or bare ground increases.

The map unit symbols for the soils identified above and the associated ecological sites for the identified soil map unit symbols found within the POD boundary are listed in the table 3.1 below.

Table 3.1 Map Units and Ecological Sites:

Map Unit	Ecological Site
157	SANDY (10-14 NP)
221	SANDY (10-14 NP)
208	CLAYEY (10-14 NP)
228	CLAYEY (10-14 NP)
144	LOAMY (10-14 NP)
110	LOAMY (10-14 NP)
226	LOAMY (10-14 NP)

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

Table 3.2 Summary of Ecological Sites

Map Unit Name	Acres	%
Clayey 10-14" Northern Plains	365.26	28.02
Loamy 10-14" Northern Plains	93.02	7.14
Sandy 10-14” Northern Plains	845.31	64.84

3.2.1. Wetlands/Riparian

No wetland conditions were observed in the Playa project area, however there does exist the potential for wetlands to occur due to discharging effluent into the playas. Monitoring will occur as requested by the landowner. If wetlands are created, Williams may consider fencing the area in order to protect and allow the vegetation to develop and maintain water quality. These actions will be coordinated with the landowner or lessee.

3.2.2. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by calling The Wyoming Weed and Pest Council at the Campbell County Weed and Pest Control District:

- Spotted Knapweed
- Russian Knapweed
- Diffuse Knapweed
- Scotch Thistle
- Canada Thistle
- Field Bindweed

The operator or BLM did not find infestations of weed species during subsequent field investigations.

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

The land cover within the project area consists of approximately 67% grasslands, 30% sagebrush, and 3% rock/bare soil. Sagebrush habitats are present throughout the majority of the Playa POD. Mechanical sage brush treatment occurred in NE S26, SESE, NESE of S26 and SW S25, T42N R72W. Grasslands are prevalent among many of the gentle hills and drainages within NE S25 and NW S 26, T42N R72W. Most of the pasture grasses are less than eight inches in height, with most of the grazed pastures having grasses 3 to 6 inches. Current land uses within the project area include domestic sheep grazing and CBNG.

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 ICF Jones & Stokes (J&S 2009). From winter 2006 through spring 2009, J&S performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol (2005). Surveys were also conducted for Ute ladies'-tresses orchid and blowout Penstemon. PRB IWG accepted protocol is available on the following website.
www.blm.gov/style/medialib/blm/wy/field-offices/buffalo/wildlife.Par.34632.File.dat/WildlifesurveyProtocol.pdf

A BLM biologist conducted field a visit on October 13, 2009. During the visit, the biologist verified the wildlife survey information for accuracy, evaluated potential impacts to wildlife resources, and provided project modification recommendations.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 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

Pronghorn is the only big game species expected to be within the Playa project area according to BLM GIS habitat data. Pronghorn within the Playa POD are part of the North Converse herd unit #748. As of 2007, the pronghorn population was 31,028, 11% above the population objective of 28,000 (WGFD 2007 job completion report). The WGFD has determined that the project area contains winter-yearlong range for pronghorn antelope. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

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.

3.3.2. Aquatics

The project area is within the **Antelope Creek** drainage which is a tributary to the Cheyenne River. The southeast portion of the Playa POD is located at the head of Black Butte Creek, an intermittent stream.

Numerous playas also contained water, including those in NESE S23, SENW S26, and SWNE S36 T42N R72W. These playas are most likely important breeding habitat for toads and possibly turtles. Playas also support prey for snakes and lizards. Amphibian and reptile species occur throughout the Basin, but

there is little recorded baseline information available about them. Wyoming Game and Fish (WGFD), Montana Natural Heritage and Wyoming Natural Diversity Database (WYNDD) investigations have identified numerous species present within Powder River Basin.

3.3.3. Migratory Birds

Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. A moderately-sized pond is present in NENE Section 25, and three smaller ponds in SENW, SESE, and NESE S25 T42N R72W contain enough water to host several waterfowl species.

Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified three groups of high-priority bird species in Wyoming: Level I – those that clearly need conservation action, Level II – species where the focus should be on monitoring, rather than active conservation, and Level III – species that are not otherwise of high priority but are of local interest. Vegetation types that occur in the project area include shortgrass prairie and shrub-steppe. Many species that are of high management concern use these areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds have declined more consistently in the last 30 years than any other ecological association of birds (WY 2009).

Species that may occur in these vegetation types include the following.

Level	Species	Wyoming BLM Sensitive?
Level I	Brewer's sparrow	Yes
	Ferruginous hawk	Yes
	Greater sage-grouse	Yes
	Long-billed curlew	Yes
	McCown's longspur	
	Mountain plover	Yes
	Sage sparrow	Yes
	Short-eared owl	
	Upland sandpiper	
	Western burrowing owl	Yes
Level II	Black-chinned hummingbird	
	Bobolink	
	Chestnut-collared longspur	
	Dickcissel	
	Grasshopper sparrow	
	Lark bunting	
	Lark sparrow	
	Loggerhead shrike	Yes
	Sage thrasher	Yes
	Vesper sparrow	
Level III	Common poorwill	
	Say's phoebe	

The affected environment for migratory birds is discussed in the PRB FEIS (pp. 3-150 to 3-153). This discussion includes a list of habitat requirements and foraging patterns for the species listed above, with the exception of upland sandpipers, common poorwills, and Say's phoebes, which are discussed here.

Upland sandpipers prefer Great Plains grasslands, dryland grass pastures, hayfields, and alfalfa fields. They nest in grass-lined depressions in the ground and feed on insects and seeds on the ground where grasses are low and open. Common poorwills inhabit sparse, rocky sagebrush; open prairies; mountain-foothills shrublands; juniper woodlands; brushy, rocky canyons; and ponderosa pine woodlands. They prefer clearings, such as grassy meadows, riparian zones, and forest edges for foraging. They lay eggs directly on gravelly ground, flat rock, or litter of woodland floor. Nests are often placed near logs, rocks, shrubs, or grass for some shade. They feed exclusively on insects, catching them by leaping from the ground or a perch, or picking them up from the ground. Say's phoebes inhabit arid, open country with sparse vegetation, including shrub-steppe, grasslands, shrublands, and juniper woodlands. They nest on a variety of substrates such as cliff ledges, banks, bridges, eaves, and road culverts and often reuse nests in successive years. They eat mostly insects and berries.

3.3.3.1. Raptors

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

Four raptor nest sites were identified by Jones & Stokes (2009) and BLM within 0.5 mile of the project area boundary. None of the project components are within 0.5 miles from a known raptor nest.

Table 3.3 Documented raptor nests within the Playa POD boundary in 2009.

BLM ID#	SPECIES	UTM (NAD 83)	SUB-STRATE	CONDITION	STATUS 2009
2471	Ferruginous Hawk	464226E 4827246N	Ground	Good	Inactive
2474	Ferruginous Hawk	462632E 4827492N	Ground	Fair	Inactive
5490	Ferruginous Hawk	462601E 4827352N	Ground	Good	Inactive
5492	Ferruginous Hawk	464289E 4827465N	Ground	Goof	Inactive

3.3.4. Threatened and Endangered and Sensitive Species

3.3.4.1. Threatened and Endangered Species

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

3.3.4.1.1. Black-footed ferret

No known prairie dog colonies occur within the Playa POD (J&S 2009). Black-footed ferret habitat is not present within the Playa POD project area. See Section 3.3 for project area description of habitat.

3.3.4.1.2. Blowout Penstemon

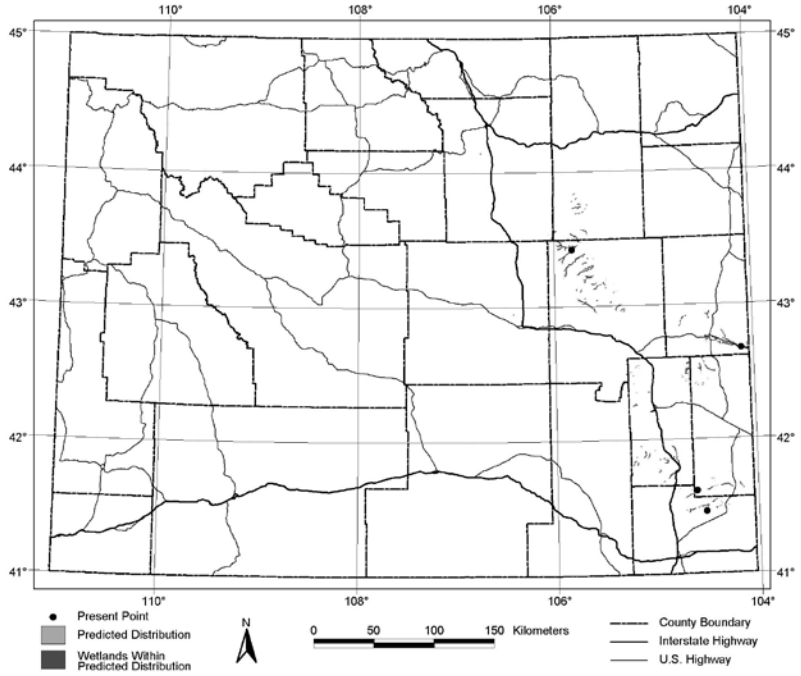
Blowout penstemon habitat is not present and is not expected to occur within the Playa POD. See Section 3.3 for project area description of habitat.

3.3.4.1.3. Ute 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. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern

Campbell and northern Converse Counties.

Figure 1. Predicted Distribution of Ute ladies'-tresses in Wyoming



Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. In Wyoming, *Spiranthes diluvialis* blooms from early August to early September, with fruits produced in mid August to September (Fertig 2000).

The project area is within the Antelope Creek drainage which is a tributary to the Cheyenne River.
J&S surveyed within the Playa POD for Ute Ladies'-Tresses Orchid habitat during spring of 2007. All drainages within the POD were dry during 2007 ground surveys. The only locations that did contain surface water included a moderately-sized pond in NENE S25; three smaller ponds in SENW, SESE, and NESE S25; and a small playa in SENW S26 T42N R72W. Most of the water sources were surrounded by bare soils that quickly transitioned to upland vegetation, including bluegrasses, junegrass, mustard, and big sage. However, foxtail barley is present around the CBNG pond and nearby drainage in SENW S25 and the impoundment in NENE S25 T42N R72W. Field tests of surface soil samples collected within that area suggest the presence of sandy and loamy soils. All other playas throughout the POD remained dry, hosting many of the same upland species, during the spring 2007 surveys (J&S 2007). Suitable orchid habitat is present downstream from the Playa POD (see Aquatics section 3.3.2.for additional description of habitat). The nearest known population and habitat potential of Ute Ladies'-Tresses Orchid is approximately 6 miles south west of the Playa POD (BLM 2010).

3.3.4.2. 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 sagebrush ecosystems habitat type, commonly found in the Playa POD, contains habitat components required in the

life cycle of several sensitive species. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.4.2.1. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs in other words, species requiring sagebrush for some part of their life cycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, sage thrasher, and sage sparrow. Greater sage-grouse, sage sparrows, Brewer's sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Greater sage-grouse typically nest underneath sagebrush with residual grass cover (see Greater sage-grouse section 3.3.4.2.6.1.). Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer's sparrows are associated closely with sagebrush habitats, having abundant scattered shrubs and short grass (Paige and Ritter 1999). Other sagebrush obligate species include sagebrush vole and pronghorn (see Big Game section 3.3.1 for pronghorn).

3.3.4.2.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald eagle was removed from the Endangered Species list. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (ES-6-WY-07-F012) (USFWS 2007) shall continue to be complied with.

The project are does not contain nesting or roosting habitat due to the absence of trees. Foraging habitat does exist within the project area because of domestic sheep grazing and waterfowl use at ponds located within the project area, but the lack of nesting/roosting habitat nearby limits the importance of this area for bald eagles.

3.3.4.2.3. Black-tailed prairie dog

No known prairie dog colonies occur within the Playa POD (J&S 2009). A black-footed ferret population requires at least 1,000 acres of prairie dog colonies, separated by no more than 1.5 km, for survival (USFWS 1989).

3.3.4.2.4. Grouse

3.3.4.2.4.1. Greater sage-grouse

The Greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On March 5, 2010, the USFWS issued a proposed rule, finding that listing the greater sage-grouse as threatened was warranted, but precluded by other listing priorities (FWS-R6-ES-2010-0018).

Habitats in the project area are adequate to support sage-grouse throughout the year. 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 few moist drainages within NE portion of the project area provides brood-rearing and late-summer habitat. Dense stands of sagebrush in the north and northeast (SE section 23, S1/2 section 24, and NE section 26, T42N,

R72W) area of the project provide habitat for nesting and wintering sage grouse. BLM records identified one sage grouse lek within 4 miles of the Playa POD. The lek site is identified below (Table 3.4).

Table 3.4 Sage-grouse leks surrounding the Playa POD project area.

LEK NAME	LEGAL LOCATION	OCCUPANCY AND ACTIVITY STATUS IN (YEAR) (PEAK MALES)	DISTANCE FROM PROJECT AREA
36-59	NW SE Sec 23 T42N,R72W	2006-2009=0, 2002-2004=0	0.5 miles North

3.3.4.2.4.2. Sharp-tailed grouse

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

The Playa POD project area has limited potential to support sharp-tailed grouse throughout the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October.

However, the project area does not have berry producing trees or shrubs to sustain sharp-tailed grouse during winter. No known sharp-tailed grouse leks occur within a mile of the Playa POD (J&S 2009).

3.3.4.2.5. Mountain plover

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

Short grasses (less than 4 inches) and level terrain provide suitable mountain plover habitat in section 26. The other half of the Playa POD (section 25) does not provide suitable mountain plover habitat because of the rough terrain (greater than 4% slopes) and tall pasture grasses (greater than 6 inches). J&S surveyed for mountain plovers on May 10, May 30, and again on June 14 of 2008. No known mountain plovers occur within the Playa POD (J&S 2009).

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.

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).

3.5. Water Resources

The Playa POD project area is within the Antelope Creek drainage system. The climate is semi-arid, averaging 12.40 inches of precipitation annually. The mean annual air temperature is 43.2 degrees Fahrenheit. The upper reaches of the watershed consists of steep to moderately steep, dissected terrain with slopes at times exceeding 20%, while the lower portion of the drainages are less steep as a result of subdued topography as the drainages converge on the main channels of Antelope Creek. The outfalls and impoundments are located on tributaries of the Cheyenne River, flowing from unnamed tributaries to Porcupine and Antelope Creek, eventually discharging to the Cheyenne River.

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.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 28 registered stock and domestic water wells within 1 mile of a federal CBNG producing well in the POD with depths ranging from 70 to 960 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Antelope Creek drainage which is tributary to the Cheyenne River. 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 Antelope Creek Watershed the EC ranges from 1,800 at Maximum monthly flow to 2,354 at Low monthly flow and the SAR ranges from 2.82 at Maximum monthly flow to 2.60 at Low monthly flow. These values were determined at the USGS station located at Antelope Creek near Teckla, 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 inventory was performed for the Playa POD prior to on-the-ground project work (BFO project no. 70080145). Western Land Services conducted the fieldwork and Cultural Resource Analysts, Inc. produced the final report for a combination block and linear class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports*. Ardeth Hahn, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located in or near the project area.

Site Number	Site Type	Eligibility
48CA5296	Historic Road	NE
48CA6876	Historic Site	NE
48CA6877	Historic and Prehistoric Site	NE
48CA6878	Historic Site	NE
IR1	Prehistoric Isolated Resource	NE
IR2	Prehistoric Isolated Resource	NE
IR3	Historic Isolated Resource	NE
IR4	Historic Isolated Resource	NE
IR5	Historic Isolated Resource	NE
IR6	Historic Isolated Resource	NE
IR7	Historic and Prehistoric Isolated Resource	NE

3.7. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NOx]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;
- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NOx, particulate matter, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

4. ENVIRONMENTAL CONSEQUENCES

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

4.1. Vegetation & Soils Direct and Indirect Effects

Surface disturbance acreages are described in table 2.5.

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing 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 dependent on soil, climate, topography and cover.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery.
- Modification of hill slope hydrology.
- An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (BLM 2003). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily disturbed or destroyed by surface disturbances associated with construction activities.

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

Cumulative Effects
The designation of the duration of disturbance is defined in the PRB FEIS (pg 4-1 and 4-151).

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).

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).

Mitigation
Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation.

- Impacts to vegetation and soils from surface disturbance will be reduced by following the operator's plans and BLM applied mitigation.
- The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities.
  Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved "Reference Site" or NRCS Ecological Site Transition State. 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.
- Compaction may be remediated by plowing or ripping.

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.

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. Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges.

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

richness for wetlands and riparian areas." (PRB FEIS Page 4-175). Water discharged into playas will not exceed the existing identified vegetative green line. If wetland creation occurs, Williams may consider fencing the area in order to protect and allow the vegetation to develop and maintain water quality. These actions will be coordinated with the landowner or lessee. Baseline soil investigation will be conducted prior to any discharging water into the playas.

4.1.2. Invasive Species

The operator has committed to the control of noxious weeds and species of concern using the following measures identified in their Integrated Pest Management Plan (IPMP):

1. Control methods including treatment
2. Education
3. Monitoring
3. Preventive practices such as:
    - cleaning equipment
    - maintaining weed-free buffers
    - minimizing disturbance
    - using weed–free mulch and seed
    - maintain records of existing infestations
    - eliminate new infestations

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

Residual Effects:

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

4.2. Wildlife (Alternative C – Environmentally Preferred)

During the environmental analysis process, the BLM identified project modifications resulting in an environmentally preferred alternative (Alternative C). At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be reduced. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate or minimize environmental impacts.

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Winter-Yearlong range for pronghorn would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 2.5 summarizes 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. 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.

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

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

4.2.1.1. Big Game Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be stored in two playas within the POD boundary. No enhancements will be made to the playas; however, the Peasely #1 Pit playa has had enhancements made by the previous landowners in 1964. Due to expected low water volumes, (1.03 gallons per minute (gpm) per well), discharging effluent to the playas was chosen as the preferred, primary strategy. Williams has committed to obtaining a baseline soil investigation prior to discharging into the playas. Water discharged into the playas will not exceed the existing identified vegetative green line. If wetland creation occurs, Williams may consider fencing in order to protect and enhance the vegetation and to maintain water quality. Periodic monitoring will occur as requested by the landowner. Local populations of amphibian and reptile species may be beneficially or adversely impacted by produced water in these playas. In general, increased water should benefit aquatic species; however, poor water quality (high selenium, high sodium bicarbonate) may be detrimental. Aquatic impacts from the two secondary on-channel reservoirs have not been assessed.

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

4.2.2.1. Aquatics Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

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

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

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

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

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same effects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable.

CBNG activities that occur in the spring may be detrimental to migratory bird production and survival. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Migratory Birds Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

Wyoming is the approximate center of the ferruginous hawk breeding range and has one of the largest breeding populations of any state or province. Ferruginous-hawks are listed as BLM Wyoming sensitive species. Ferruginous hawk populations within the Powder River Basin have declined in recent years according to the BLM data base. Ferruginous hawks are sensitive to human disturbance; pairs may abandon nests even when mildly disturbed during nest building or incubation (Smith and Murphy 1978, White and Thurow 1985, Olendorff 1993, Washington Department of Fish and Wildlife 1996).

Furthermore, disturbed nests fledge fewer young, and they often are not reoccupied the year following disturbances (White and Thurow 1985). Rather than becoming acclimated to repeated disturbance, ferruginous hawks become sensitized and flush at greater distances (White and Thurow 1985), which may result in increased clutch or brood mortality due to exposure, predation, starvation, or nest desertion.
Recommended biological buffer distance from other federal agencies are no surface disturbance 0.5mi year-round and a one mile timing restriction (Fisher 1978).

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

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

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Raptors Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

4.2.5.1. Threatened and Endangered Species

Table 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 (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	No habitat present
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	S	NLAA	No suitable habitat present within POD, water discharge may affect known populations downstream. COA requiring surveys prior to any discharge in habitat will minimize potential for impacts.

Presence: **K** Known, documented observation within project area. **S** Habitat suitable and species suspected, to occur within the project area. **NS** Habitat suitable but species is not suspected to occur within the project area.**NP** Habitat not present and species unlikely to occur within the project area. **Project Effects:** **LAA** Likely to adversely affect. **NE** No Effect. **NLAA** May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-Footed Ferret Direct and Indirect Effects

Because black-tailed prairie dog colonies are not within the project area, implementation of the proposed development will have "***no effect***" on the black-footed ferret.

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

The Ute ladies'-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants.

Invasive weeds transplanted by vehicle and foot traffic in habitat could out-compete this fragile species. Restricting work from areas of Ute ladies'-tresses orchid habitat reduces these impacts.

Produced water is to be stored in two playas within the POD boundary. There is a slight potential for infiltrating water to surface in occupied drainages. Due to occupied habitat downstream from the proposed action, the proposed coal bed natural gas project '***may affect, but is not likely to adversely affect***" the Ute ladies'- tresses orchid.

A secondary water management strategy, two on-channel reservoirs, will be processed through sundry if needed. Should these reservoirs be needed, further surveys, analysis and conditions for approval may be needed to protect Ute ladies'-tresses orchid populations downstream.

4.2.5.2. Sensitive Species Direct and Indirect Effects

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

4.2.5.2.1. Sagebrush obligates

Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003)

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area

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

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

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

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

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

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

4.2.5.2.1. Bald eagle Direct and Indirect Effects

No bald eagle habitat within the Play POD. The proposed project will not affect bald eagle nesting or winter roosting.

4.2.5.2.2. Black-tailed prairie dog Direct and Indirect Effects

Because of the absence of prairie dog colonies within the Play POD, implementation of the proposed development will have no affect to black-tailed prairie dogs.

4.2.5.2.3. Grouse

4.2.5.2.3.1. Greater sage-grouse Direct and Indirect Effects

There is one sage-grouse lek located within four miles of the Play POD project area. The proposed action will adversely impact breeding, nesting, brood rearing, late summer, and winter habitat. Proposed project elements that are anticipated to negatively impact grouse are approximately: 6 CBNG wells on 6 locations, 0.28 miles of new roads, 1.24 miles of new pipelines, 1 mile of new overhead power, 2 new reservoirs, increased vehicle traffic on established roads and increased noise from compressor stations.

Using 0.6 miles as a distance for impacts (Holloran et al. 2007, Aldridge and Boyce 2007), effective sage-grouse habitat loss will be 6.78 acres from 6 well locations, 107 acres from roads, 476 acres from pipelines, and 385 acres from overhead power. These numbers are not additive, since in many cases overlap exists across infrastructure buffers. A total of approximately 13,470 acres can be considered impacted by the Playa POD project.

During the onsite visits, none of the 6 proposed wells locations were moved to reduce direct loss and fragmentation of sage-grouse habitat, as all wells are in locations that utilize existing disturbance. The generator location was moved near the county road to avoid truck traffic through sage-grouse habitat. An upgrade to the generator's muffler system will be added to minimize noise level to no more than 49 dBA (or no increase to ambient if ambient conditions are above 49 dBA) as measured at the 36-59 sage grouse lek. The majority of the proposed overhead power will follow the county road corridor where it will end at a power drop; from there, power will be buried. Additional overhead power will continue from an existing overhead power line near well 43-25; from the well, power will be buried.

4.2.5.2.3.2. Greater sage-grouse Cumulative Effects

In addition to the direct impacts to sage-grouse habitat that will be created by the federal wells and associated infrastructure, the project area also contains existing fee, state, and federal fluid mineral development. The sage-grouse cumulative impact assessment area for this project encompasses a four mile radius from the 36-59 sage-grouse lek. As of February 28, 2010, there are approximately 332 existing wells and associated infrastructure within four miles of the 36-59 lek - an area of 25 square miles.

The existing well density is approximately 13.2 wells/section. Due to this level of development, there is potential that the population(s) breeding at these leks may become extirpated without the federal development.

There are 121 proposed wells (including the 6 wells from this project) within four miles of the 36-59 lek. With the addition of 115 proposed wells that are not associated with this proposed action, the well density within four miles of the 36-59 lek increases to 18 wells/section. With approval of alternative C (6 proposed well locations) the well density increases to 13.4 wells/section.

CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (WGFD 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003).

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

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

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

Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active

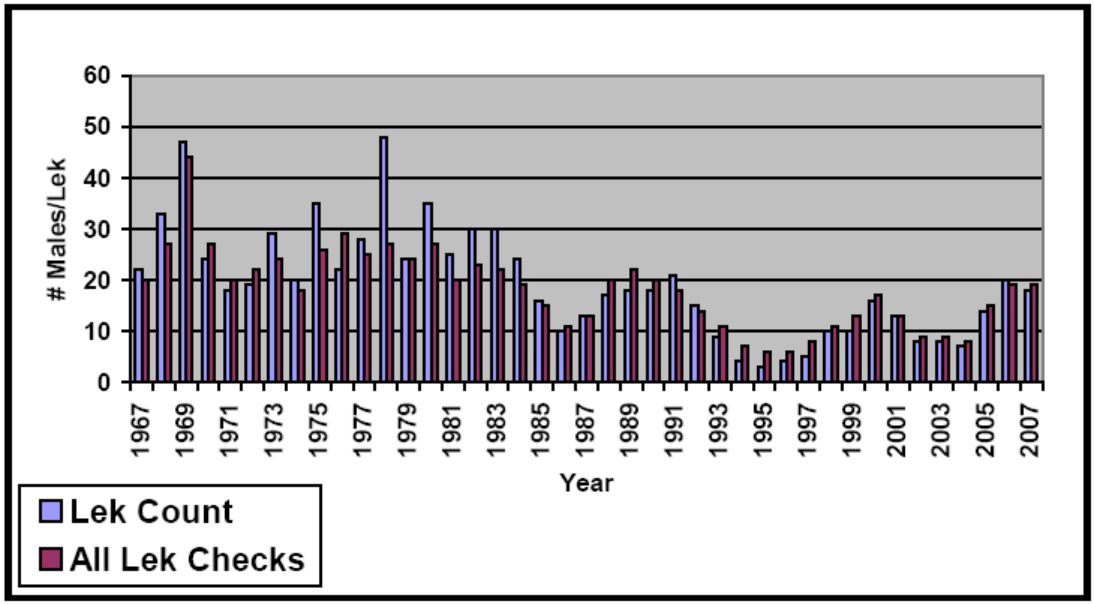
drilling rigs within 5 km (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et al. documented approximately 200 CBNG facilities within one mile of sage-grouse leks. Sage-grouse numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct habitat losses from the facilities themselves, roads and traffic, and the associated noise were found to be the likely reason for this finding.

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

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

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

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



The BFO Resource Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). BLM Wyoming adopted the two-mile recommendation in 1990 (BLM 1990). The two-mile recommendation was based on early research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

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

A two-mile timing limitation, given the long-term population decline and that less than 50% of sage-grouse are expected to nest within the limitation area, is insufficient to reverse the population decline.

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

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

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

4.2.5.2.3.3. Sharp-tailed grouse Direct and Indirect Effects

Effects similar to sage-grouse.

4.2.5.2.4. Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is not present within the project area. The project should not impact mountain plovers.

4.2.5.2.5. Sensitive Species Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Antelope Creek 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. The operator plans to discharge water into two natural playas as part of their primary water management strategy. The Playa POD project will have a common water line system that will allow effluent discharge from all Williams well to all outfalls. Due to the expected low water volumes (1.0 gpm per well) Williams has chosen to discharge into the Peasely #1 Pit and the Litton 43-26 playa.

If additional storage is needed, Williams may utilize two on-channel reservoirs that are part of the secondary water management strategy. If the on-channel reservoirs will be discharged into, Williams will submit the appropriate bond amount, sundry notice and complete approved SEO permits to the BLM Authorized Officer prior to use. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies.

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

The maximum water production is predicted to be 1.0 gpm per well or 6.2 gpm (0.012 cfs or 10.0 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 Antelope Creek drainage, the projected volume produced within the watershed area was 17,385 acre-feet in 2006 (maximum production is estimated in 2010 at 3,574 acre-feet). As such, the volume of water resulting from the production of these wells is 0.003% of the total volume projected for 2010. 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 30% to groundwater aquifers and coal zones in the Antelope Creek drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 1.86 gpm will infiltrate at or near the discharge points and impoundments (3.0 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, within one mile of the POD boundary, produce from depths which range from 70 to 960 feet compared to 895 feet to the Wyodak 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 (1 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 stored within the Wasatch - Tongue River sand and coals, and sands units above and below the coals is almost 750 million acre-feet of recoverable groundwater are (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 was revised as the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved in June, 2006. The Wyoming DEQ established an Impoundment Task Force which drafted an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments began in the spring of 2006.

Based on information received from the WDEQ, as of September 2009, approximately 2010 impoundment sites have been investigated with more than 2290 borings. Of these impoundments, 272 met the criteria to require "compliance monitoring" if constructed and used for CBNG water containment. Only 133 impoundments requiring monitoring are presently being used. As of the third quarter of 2009, only 21 of those monitored impoundments caused a change in the "Class of Use" of any parameter in the underlying aquifer water.
impoundments.

4.4.1.1. Groundwater Cumulative Effects:

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

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

4.4.2. Surface Water

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

Table 4.4 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Antelope Creek at 06364700 Gauging station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 2.82 2.60	 1,800 2,354
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	500 2,000 5,000	8	
WDEQ Water Quality Requirement for WYPDES Permit # WY0052931 At discharge point	315	7.4	520
Predicted Produced Water Quality Coal Zone 1 Wyodak	315	7.4	520

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 315.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

However direct land application is not included in this proposal. 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 quality for the water produced from the Wyodak target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 1.03 gallons per minute (gpm) per well is projected is to be produced from these 6 wells, for a total of 6.18 gpm for the POD. See Table 4.5.

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

There are four (4) total discharge points proposed for this project. However, two facilities are part of the primary water management strategy and two are part of the secondary water management strategy and will only be utilized in the event that additional storage will be needed. All outfalls have been appropriately sited and will 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, 4 impoundments (30 acre feet) would potentially be utilized within the project area. Two of the impoundments are natural playas that will not be enhanced at all. If additional storage is needed, the on-channel impoundments, existing stock reservoirs, will be brought up to standards required by law, thus minimizing the overall impact of disturbance. These impoundments will disturb approximately 7.5 acres including the dam structures. The off-channel playas contain a combined drainage area of 0.13 square miles, and would result in evaporation and infiltration of CBNG water.

Criteria identified in “Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming” (WDEQ, 2002) was used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004). The existing playas will not be upgraded and proposed impoundments will be constructed or enhanced to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner, in the event that additional storage will be needed. 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 0.93 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 2004 at a total contribution to the mainstem of the Antelope Creek of 12 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 6 wells is anticipated to be a total of 6.2 gpm or 0.013 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Porcupine Creek from this action (0.002 cfs) may add a maximum 0.001 cfs to the Antelope Creek flows, or 12% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Antelope Creek 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).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 25). Based on the area of the watershed above the POD (64.5 sq mi) and an assumed density of 1 wells per location every 80 acres, the potential exists for the development of 516 wells which could produce a maximum flow rate of 535.35 gpm (1.2 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

1. The Operator plans to develop 6 wells with the Playa POD..
2. New wells will be phased in over several years, and
3. A decline in well discharge generally occurs after several months of operation.

The potential maximum flow rate of produced water within the watershed upstream of the project area, 19 cfs, is much less than the volume of runoff estimated from the 2-year storm event for Antelope Creek drainage.

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.

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

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	299.7 µg/l max
Dissolved manganese	629 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	7 µg/l max
Chlorides	46 mg/l

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

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 for the Playa POD prepared by Grouse Mountain Environmental Consultants for Williams Production RMT.

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 Antelope Creek watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

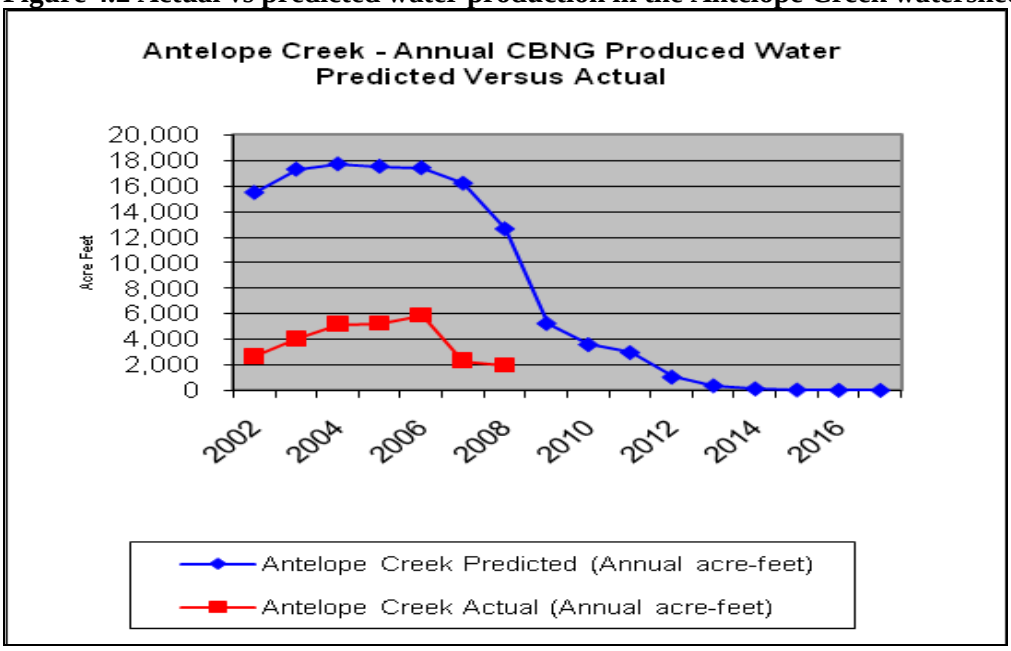
As of December 2008, all producing CBNG wells in the Antelope Creek watershed have discharged a cumulative volume of 27,304 acre-ft of water compared to the predicted 114,097 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.5 following. This volume is 23.9% of the total predicted produced water analyzed in the PRB FEIS for the Antelope Creek watershed.

Table 4.5 Actual vs predicted water production in the Antelope Creek watershed *2008 Data Update 06-08-09*

Year	Antelope Creek Predicted (Annual acre-feet)	Antelope Creek Predicted (Cumulative acre-feet from 2002)	Antelope Creek Actual (Annual acre-feet)		Antelope Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	15,460	15,460	2,668	17.3	2,668	17.3
2003	17,271	32,731	4,042	23.4	6,710	20.5
2004	17,685	50,416	5,181	29.3	11,891	23.6

Year	Antelope Creek Predicted (Annual acre-feet)	Antelope Creek Predicted (Cumulative acre-feet from 2002)	Antelope Creek Actual (Annual acre-feet)		Antelope Creek Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2005	17,503	67,919	5,234	29.9	17,125	25.2
2006	17,385	85,304	5,869	33.8	22,994	27.0
2007	16,180	101,484	2,327	14.4	25,321	25.0
2008	12,613	114,097	1,983	15.7	27,304	23.9
2009	5,226	119,323				
2010	3,574	122,897				
2011	2,956	125,853				
2012	1,041	126,894				
2013	363	127,257				
2014	124	127,381				
2015	40	127,421				
2016	13	127,434				
2017	3	127,437				
Total	**127,437**		**27,304**			

Figure 4.2 Actual vs predicted water production in the Antelope Creek watershed



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

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 Antelope Creek drainage, which is approximately 23.9% 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.

Water discharged into playas will not exceed the existing identified vegetative green line. Baseline soil investigation will be conducted prior to any discharged waters into the playas.

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

4.5. Cultural Resources

Non eligible site(s) 48CA5296, 48CA6876, 48CA6877, and 48CA6878 will be impacted by the proposed project. No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 1/6/2010 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).

4.6. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBM well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards.

5. OTHER PERMITS REQUIRED

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

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