

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Williams Production RMT
Vista**

ENVIRONMENTAL ASSESSMENT –WY-070-EA08-34

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Williams Production RMT’s Vista Coal Bed Natural Gas (CBNG) POD comprised of the following 14 Applications for Permit to Drill (APDs):

	Well Name	Well #	Qtr	Sec	Twp	Rng	Lease #
1	VISTA FEDERAL	12-20	SWNW	20	45N	77W	WYW133628
2	VISTA FEDERAL	14-20	SWSW	20	45N	77W	WYW133628
3	VISTA FEDERAL	21-20	NENW	20	45N	77W	WYW133628
4	VISTA FEDERAL	23-20	NESW	20	45N	77W	WYW133628
5	VISTA FEDERAL	12-21	SWNW	21	45N	77W	WYW133628
6	VISTA FEDERAL	14-21	SWSW	21	45N	77W	WYW133628
7	VISTA FEDERAL	21-21	NENW	21	45N	77W	WYW133628
8	VISTA FEDERAL	23-21	NESW	21	45N	77W	WYW133628
9	VISTA FEDERAL	32-21	SWNE	21	45N	77W	WYW133628
10	VISTA FEDERAL	34-21	SWSE	21	45N	77W	WYW133628
11	VISTA FEDERAL	41-21	NENE	21	45N	77W	WYW133628
12	VISTA FEDERAL	43-21	NESE	21	45N	77W	WYW133628
13	VISTA FEDERAL	32-28	SWNE	28	45N	77W	WYW133628
14	VISTA FEDERAL	41-28	NENE	28	45N	77W	WYW133628

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	T	R	Capacity (Acre Feet)	Surface Disturbance (Acres)	PRI	Lease #
1	BLM 11-20-4577	NWNW	20	45	77	15.04	3.79	Y	WYW133628
2	BLM 13-20-4577A	NWSW	20	45	77	15.7	3.55	Y	WYW133628
3	BLM 13-20-4577	NWSW	20	45	77	19.59	4.79	N	WYW133628
4	BLM 14-20-4577	SWSW	20	45	77	12.17	2.53	Y	WYW133628
5	BLM 21-20-4577	NENW	20	45	77	10.49	2.34	Y	WYW133628
6	BLM 24-20-4577	SESW	20	45	77	18.61	4.33	N	WYW133628
7	BLM 21-21-4577	NENW	21	45	77	19.97	4.46	Y	WYW133628
8	BLM 31-21-4577	NWNE	21	45	77	13.82	2.54	Y	WYW133628
9	BLM 34-21-4577	SWSE	21	45	77	16.46	3.18	Y	WYW133628

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

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

1. The Operator, in their POD, has committed to:

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

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

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Williams Production RMT
Vista
PLAN OF DEVELOPMENT
WY-070-EA08-34**

INTRODUCTION

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

1. PURPOSE AND NEED

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A No Action

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

2.2. Alternative B Proposed Action

Description of the Proposed Action

Proposed Action Title/Type: Williams Production RMT’s Vista Plan of Development (POD) for 14 coal bed natural gas well APD’s and associated infrastructure.

Proposed Well Information: There are 14 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from the Lower Big George coal seam. Proposed well house dimensions are 4 ft wide by 4 ft in length and 4 ft in height. Well house color is Carlsbad Canyon, (2.5Y 6/2) selected to blend with the surrounding vegetation.

Wells are located as follows:

	Well Name	Well #	Qtr	Sec	Twp	Rng	Lease #
1	VISTA FEDERAL	12-20	SWNW	20	45N	77W	WYW133628
2	VISTA FEDERAL	14-20	SWSW	20	45N	77W	WYW133628
3	VISTA FEDERAL	21-20	NENW	20	45N	77W	WYW133628
4	VISTA FEDERAL	23-20	NESW	20	45N	77W	WYW133628
5	VISTA FEDERAL	12-21	SWNW	21	45N	77W	WYW133628
6	VISTA FEDERAL	14-21	SWSW	21	45N	77W	WYW133628
7	VISTA FEDERAL	21-21	NENW	21	45N	77W	WYW133628
8	VISTA FEDERAL	23-21	NESW	21	45N	77W	WYW133628
9	VISTA FEDERAL	32-21	SWNE	21	45N	77W	WYW133628
10	VISTA FEDERAL	34-21	SWSE	21	45N	77W	WYW133628
11	VISTA FEDERAL	41-21	NENE	21	45N	77W	WYW133628
12	VISTA FEDERAL	43-21	NESE	21	45N	77W	WYW133628
13	VISTA FEDERAL	32-28	SWNE	28	45N	77W	WYW133628
14	VISTA FEDERAL	41-28	NENE	28	45N	77W	WYW133628

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

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec	T	R	Capacity (Acre Feet)	PRI	Surface Disturbance (Acres)	Lease #
1	BLM 11-20-4577	NWNW	20	45	77	15.04	Y	6.42	WYW133628
2	JUNGLE GYM Changed to BLM 13-20-4577A	NWSW	20	45	77	16.5	Y	3.91	WYW133628
3	BLM 13-20-4577	NWSW	20	45	77	19.59	N	4.41	WYW133628
4	BLM 14-20-4577	SWSW	20	45	77	12.17	Y	2.34	WYW133628
5	BLM 21-20-4577	NENW	20	45	77	10.49	Y	2.34	WYW133628
6	BLM 24-20-4577	SESW	20	45	77	18.61	N	3.7	WYW133628
7	BLM 24-20-4577A	SESW	20	45	77	11.69	Y	2.02	WYW133628
8	BLM 34-20-4577	SWSE	20	45	77	19.39	Y	3.92	WYW140157
9	BLM 14-21-4577	SWSW	21	45	77	19.49	Y	4.25	WYW133628
10	BLM 21-21-4577	NENW	21	45	77	19.97	Y	3.88	WYW133628
11	BLM 31-21-4577	NWNE	21	45	77	13.82	Y	2.51	WYW133628
12	BLM 34-21-4577	SWSE	21	45	77	16.46	Y	3.1	WYW133628

The following Right-of-Way applications that are associated with this project have been received and are currently being processed.

- WYW169882
- WYW170165

County: Johnson

Applicant: Williams Production RMT

Surface Owners: BLM, John Christensen, and Ed Streeter

Project Description:

The proposed action involves the following:

- Drilling of 14 total federal CBM wells in the Lower Big George coal zone to depths of approximately 1,550 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 and well visitation. This may entail several visits per month to each well.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 6 discharge points and 12 stock water reservoirs within the Upper Powder River watershed. The 14-20, 21-20, and 24-20 dams were proposed as “Periodic Discharge” dams, thereby negating the need for outfalls in the reservoirs downstream of them. All are on channel dams.
- An unimproved and improved road network.
- An above ground power line network to be constructed by a contractor. The proposed route has not 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 power drops.
- A buried gas, water and power line network, and central gathering/metering facilities.

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

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

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

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

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

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts.

Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator’s proposal. The specific changes identified for the Vista POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Comments
1	VISTA FEDERAL	12-20	SWNW	20	45N	77W	Keep pipeline within corridor of existing two-track road.
2	VISTA FEDERAL	14-20	SWSW	20	45N	77W	Well site was moved prior to on-site.
3	VISTA FEDERAL	21-20	NENW	20	45N	77W	Well site was moved prior to on-site.
4	VISTA FEDERAL	23-20	NESW	20	45N	77W	Well site was moved prior to on-site.
5	VISTA FEDERAL	12-21	SWNW	21	45N	77W	Well site was moved out of line of sight prior to onsite. Monitor road and drainage crossing east of the 12-21; install Low Water Crossing, if needed.
6	VISTA FEDERAL	14-21	SWSW	21	45N	77W	Well was moved prior to onsite.
7	VISTA FEDERAL	23-21	NESW	21	45N	77W	Well site was moved out of line of sight and out of sagebrush area.
8	VISTA FEDERAL	32-21	SWNE	21	45N	77W	Well site was moved prior to on-site.
9	VISTA FEDERAL	34-21	SWSE	21	45N	77W	Keep width of disturbance on access road to well site as minimal as possible. Install erosion control/soil stability measures during and after construction. Keep spoil material from entering adjacent drainages.
10	VISTA FEDERAL	43-21	NESE	21	45N	77W	Well moved due to topography and raptor nests in vicinity. Install erosion control/soil stability measures during and after construction. Keep spoil material from entering adjacent drainages.

Water Management:

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec.	TWP	RNG	Comments
1	BLM 24-20-4577 A BLM 34-20-4577	SESW SWSE	20 20	45 45	77 77	Dropped by operator before onsite because they were on another operator's lease.
2	BLM 14-21-4577	SWSW	21	45	77	Will not be allowed as staked because of large headcut which would be less than 50 feet downstream of the toe of the dam.
3	BLM 21-21-4577	NENW	21	45	77	This dam is several hundred feet upstream of a major active headcut on state owned land. If constructed, the headcut will be inspected for signs of degradation due to seepage on at least an annual basis. If degradation is detected, discharge to this reservoir will be stopped and the facility reclaimed.
4	JUNGLE GYM Name changed to BLM 13-20-4577A	NWSW	20	45	77	This damsite has outcrops of sandstone on the right flank. The dam location was moved upstream about 200 feet and re-named in order to avoid a narrowing right flank. This damsite is recommended for enlargement in order to provide storage so that one or two other proposed dams can be dropped from the plans. Construction oversight will be required because of the sandstone outcrops and narrowing flank.
5	BLM 13-20-4577 BLM 24-20-4577	NWSW SESW	20 20	45 45	77 77	These two dams are proposed in broad-bottomed gullies with excellent sage grouse nesting and brood rearing habitat within easy traveling distance of two lek sites. Because of this, these two dams will be designated as secondary by the operator and constructed as a last resort only if the operator requires the storage capacity (39 acre-feet). As secondary impoundments, reclamation bonding will not be required prior to POD approval. Additionally, if constructed, timing of periodic discharge from these dams will be closely coordinated with BLM's Wildlife and Hydrology Specialists. Prior to construction, a sundry notice will be provided to the BLM for site re-evaluation and approval and for reclamation bond tracking.
6	BLM 34-21-4577	SWSE	21	45	77	This site has a narrowing right flank. The embankment should either be angled upstream on the right or moved upstream. Construction oversight will be required because of sandstone outcrops and the narrow right flank. There is a large headcut some distance downstream which will require annual inspection for signs of degradation. If degradation does begin to

	IMPOUNDMENT Name / Number	Qtr/Qtr	Sec.	TWP	RNG	Comments
						occur, discharge will cease and the dam will be reclaimed.
7	BLM 21-20-4577	NENW	20	45	77	This dam will be constructed with a major road on its embankment. Soils in the area are steep and highly erosive. Construction reclamation will be challenging. This dam will discharge at about the proposed high water line of the BLM 11-20 dam described below. Since this dam will act as the discharge point for the 11-20 dam, an armored and lined chute or channel will be constructed for water to travel well into the 11-20's pool in order to reduce erosion.
8	BLM 11-20-4577	NWNW	20	45	77	This proposed dam location is in the silted-in pool area of an old, abandoned downstream dam. Soils in the area are highly erosive and subject to piping. Because of the nature of the construction site, this dam will require construction oversight. A uranium claim pole was found in the pool area.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

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

2.3.2.2. Surface Water

1. Channel Crossings:
 - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
 - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
 - c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

3. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.
4. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.
5. The operator will supply a copy of the complete approved WYPDES permits to BLM as they are issued by WDEQ.

2.3.2.3. Soils

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

2.3.2.4. Wetland/Riparian

1. Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines. Where avoidance can't occur, the minimum number of poles necessary to cross the area will be used.
2. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
3. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
4. The lower edge of soil or other material stockpiles will be located outside the active floodplain.
5. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphologic configuration and properly stabilized.
6. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.3.2.5. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.
3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.

4. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.
5. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.
6. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

1. Site-specific project areas will be evaluated for suitable bald eagle nesting and roosting habitat prior to permit approval. Suitable nesting habitat is any mature stand of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes or any significant body of water. Suitable roosting habitat is defined as any mature stands of conifer or cottonwood trees.
2. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.
3. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
4. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimal disturbance buffer zone of one mile will be established for all bald eagle nest sites (February 1 – August 15). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
5. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle winter roost sites. A seasonal minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
6. Within 1 mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).
7. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.7. Visual Resources

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

2.3.2.8. Noise

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

2.3.2.9. Air Quality

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

2.3.3. Site specific mitigation measures

1. All changes made at the onsite will be followed. They have all been incorporated into the operator’s Plan of Development (POD).
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 Vista POD is Carlsbad Canyon (2.5Y 6/2).
3. Install low water crossing if necessary on access road located east of 12-21 well if drainage area becomes too wet for travel.
4. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

A. Seed Mix:	
Species- Cultivar	LBS PLS/ACRE
Western Wheatgrass	4.8
Green Needlegrass	4.0
Bluebunch Wheatgrass	2.2
Slender Wheatgrass	2.2
American Vetch	0.6
Prairie Coneflower	0.6
Purple Prairie Clover	0.6
Total	15.0

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.

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

Grade Drainage Spacing

2-4%	310 ft
5-8%	260 ft
9-12%	200 ft
12-16%	150 ft

6. The disturbance areas mentioned below have fragile soils and erosive conditions that shall be stabilized in a manner which eliminates erosion until a self-perpetuating non-weed native plant community has stabilized the site. Stabilization efforts shall be finished within 30 days (or sooner) of the completion of construction activities.

Well site(s): 14-21; 34-21; 43-21

Pipeline/Access segments associated with well(s): access road east of 12-21 well, crossing drainage; 14-21; 23-21; 34-21; 43-21

7. The Vista POD project area has been identified to have areas of limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:

Reclamation Standards:

C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:

- a. Large rills or gullies.
- b. Perceptible soil movement or head cutting in drainages.
- c. Slope instability on, or adjacent to, the reclaimed area in question.

C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.

C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:

- a. Successful onsite establishment of species included in the planting mixture or other desirable species.
- b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

8. All roads, pads, impoundments and locations where engineered construction will occur will be completely slope staked for the pre-construction meeting.
9. Primitive roads (2-tracks) corridors with 3” and 4” pipes will not exceed a disturbance width of 35 feet. Widths may increase in areas where extreme topography is encountered.
10. Utility corridors will be expediently reclaimed following construction and maintained in a professional and workmanship manner avoiding tire rutting, settling and erosion.
11. Mowing at the well site where a constructed pad is not approved as designed will be minimized to a 50 foot radius of the well stake.
12. Please contact Casey Freise – Natural Resource Specialist, @ (307) 684-1189, Bureau of Land Management, Buffalo, if there are any questions concerning surface use COAs.

Wildlife

1. Observations of any threatened, endangered, proposed, candidate, or sensitive species within the project area shall be reported to the BLM Buffalo Field Office (307-684-1100).
2. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly re-vegetated if construction activities impact the vegetation in these areas. Re-vegetation will be designed to avoid the establishment of noxious weeds.
3. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
4. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following proposed wells and their associated infrastructure:

<i>Township/Range</i>	<i>Section</i>	<i>Affected Wells and Infrastructure</i>
<i>45/77</i>	20	21-20, 12-20 wells, roads and infrastructure; 11-20, 21-20 reservoirs
<i>45/77</i>	21	12-21, 23-21 wells, roads and infrastructure,
<i>45/77</i>	21	43-21 well, roads and infrastructure
<i>45/77</i>	29	Access road to 14-20well, 14-20 reservoir
<i>45/77</i>	10	Access road to 14-20well
<i>45/77</i>	28	32-28 well, roads and infrastructure

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

results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. Nests to be checked are within a ½ mile or less of the proposed development.

- c. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
5. The following conditions will reduce impacts to sage grouse:
- a. No surface disturbing activities are permitted within 2 miles of the following leks; Irrigary, IrrigaryII, between March 1 and June 15, prior to completion of a greater sage-grouse lek survey. **This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the entire project area.
If an active sage grouse lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and disturbance activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, disturbance activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
 - b. Creation of raptor hunting perches will be avoided within 0.5 mile of documented sage grouse and sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
 - c. Primary access road to the POD will be from the north through section 17 as agreed to by Williams.
 - d. The Jungle Gym and 13-20 reservoirs will be constructed only after Williams makes a determination that the reservoirs are needed for water storage.

Water Management:

1. BLM 21-21-4577 dam is several hundred feet upstream of a major active headcut on state owned land. This headcut will be inspected at least annually for signs of degradation due to seepage. If degradation is detected, discharge to this reservoir will be stopped and the facility reclaimed.
2. BLM 13-20-4577A (formerly known as “Jungle Gym”) damsite has outcrops of sandstone on the right flank. Construction oversight will be required. The dam location was moved upstream about 200 feet from its original location and re-named in order to avoid a narrowing right flank.
3. BLM 13-20-4577 and BLM 24-20-4577 dams are proposed in broad-bottomed gullies with excellent sage grouse nesting and brood rearing habitat and within easy traveling distance of two lek sites. Because of this, these two dams will be designated as secondary by the operator and constructed as a last resort only if the operator requires the storage capacity (39 acre-feet). **As secondary impoundments, reclamation bonding will not be required prior to POD approval. Additionally, if constructed, timing of periodic discharge from these dams will be closely coordinated with BLM’s Wildlife and Hydrology Specialists.** Prior to construction, a sundry notice will be provided to the BLM for site re-evaluation and approval and for reclamation bond tracking.
4. BLM 34-21-4577 site has a narrowing right flank. Construction oversight will be required. The embankment should either be angled upstream on the right or moved upstream. There is a large headcut some distance downstream which will be inspected at least annually for signs of

5. BLM 21-20-4577 dam will discharge at about the proposed high water line of the BLM 11-20 dam described below. Since this dam will act as the discharge point for the 11-20 dam, an armored and lined chute or channel will be constructed for water to travel well into the 11-20's pool in order to reduce erosion.
6. BLM 11-20-4577 proposed dam location is in the silted-in pool area of an old, abandoned downstream dam. Because of the nature of the construction site and the highly erosive soils (which are subject to piping), this dam will require construction oversight.
7. All constructed reservoirs and associated disturbance on BLM surface, will be fenced to prevent livestock access. The fencing must be wildlife friendly and meet the parameters no more than three strands with the bottom wire being 16" off the ground and the top wire not higher than 38". The fences must be inspected and maintained by the operator on a routine basis.

Cultural

1. No earth moving activity on or use of, the proposed access in section 29 will be authorized until the Bureau receives an acceptable cultural inventory for all proposed infrastructure in that section and completes its consultation with the Wyoming SHPO.

2.4. Alternatives considered but not analyzed in detail

The operator did not provide any analyses of alternative water management strategies that might have been employed with this plan of development.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on May 29, 2007. Field inspections of the proposed Vista CBNG project were conducted on 11/7/2007 by

DATE	NAME	TITLE	AGENCY
11/07/07	Amy Shepperson	Natural Resource Specialist	BLM
11/07/07	Larry Gerard	Wildlife Biologist	BLM
11/07/07	Leigh Grench	Archeologist	BLM
11/07/07	Ben Adams	Hydrologist	BLM
11/07/07	Ted Hamersma	Civil Eng. Tech.	BLM
11/07/07	Randi Jespersen	Field Landman	Williams
11/07/07	Kraig Zimmerman	Production Engineer	Williams
11/07/07	Allen Jones	Hydrologist	Western Land Services
11/07/07	Chad Reed	Civil/Water Res. Dept. Mgr.	WWC Engineering
11/07/07	David Platt	Permitting	Windmill Energy Services
11/07/07	Jim Adams		Windmill Energy Services

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species		X		Larry Gerard
Floodplains	X			Ben Adams
Wilderness Values			X	Amy Shepperson
ACECs			X	Amy Shepperson
Water Resources	X			Ben Adams
Air Quality	X			Amy Shepperson
Cultural or Historical Values	X			Buck Damone
Prime or Unique Farmlands			X	Amy Shepperson
Wild & Scenic Rivers			X	Amy Shepperson
Wetland/Riparian			X	Ben Adams
Native American Religious Concerns			X	Buck Damone
Hazardous Wastes or Solids			X	Amy Shepperson
Invasive, Nonnative Species	X			Amy Shepperson
Environmental Justice		X		Amy Shepperson

3.1. Topographic Characteristics of Project Area

The project area is west and south of Gillette, T. 45 N., R.77 W. Sec. 20, 21, & 28. For detailed directions on how to access the project are see the MSUP in the POD. Elevations within the project area range from 4000 to 4650 feet above sea level. The topography throughout the area is rolling hills with moderately steep ridges and draws. Several ephemeral tributaries drain the majority of the area into the Powder River. The Powder River is located approximately 1 mile west of the POD area. Current land uses in the region include grazing of cattle and sheep, conventional oil production, and coalbed methane gas production.

3.2. Vegetation & Soils

General vegetation communities within the project area consist of sagebrush/grassland. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the POD. Grass species consist of blue grama, threadleaf sedge, western wheatgrass, and cheatgrass. Rubber rabbitbrush and prickly pear are found interspersed throughout the general area. Differences in dominant species within the project area vary with soil type, aspect and topography.

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

The map units identified for the soils within this project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

MAP UNIT NAME	ACRES	%	MAP UNIT SYMBOL	ECOLOGICAL SITE
ALLUVIAL LAND	29.11	1.01	AL	SANDS (10-14 PZ)

CUSHMAN-BRIGGSDALE ASSOCIATION	35.70	1.24	CV	LOAMY (10-14 PZ)
MAYSDORF-SCHOONER ASSOCIATION	6.20	0.22	MR	LOAMY (10-14 PZ)
RAZOR-GAYNOR-SAMSIL COMPLEX, HILLY	61.94	2.15	RAD	CLAYEY (10-14 PZ)
SAMSIL-SHALE OUTCROP COMPLEX, STEEP	17.86	0.62	SDE	SHALLOW LOAMY (10-14 PZ)
SHINGLE-CUSHMAN ASSOCIATION	74.48	2.59	SNb	SHALLOW LOAMY (10-14 PZ)
SHINGLE-KIM ASSOCIATION, VALLEYS	1.32	0.05	SNd	SHALLOW LOAMY (10-14 PZ)
SHINGLE-TASSEL ASSOCIATION	2447.60	85.00	SNe	SHALLOW LOAMY (10-14 PZ)
SHINGLE-WORF ASSOCIATION	5.39	0.19	SNf	SHALLOW LOAMY (10-14 PZ)
TERRY-TASSEL ASSOCIATION	71.79	2.49	TE	SANDY (10-14 PZ)
VALENT-CUSHMAN ASSOCIATION	128.24	4.45	VC	SANDS (10-14 PZ)
TOTALS	2879.64	100		

For more detailed soil information, see the NRCS Soil Survey 619 – Southern Johnson County. Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.1.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 2 to 4 inches on ridges to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. Areas with limited reclamation capability and/or highly erosive soils were identified by BLM specialists and the operator during the pre-approval onsite inspection. Approximately 92 percent of the area within the proposed action boundary has soil mapping units identified as having a poor reclamation potential.

The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes. Approximately 90% of the area within the POD boundary has been identified by BLM as being moderately susceptible to degradation due to steep slopes and/or highly erosive soil utilizing Soil Survey Geographical Data (SSURGO).

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

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information. The map unit symbols identified for the soils and the associated ecological sites found within the POD boundary are listed in the table below.

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are:

Shallow Loamy site (88%):

This site occurs on steep slopes and ridge tops, but may occur on all slopes, on landforms which include hill sides, ridges and escarpments in the 10-14 inch precipitation zone. The soils of this site are shallow (less than 20" to bedrock) well-drained soils formed in alluvium over residuum or residuum derived from sandstone and shale. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The main soil limitations include the depth to bedrock.

The present plant community is a Mixed Sagebrush/Grass. Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass plant community. Cool-season mid-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 bluebunch wheatgrass, rhizomatous wheatgrass, blue grama, and little bluestem. Other grasses occurring on the state include Cusick's and Sandberg bluegrass, and prairie junegrass. Cheatgrass may invade this state.

3.3. Wetlands/Riparian

There are no natural wetlands within the POD boundary.

3.4. Invasive Species

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

- Scotch Thistle
- Cheatgrass

The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Additionally, the operator or BLM confirmed the following WRIC identified infestations and/or documented additional weed species during subsequent field investigations:

- None were observed at the onsite, conducted in November, which is not the optimal time for identifying plants and weeds.

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).

3.5. Wildlife

Several habitat assessment and wildlife inventory surveys were performed by Thunderbird-Jones and Stokes (TJS) in 2006 and 2007. Bald eagle surveys were conducted in 2005–2006 and 2006-2007. TJS conducted surveys for sage and sharp-tailed grouse on April 5, 14 and 27, 2006, and on 6, 14, and 25 April, 2007. A habitat assessment was conducted on 13, 26 May, and 9 and 20 June 2006, and 4 and 15 May, 2007. During this time TJS verified the location of known raptor nests and prairie dog colonies and conducted mountain plover surveys. Mountain plover surveys were conducted on 13, and 26 May and 9 June, 2006 and 4, 15 and 22 May in 2007. Burrowing owl and prairie dog surveys were not conducted due to lack of suitable habitat.

TJS conducted a habitat assessment for Ute ladies'-tresses orchid on 13, 26 May and 9 June 2006.

A BLM biologist conducted field visits on November 7, 2007. During this time, the biologist field reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

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

3.5.1. Big Game

Big game species expected to be within the project area include pronghorn and mule deer. The WGFD has determined that the project area contains Winter/Yearlong range for mule deer and yearlong range for pronghorn antelope. The antelope are part of the Pumpkin Buttes herd unit estimated to be 36,500 in 2005. The population objective for the unit is 18,000. Mule deer are part of the Pumpkin Buttes herd unit estimated to be 10,350 in 2005. The herd objective is 11,000.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.5.2. Aquatics

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

3.5.3. Migratory Birds

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

3.5.4. Raptors

Thirteen raptor nests were identified within the Vista project area. In 2006 there were seven active nests, and six inactive nests. In 2007, there were 5 active nests. Eight nests were inactive in 2007. Eight nests are located within the Vista POD boundary, and 4 nests are within .5 miles of the boundary. A ferruginous hawk was observed during wildlife surveys.

Table 3.5.1. Documented raptor nests within the Vista project area in 2007 (UTM Zone 13, NAD83).

BLM ID#	Species	UTM	Legal Location	Substrate	Condition	Status 2007	Status 2006
4202	RTHA	408120 4856963	NENW SEC 20	CTL	GOOD	ACT	ACT
4465	RTHA	409628 4856518	SWNW SEC 21	CTL	GOOD	ACT	ACT

4466	RTHA/G HOW	410557 4856535	SENE SEC 21	CTL	GOOD	INAC	ACT
4085	GHOW	411877 4856487	NWSE SEC 22	CTL	UNKNOWN	UNKNO WN	ACT
4467	FEHA	410383 4856094	SWSE SEC 21	ROCK	REMNANT	INAC	INAC
4203	GHOW	406981 4855940	SWSE SEC 19	CRK BANK	NA	INAC	ACT
4468	RTHA	408000 4855550	NWNW SEC 29	CTL	GOOD	ACT	-
4204	RTHA	408726 4855294	SWNE SEC 29	CTL	FAIR	INAC	ACT
4469	RTHA/G HOW*	411224 4855292	SWNW SEC 27	CTD	GOOD	ACT	ACT
4470	FEHA	410199 4854943	NWSE SEC 28	CRK BANK	FAIR	INAC	INAC
4205	RTHA	409157 4853957	NENE SEC 32	CTL	GONE	GONE	INAC
4206	RTHA/G HOW*	408510 4853401	SWNE SEC 32	CTL	FAIR	ACT	INAC
4207	RTHA	408506 4853397	SWNE SEC 32	CTL	FAIR	INAC	INAC

* indicates species that used the nest in the current year.

3.5.5. Threatened and Endangered and Sensitive Species

3.5.5.1. Threatened and Endangered Species

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

3.5.5.1.1. Black-footed ferret

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

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

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

No active prairie dog colonies were identified by TJS (2007) within the Vista project area. Suitable black-footed ferret habitat is not present within the Vista project area.

3.5.5.1.2. 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. 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.

The project is located within the Upper Powder River Watershed. The project area contains ephemeral drainages that flow to the Powder River (TJS 2007). There are no springs within the project area. The project area consists of upland vegetation with no surface water. Suitable orchid habitat is not present within the Vista project area.

3.5.5.2. Sensitive Species

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

3.5.5.2.1. Bald eagle

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

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

One bald eagle was observed flying near the project area during the 2006 winter. BLM records indicate a historic bald eagle winter roost location .37 miles northeast of the POD along Willow Creek; however no trees were recorded at this location. The majority of trees, capable of supporting roosting and nesting bald eagles are located approximately .75 and .83 miles northeast of the POD in NE of Sec 15, along Willow Creek. No roosting eagles were documented at those locations or elsewhere within 1 mile of the Vista POD boundary in the winters of 2005-2006, 2006-2007.

The project area has a limited year round prey base in the form of lagomorphs (hares and rabbits).

3.5.5.2.2. Greater sage-grouse

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

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). A group of sage grouse hens and chicks were observed along a seep area created from CBNG reservoir storage.

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

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

LEK ID	LEGAL LOCATION	STATUS (PEAK MALES)	DISTANCE FROM PROJECT AREA (MILES)
Irigaray	SWSW 28 T45N, R77W	2007 0 males 2006 1 males	within
Irigaray II	SWSE 28 T45, R77W	2007 7 males 2006 0males	within

Sharp-tailed grouse

Habitat for sharp-tailed grouse is limited in the Vista project area. Multiple surveys were conducted by TJS and found no sharp-tailed grouse using the area. The closest known sharp-tailed grouse lek is >17 miles north of the POD.

3.5.5.2.3. Mountain plover

In September 2003, the U.S. Fish and Wildlife Service withdrew their proposal to list the mountain plover. However, the mountain plover remains an agency-designated Sensitive Species within both the Bureau of Land Management and the Forest Service. According to the U.S. Geological Survey, prairie dogs currently exist on less than one percent of their former range, and their numbers have declined by 98 percent (Turbak 2004). Mountain plover numbers have declined, possibly from millions to only about 10,000 birds today, due in large part to declines in prairie dogs (Turbak 2004).

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

Suitable mountain plover habitat is limited due to lack of prairie dog colonies, rough topography, and moderately dense stands of vegetation. The best habitats are the level ridge tops with sparse grass cover (TJS 2006).

3.6. West Nile Virus

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

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

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

Table 3.4 Historical West Nile Virus Information

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

*Wyoming Department of Health Records September 12, 2007.

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

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

22 sage-grouse in one study project (90% of the study birds), succumbed to WNV in the PRB in 2003. While birds infected with WNV have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

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

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

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

3.7. Water Resources

The project area is within the Upper Powder River drainage system. Three of the proposed reservoirs drain into the Willow Creek Watershed and six drain to Jepson Draw.

3.7.1. Groundwater

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

The PRB EIS Record of Decision includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation. Specifically related to groundwater, the plan identified the following (PRB EIS ROD page E-4):

- The effects of infiltrating waters on the water quality of existing shallow groundwater aquifers are not well documented at this time
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions

- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts
- Provide site specific guidance on the placement and design of CBNG impoundments
- Shallow groundwater wells would be installed and monitored where necessary

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

The BLM installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site had a battery of nineteen wells which were installed and monitored jointly by the BLM and USGS starting in August of 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment site, which has since been reclaimed, lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicated increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

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

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 2 registered stock water wells within ½ mile of the POD with depths ranging from 430 to 550 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).

3.7.2. Surface Water

The project area is within the Jepson Draw and Willow Creek drainages which are both tributaries to the Upper Powder River. All drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined beds and banks. There are numerous headcuts, some fairly large, as the channels wind to the Powder River.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "...illustrate the variability

in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area...” (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1797 µmhos/cm at Maximum monthly flow to 3400 µmhos/cm at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station named Powder River at Arvada, Wyoming. For comparison purposes, to show the water quality of a major tributary to the Powder River near this project, the EC for the Salt Creek near Sussex station range from 5204 to 5668 µmhos/cm EC and 18.9 to 23.6 for SAR (PRB FEIS page 3-49).

The operator has stated that no natural springs were found during field investigations or identified in other documentation.

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

3.8. Cultural Resources

A Class III inventory was conducted for the Vista project prior to on-the-ground project work (BFO project # 70070135). SWCA Environmental Consultants conducted a Class III inventory following the Archeology and Historic Preservation: Secretary of the Interior’s Standards and Guidelines (48FR190) for the proposed project. G.L. “Buck” Damone, BFO archaeologist, reviewed the report for technical adequacy and for compliance with BLM and Wyoming State Historic Preservation Office standards, and determined it to be adequate. The following resources are located within the project area.

Table 3.7 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48JO636	Historic Site	Not Eligible
48JO637	Historic Site	Not Eligible
48JO1542	Prehistoric Site	Not Eligible
48JO1550	Prehistoric Site	Not Eligible
48JO1552	Prehistoric Site	Not Eligible
48JO1553	Prehistoric Site	Not Eligible
48JO3825	Prehistoric Site	Not Eligible
48JO3828	Historic/Prehistoric Site	Not Eligible
48JO3829	Historic Site	Not Eligible
48JO3830	Historic Site	Not Eligible
48JO3831	Prehistoric Site	Not Eligible
48JO3832	Prehistoric Site	Not Eligible
48JO3833	Prehistoric Site	Not Eligible
48JO3834	Prehistoric Site	Not Eligible

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. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator’s plans and BLM applied mitigation. Of the 14 proposed well locations, none are on existing or reclaimed conventional well pads, 11 can be drilled without a well pad being constructed and 3 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 11 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 11 wells would involve approximately 0.5 acre/well for 5.5 total acres. The other 3 wells requiring cut & fill pad construction would disturb approximately 0.4 acres per well pad for a total of 1.2 acres. The total estimated disturbance for all 14 wells would be 2.3 acres.

Approximately 0.43 miles of improved roads would be constructed to provide access to various well locations. Approximately 11.63 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in “disturbance corridors.” Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.15 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	11	0.5/acre	5.5	Long Term
Constructed Pad	3	Site Specific	1.2	
Gather/Metering Facilities	0	Site Specific	0	Long Term
Screw Compressors	0	Site Specific	0	Long Term

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Impoundments				Long Term
On-channel	9	Site Specific	32	
Off-channel	0	Site Specific	0	
Water Discharge Points	6	Site Specific or 0.01 ac/WDP	0.1	
Channel Disturbance				
Headcut Mitigation*	0	Site Specific	0.0	
Channel Modification	0	Site Specific	0.0	
Improved Roads	0.43	60' Width or Site Specific	3.1	Long Term
No Corridor				
With Corridor				
2-Track Roads	11.63			Long Term
No Corridor	1.46	Site Specific	69	
With Corridor	10.17			
Pipelines				Short Term
No Corridor	.59	Site Specific	2.5	
With Corridor				
Buried Power Cable				Short Term
No Corridor	0.16	Site Specific	0.7	
Overhead Powerlines	2.54	Site Specific	10.8	Long Term

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

4.1.1. Wetland/Riparian

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. The shallow groundwater table would rise closer to the surface downstream of the impoundments. Vegetation in the draw bottoms, such as sagebrush, grasses and forbs that cannot tolerate year-round inundated root zones, would die and could eventually be replaced by water-loving plants such as rushes and sedges. In some cases, if surfacing water quality were poor, there would be no vegetative recruitment.

4.1.2. Invasive Species

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

1. Use only certified weed-free hay, straw and/or other organic mulches used for erosion control and other environmental restoration activities.
2. Use only weed-free road surfacing and other earthen materials for construction/maintenance of access roads

3. Encourage the cleaning of all vehicles and equipment used in construction, drilling, restoration and maintenance activities by pressure washing or other effective means. If done this would ensure that all equipment/vehicles are weed-free prior to transporting into new areas of development.
4. Reseed all areas not utilized for production/maintenance immediately following construction and restoration activities.
5. Use only certified weed-free seed for the reclamation/restoration of areas disturbed by coal bed natural gas or related development/activities.
6. Initiate a weed education policy to assist contractors and field employees in the identification of noxious weeds and to create an awareness of the impacts that noxious weeds and invasive plants have on the environment.
7. Encourage contractors and employees to report new noxious weed infestations to company representative responsible for weed management and the appropriate county weed board/supervisor
8. Distribute and review weed education materials to employees and contractors.

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

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

4.1.3. Cumulative Effects

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

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

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 17% of that total (see section 4.4.2.1).
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the tributaries to the Powder River and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the Vista proposes that produced water will not contribute significantly to flows

downstream.

No additional mitigation measures are required at this time.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter yearlong range for mule deer, and yearlong ranges for antelope would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

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

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

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

4.2.1.1. Cumulative effects

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

4.2.2. Aquatics Direct and Indirect Effects

Produced water is to be contained in 12 on-channel reservoirs (proposed). If a reservoir were to discharge, it is unlikely produced water will reach a fish-bearing stream. It is unlikely downstream species would be affected.

4.2.2.1. Cumulative effects

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

4.2.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the construction of wells, roads, pipelines and reservoirs. Prompt 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).

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.

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.

4.2.3.1. Cumulative effects

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

4.2.4. Raptors Direct and Indirect Effects

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

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

NEST	WELL/PIT NUMBER	DISTANCE
4202	Wells: 21-20, 12-20 roads and infrastructure; Reservoirs: 11-20 21-20	.2NE .25SW .1E .1NE .1N
4465	Wells: 12-21 23-21, roads and infrastructure powerline	.25NW .1E .15N, .1SE .25E
4466	Wells:43-21 32-21 roads and infrastructure, powerline	.15E .25W .15 N, S, E, W .25 N to W
4468	well 14-20	.26NW

	roads and infrastructure, reservoir 14-20, 24-20	.23 S to NW .22NW .3N
4204	Access road to 14-20 well Improved road/corridor	.2SW .3S, E, N
4470	Well 32-28 roads and infrastructure	.2N .15E to N

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

Williams initially proposed an overhead powerline within 100 yards of nest # 4466. The on-site determination was to move the powerline to the west .25 miles. The 23-21 well location was within .25 miles of nest #4465; however the on-site determined the road and well were out of sight of the nest. The access roads and wells proposed within .25 miles of nest #4202 were also out of line of sight. See Table 3.3.4.1 for nest information.

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

4.2.4.1. Cumulative effects

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

4.2.5. Threatened and Endangered and Sensitive Species

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

Table 4.2 Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (<i>Mustela nigripes</i>)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	No habitat
Threatened				
Ute ladies'-tresses orchid (<i>Spiranthes diluvialis</i>)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence

K Known, documented observation within project area.

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

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

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

Effect Determinations

LAA Likely to adversely affect

NE No Effect.

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

4.2.5.1. Black-footed ferret

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

4.2.5.2. Ute Ladies’ Tresses Orchid

Produced water will be stored in 9 reservoirs (proposed). The reservoirs are proposed on-channel and are located within dry upland drainages. No springs have been identified within the Vista project area (TJS 2007). Suitable habitat is not present within the Vista project area(Vetter 2007).

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within the project area. Implementation of the proposed coal bed natural gas project should have “no effect” on the Ute ladies’- tresses orchid as neither suitable habitat nor a seed source are present.

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

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

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sagebrush cover will be affected.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	NP	NI	No Prairie dog towns present
Fringed myotis (<i>Myotis thysanodes</i>)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (<i>Myotis evotis</i>)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (<i>Euderma maculatum</i>)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (<i>Vulpes velox</i>)	Grasslands	S	MIIH	Sagebrush and grassland habitat will be lost.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Caves and mines.	NP	NI	Habitat not present.

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

Presence

K Known, documented observation within project area.

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

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

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

Project Effects

NI No Impact.

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

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

BI Beneficial Impact

4.2.5.3. Bald eagle

The Vista project area is surrounded by extensive natural gas development. Existing 3-phase overhead power lines can be found south and east of the project area. There are no existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Williams will be using existing 3 phase overhead power lines within the project area, and is proposing to have an additional 2.54 miles of new overhead power lines within the Vista project area.

The presence of overhead power lines and roads may impact foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through August 14, 2007, Service Law Enforcement salvage records for northeast Wyoming identified that 180 raptors, including 1 bald eagle, 106 golden eagles, 1 unidentified eagle, 28 hawks, 44 owls and 8 unidentified raptors and 1 great-blue heron were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2007). Of the 180 raptors electrocuted 58 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with power lines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Improved private roads access the project area on the south, north and east. With the increase in gas development in the area, vehicle size and traffic volume will also increase.

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

Produced water will be stored in 9 reservoirs (proposed) which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management. As the reservoirs are developed and begin taking water, water fowl will likely be attracted to the project area and provide an additional prey source for bald eagles.

4.2.5.4. Greater sage-grouse

Suitable sage-grouse habitat is present throughout the Vista project area. The main access road into the POD was changed from the south (adjacent to 2 sage grouse leks) to a road coming from the north. This would lessen the impact to sage grouse from increased daily traffic to the area. Three reservoirs proposed in sagebrush bottoms, were dropped from the original proposal, reducing the direct impact to nesting and brood rearing habitat, however all of the remaining proposed 9 reservoirs contain moderate to dense sage brush habitat used by sage grouse, thus an estimated 31 acres of habitat will be lost from this action. Additional disturbance to sage grouse habitat will occur as a result of wells, roads and utility corridor construction. The draw bottoms within the project area are the primary sagebrush habitat areas for sage grouse nesting and brood rearing,

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

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

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

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

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

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

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

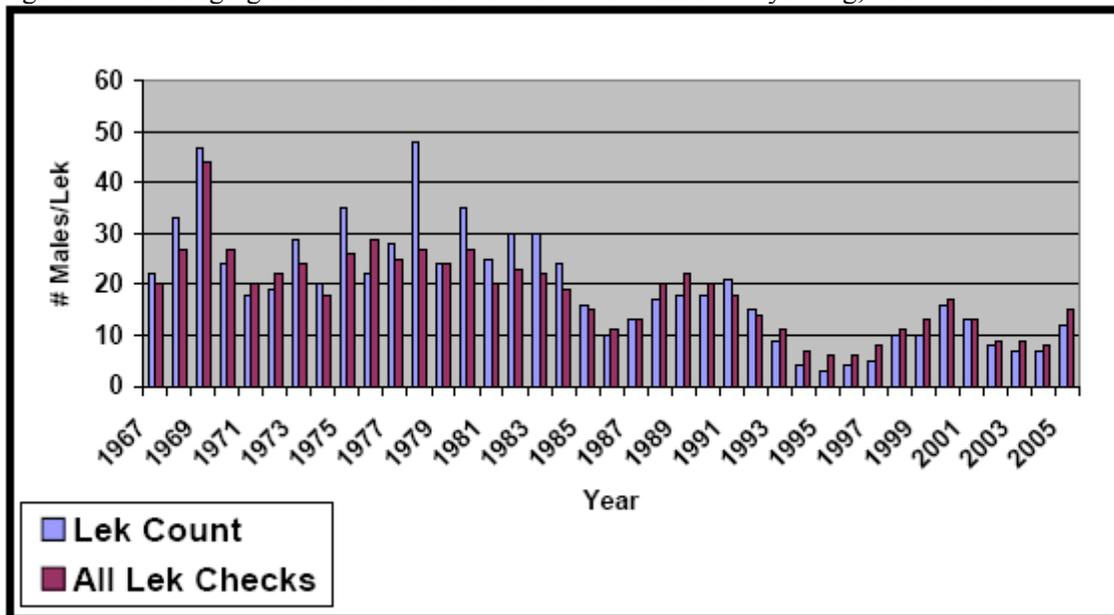
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed

natural gas development. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan’s north-central Montana study area.

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

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

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



Sage-grouse populations within the PRB are declining independent of coalbed natural gas development. CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (Oedekoven 2004). The Powder

River Basin Oil and Gas Project Final Environmental Impact Statement estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003). Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

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

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

4.2.5.5. Mountain plover

The majority of the Vista project area is unsuitable mountain plover habitat. There are no active prairie dog colonies within the project area that are considered mountain plover potential habitat. Additionally areas of level terrain were limited to only a few ridge tops and dry impoundments. All of these locations were surrounded by tall grasses or shrubs and were relatively isolated and small.

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipeline corridors and roads may be attractive to plovers, while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. Overhead power lines provide perch sites for raptors that could potentially result in increased mountain plover predation. CBNG infrastructure such as well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

With the loss or alteration of their natural breeding habitat (predominately prairie dog colonies), mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat. Such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines. These areas could become reproductive sinks. Adult mountain plovers may breed there and lay eggs and hatch chicks, however the young may not reach fledging age due to the poor quality of the habitat.

Recent analysis of the US Fish and Wildlife Service (USWFS) Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf 1995).

An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.5.1. Cumulative effects

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

4.3. West Nile Virus Direct and Indirect Effects

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

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

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

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

4.4. Water Resources

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

The strategy for disposal of produced water is to discharge into on-channel impoundments for evaporation and exfiltration. Three of the dams are proposed for “periodic discharge” to reservoirs farther downstream. However, the WYPDES permit does not allow discharge from the most downstream dams in this system. For a complete discussion on which dams are “full containment” and which ones will have “periodic discharges”, see page 16 of the water management plan.

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 18.0 gpm per well or 252.0 gpm (0.6 cfs or 434 acre-foot per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 147,481 acre-feet in 2008 (maximum production was estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 0.3% of the total volume projected for 2008. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 100 gpm will infiltrate at or near the discharge points and impoundments (161 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). However, there is potential for infiltration of produced water to influence the quality of the antecedent groundwater. The WDEQ requires that operators determine initial groundwater quality below impoundments to be used for CBNG produced water storage. If high quality water is detected (Class 3 or better) the operator is required to establish a groundwater monitoring program at those impoundments.

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring 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. The Wyoming DEQ has also established an Impoundment Task Force which is in the process of drafting an “Impoundment Monitoring Plan” to investigate the potential for existing impoundments to have impacted shallow ground water. WYPDES permits received by DEQ prior to August 1, 2004, for discharging to impoundments will be assessed through the “Impoundment Monitoring Plan”. For WYPDES permits received by DEQ after August 1, 2004, the BLM will require that operators comply with the requirements outlined in the DEQ compliance monitoring guidance document (June 14, 2004) prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of water wells in the area. The permitted water wells in the area produce from water bearing zones ranging in depth from 430 to 550 feet below the ground surface. The targeted coal zones range from 1530 to 1695 feet below ground surface. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence of the proposed wells.

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

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures will protect any

potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

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

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

4.4.2. Surface Water

The WDEQ limits applied to waters of the Upper Powder River for waters flowing into Montana are shown in table 4.5 below as most and least restrictive proposed limits. WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) are also listed and 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). Also listed are historic water quality figures for the Powder River and for a major tributary to the Powder River near the proposed development. It is worth noting that the water entering the Powder River from Salt Creek is affected by WYPDES permitted oilfield discharges from oil development in the Midwest and Linch areas.

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

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2	1000
Least Restrictive Proposed Limit		10	3200
Powder River at Arvada, Wyoming			
Historic Data Average at Maximum Flow		4.76	1797
Historic Data Average at Minimum Flow		7.83	3400
Salt Creek near Sussex, Wyoming			
Historic Data Average at Maximum Flow		18.9	5204
Historic Data Average at Minimum Flow		23.6	5668
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ WYPDES PERMIT LIMITS ARE NOT AVAILABLE AT THIS TIME			

Predicted Values	TDS, mg/l	SAR	EC, μmhos/cm
Predicted Produced Water Quality Lower Big George Coal Zone	2060	29.9	3390

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 2060.0 mg/l TDS which is not 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 Lower Big George coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 18.0 gallons per minute (gpm) is projected to be produced from these 14 wells, for a total of 252.0 gpm for the POD. See Table 4.5.

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

There are 6 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 9 impoundments (142 acre-feet of capacity) would potentially be constructed within the project area (out of 12 originally proposed). These impoundments will disturb approximately 32 acres including the dam structures. All of these water impoundments would be on-channel reservoirs. Monitoring will be required based upon WYDEQ requirements relative to "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). Proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite. These impoundments are proposed in highly erosive soils. Where banks are steep along the water line, sloughing will occur. In most cases this may not pose a serious threat to the structures, other than reducing the storage capacity of the reservoir. However, in some of the areas, bank failures could be significant, creating potential for wave action which could overtop the dam. Inspections of these dams should include the banks surrounding the reservoir pool.

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 0.1 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. 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. Reservoirs may be required to be fenced to exclude livestock based on Range Department best management practices for distribution of cattle within BLM allotments.

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 should have occurred in 2006 with a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 14 wells is anticipated to be a total of 252.0 gpm or 0.6 cfs to impoundments.

Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Willow Creek and Jepson Draw from this action (0.6 cfs) may add a maximum 0.5 cfs to the Upper Powder River flows, or 0.7% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Powder River, except during periods of very low flow (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 did provide an analysis of the potential development in the watershed above the project area (WMP page 5). Based on the area of the unnamed tributaries to Jepson Draw and Willow Creek within the POD (the POD boundary is very close to the watershed divide between these drainages and Little Willow Creek) and an assumed density of one well per location every 80 acres, the potential exists for the development of 36 wells which could produce a maximum flow rate of 648 gpm (1.44 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

1. New wells will be phased in over several years, and
2. 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, 1.4 cfs, is much less than the volume of runoff estimated from the 2-year storm event for these tributaries of the Upper Powder River 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. A copy of the final approved permit will be provided to the BLM when it is issued.

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 Vista POD prepared by Western Land Services for Williams Production RMT Company.

4.4.2.1. Surface Water Cumulative Effects

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

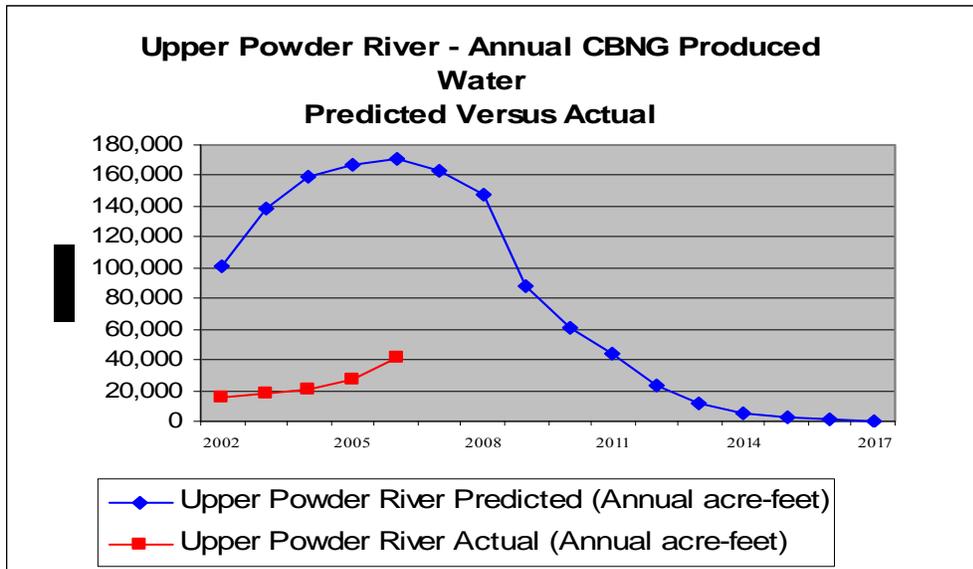
As of December 2006, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 123,984 acre-ft of water compared to the predicted 736,519 acre-ft disclosed in

the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 17 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

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

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

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



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

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

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 17% of that total (see section 4.4.2.1).
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.

Additional mitigation measures may be required as this POD is developed.

Refer to the PRB FEIS, Volume 2, page 4-115 – 117 and table 4-13 for cumulative effects relative to the

Upper Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

The Bureau of Land Management has determined that no historic properties are within the area of potential effect. On 1/28/08, the Bureau electronically notified the Wyoming State Historic Preservation Office (SHPO), following section V1(A)(1) of the Wyoming State Protocol, of a finding of No Effect to historic properties.

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

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Mary Hopkins	Interim Wyoming SHPO	Wyoming SHPO	No

6. OTHER PERMITS REQUIRED

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

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