FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Williams RMT Production
All Night Creek 4 Addition 2
ENVIRONMENTAL ASSESSMENT –WY-070-EA07-29

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Williams RMT Production's All Night Creek 4 Addition 2 Coal Bed Natural Gas (CBNG) POD comprised of the following 4 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Scott Federal	12-18	SW NW	18	42	74	WYW 152618
2	Scott Federal	21-18	NE NW	18	42	74	WYW 152618
3	Scott Federal	32-18	SW NE	18	42	74	WYW 152618
4	Scott Federal	41-18	NE NE	18	42	74	WYW 152618

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 Plan of Development, 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.
   - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
   - Provide water analysis from a designated reference well in each coal zone.

2 The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).

3 Alternative C will not result in any undue or unnecessary environmental degradation.

4 It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.

5 Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.

6 Alternative C is the environmentally-preferred Alternative.

7 The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

8 Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts of the proposed action in the attached environmental assessment, I have determined that NO significant impacts are expected 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 RMT Production
All Night Creek 4 Addition 2
PLAN OF DEVELOPMENT
WY-070 -EA07-29

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on one federal oil and gas mineral lease issued to the applicant by the BLM. 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 RMT Production's All Night Creek 4 Addition 2 Plan of Development (POD) for 4 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 4 wells proposed within this POD, as follows:

	Well Name	Well Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
1	Scott Federal	12-18	SW NW	18	42	74	WYW 152618

	Well Name	Well Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
2	Scott Federal	21-18	NE NW	18	42	74	WYW 152618
3	Scott Federal	32-18	SW NE	18	42	74	WYW 152618
4	Scott Federal	41-18	NE NE	18	42	74	WYW 152618

The proposed action involves the development of the project, which includes the following:

- Drilling of 4 total federal CBM wells in Big George, and coal zones to depths of approximately 1225 feet.

- An unimproved and improved road network.

- A water management plan that involves the following infrastructure and strategy: 1 existing discharge point and 1 existing stock water reservoir within the Upper Belle Fourche River watershed.

- A buried gas, water and power line network, and 1 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, Drilling Plan and Water Management Plan in the Plan of Development (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 Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard Conditions of Approval contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their Plan of Development, 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 Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
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.

County: Campbell

Applicant: Williams RMT Production

Surface Owners: 1. Jacques Scott 2. Mark Iberlin

2.2.1. Changes as a result of the on-sites

At the on-site, the BLM and Williams identified areas where impacts could be minimized. Those changes were included in the proposed action.

Low water crossings will be converted to culvert crossings, according to the landowner's wishes.

2.2.2. 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 *Conditions of Approval* (COAs) and will be in addition to stipulations applied at the time of lease issuance and any standard conditions of approval.

2.2.2.1. Groundwater

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the latest DEQ standards and monitoring guidance. WDEQ has also established a task force to evaluate the need for investigation of shallow groundwater aquifers under pre-existing unlined CBNG impoundments.

2.2.2.2. 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 channels.
   c) Channel crossings by roads 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. Concerns regarding the quality of the discharged CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.

3. 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 this impoundment.

2.2.2.3. 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 CBM discharges at concentrations exceeding detectable limits.

2.2.2.4. Vegetation

1. Temporarily fence reseeded areas, if not already fenced, for at least two complete growing seasons to insure reclamation success on problematic sites (e.g. close to livestock watering source, erosive soils etc.).

2.2.2.5. Wetland/Riparian

1. No wetland or riparian areas will be adversely affected by the implementation of this plan of development. The wetland/riparian area that presently exists is at the outfall. At this time flows are

so low that the area is in danger of drying up. The added water from these wells will help prolong the life of this site.

2.2.2.6. 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. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.

3. 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.

2.2.2.7. Threatened, Endangered, or Sensitive Species

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

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

2.2.2.8. Visual Resources

1. The Companies will mount lights at compressor stations 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.

2.2.2.9. 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.

2.2.3. Site specific mitigation measures

Surface Use

1. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the All Night Creek IV Addition 2 POD, Carlsbad Canyon (2.5Y 6/2), from the Munsell Soil Color Chart.

2. There were two major ecological sites identified at the onsite inspection within this POD. In order to expediently re-claim and re-vegetate the disturbed surfaces, two seed mixes have been identified for the specific ecological site areas. These mixes will be applied to any surface disturbance related to the project on Federal surface. 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:

Ecological Site at Well Sites Locations

Seed Mix A		**Seed Mix B**
Clay Loam		**Silty Loam**
41-18	12-18	21-18
32-18		

Seed Mix A - Clayey Eco Site

Species	**% in Mix**	**Lbs PLS***
Western Wheatgrass (Pascopyrum smithii)	35	4.2
Green needlegrass (Nassella viridula)	40	4.8
Bluebunch wheatgrass (Pseudoroegneria spicata ssp. Spicata)	10	1.2
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata)/or ***American vetch***(Vicia americana)	5	0.6
Totals	**100%**	**12 lbs/acre**

Seed Mix B – Silty / Sandy Loam

Species	% in Mix	Lbs PLS*
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	20	2.4
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)	15	1.8
Prairie sandreed (Calamovilfa longifolia)	30	3.6
Needleandthread (Hesperostipa comata ssp. comata)	20	2.4
Prairie coneflower (Ratibida columnifera)	5	0.6
White or Purple Prairie Clover (Dalea candidum, purpureum)	5	0.6
Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax*** (Linum lewisii)	5	0.6
Totals	**100%**	**12 lbs/acre**

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

This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site descriptions, U.W. College of Ag., and seed market availability. A site-specific inventory will allow the resource specialist to suggest the most appropriate species, percent composition, and seeding rate for reclamation purposes.

*PLS = pure live seed

3. In order to insure that 90% pure seed mixes are applied, the operator will provide the seed stock labels for any seed applied on Federal surface to the Authorized Officer in the BFO.

4. 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

5. Provide 4" of aggregate where grades exceed 8%.

   No surface disturbing activity will be allowed within ½ mile of the documented nest sites (Sutter 2004) from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing stipulation affects all wells listed below as well as nearby reservoirs and infrastructure: Scott Federal 41-18, Scott Federal 32-18.

2.3. Alternatives considered but not analyzed in detail

No alternative water management strategies, such as direct discharge, water treatment or land application were evaluated by the operator.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on (date rec'd). Field inspections of the proposed All Night Creek 4 Addition 2 CBM project were conducted on 8/17/2006 by:

Nate West – NFO / BLM
James Bashor – NFO /BLM
Kristin Mackey – Williams RMT Production
Ben Adams – BFO / BLM
Randee Jespersen – Williams RMT Production
Brent Reynolds – Williams RMT Production

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			West
Floodplains		X		Adams
Wilderness Values			X	Bashor
ACECs			X	Bashor
Water Resources	X			Adams
Air Quality		X		Bashor
Cultural or Historical Values		X		Tratebras
Prime or Unique Farmlands			X	Bashor
Wild & Scenic Rivers			X	Bashor
Wetland/Riparian	X			Adams
Native American Religious Concerns			X	Tratebras
Hazardous Wastes or Solids		X		Bashor
Invasive, Nonnative Species	X			Bashor
Environmental Justice		X		Bashor

3.1. Topographic Characteristics of Project Area

The project area is in the headwaters of the Belle Fourche River. The immediate area is very gentle topography with slopes ranging from 1-5%. Water flow features are ephemeral with sloping sides and narrow swale bottoms. All swales appear to have good grass cover when adequate rainfall occurs.

3.2. Vegetation & Soils

Species typical of short grass prairie comprise the project area flora. Specific species observed

throughout the project area includes: needleandthread and bluebunch wheatgrass, prickly pair cactus, yucca and sagebrush. Differences in dominant species within the project area vary with soil type, aspect and topography. Native soils identified surrounding the well pads and adjacent to production corridors consisted of clay to silty loam.

To determine the appropriate Ecological sites for this proposed action, BLM specialists incorporated data from onsite field reconnaissance and soil survey information. For more detailed soils information, see NRCS Soil Survey WY705.

The Ecological sites vary from loamy to primarily rocky throughout the project area. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from less than one inch to greater than ten inches on ridges, six inches to greater than thirty inches in bottomlands. Erosion potential varies from to depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. The soils reclamation objectives are stated within the COAs.

3.2.1. Wetlands/Riparian

A wetland and small riparian area has developed in the vicinity of the outfall due to past discharges. At the time of the onsite, the flows were so small that the area could be in danger of drying up. The receiving reservoir level was well below the dam's outlet, so there was no discharge into the drainage below the structure. There are no cottonwood forests in this prairie zone, although occasional small groves can be observed, especially around farmsteads.

3.2.2. Invasive Species

No state-listed noxious weeds and invasive/exotic plant infestations were discovered during field investigation by the proposed project proponent and BLM representatives.

3.3. Wildlife

3.3.1. Big Game

The project area is a yearlong use area for both mule deer and pronghorn antelope. Yearlong use is defined as when a substantial portion of a population makes general use of the habitat on a year-round basis. Big game range maps are available in the PRB FEIS and from the WGFD.

3.3.2. Aquatics

The project area does not support any aquatic species habitat.

3.3.3. Migratory Birds

Migratory birds are those that migrate from one locality to another for the purposes of breeding, and or foraging at some point during the calendar year. Please refer to the PRB FEIS for a list of potential migratory bird species that may occur in the project area.

3.3.4. Raptors

Several species of raptors may be potentially found in the habitat types associated with the proposed POD project area. For a list of potential raptor species that may occur in the proposed project area please refer to the PRB FEIS. ARCADIS conducted surveys to search for new nests and verify the location of nests. One nest, nest GRHO42N74W1801, was identified in the project area. Two juvenile owls were observed within the nest during 2006.

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

There are three listed species in the Buffalo resource area.

3.3.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 1988, the Wyoming Game and Fish Department (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).

No active prairie dog colonies are present in the project area.

3.3.5.1.2. Bald eagle

The U.S. Fish and Wildlife Service lists the bald eagle as Threatened throughout Wyoming. Eagles typically build nests in the crown of large mature trees such as cottonwoods or pines that are close to a reliable prey source. Fish and waterfowl are the primary prey for eagles, however small mammals and carrion may also be part of the diet, especially in winter months. Wintering eagles are typically associated with cottonwood gallery forests or stands of coniferous trees. Although many roosts are near water, upland tree stands are also used for the thermal cover provided.
Suitable bald eagle nesting and roosting habitat is absent on and within one mile of the ANC IV POD due to the paucity of mature trees.

3.3.5.1.3. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare, and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet. 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 a new site in 2006 (Bills 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.

No perennial streams are located in the project area. Channels in the area are ephemeral washes dominated by native grasses. Habitat features and hydrology to support Ute Ladies'-tresses are not present in the project area.

3.3.5.2. Sensitive Species

3.3.5.2.1. Black-tailed prairie dog

There are no active prairie dog colonies in the project area.

3.3.5.2.2. Greater sage-grouse

The project area contains suitable habitat for nesting/brood rearing greater sage grouse. There is one active lek within 3.5 miles of the project area. Grouse sign was present throughout the project area.

3.3.5.2.3. Mountain plover

The topography is rolling hills with the dominant vegetation being Wyoming big sagebrush. Bare ground is estimated at less than 10% and vegetation height is greater that 8 inches at the time of the onsite.

3.4. West Nile Virus

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

Since its discovery in 1999 in New York, WNV has been firmly established in the United States and has continued to spread west. Birds are the natural vector host and serve not only to amplify the virus, but spread it rapidly throughout the country since they are the only known animal to infect mosquitoes. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting the virus to humans, horses, and wildlife. The *Culex* genus appears to be the most important mosquito group that vector, WNV.

The human health issues related to WNV are well documented and may continue to escalate as the virus moves west. In Wyoming, 392 human cases, with 8 deaths, were attributed to the WNV in 2003. 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 4 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 some *Culex* species, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on

specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

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

3.5. Water Resources

The project area is within the Upper Belle Fourche River drainage system. The four wells and a non-discharging stock tank are located in the headwaters of the South Prong of the Belle Fourche River. The single discharge point and reservoir are located in one of the unnamed headwater draws which form the Belle Fourche River itself.

3.5.1. Groundwater

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

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

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

As stated in the MMRP, an Interagency Working Group 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 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 results of these investigations have yet to be analyzed and interpreted.

A search of the Wyoming State Engineers Office Ground Water Rights Database for this area showed 59 registered stock and miscellaneous water wells within a mile of the POD boundary ranging in depth from 220 feet to 1313 feet. For additional information on water, please refer to the PRB FEIS FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater) and 3-36 through 3-56 (surface water).

3.5.2. Surface Water

The project wells are within the headwaters of the South Prong of the Belle Fourche River drainage. The outfall and reservoir are in the headwaters of an unnamed tributary to the Belle Fourche River. Both these drainages are tributaries to the Belle Fourche River system. Within the POD boundary, all drainages are ephemeral. Most of the 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 well vegetated grassy swales, with somewhat defined beds and banks.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11. (PRB FEIS page 3-49). These water quality parameters "…illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Belle Fourche River, the EC ranges from 1532 at Maximum monthly flow to 2755 at Low monthly flow and the SAR ranges from 3.81 at Maximum monthly flow to 6.77 at Low monthly flow. These values were determined at the USGS station located below Moorcroft, Wyoming, many miles from the project area (PRB FEIS page 3-49).

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

There were no natural springs identified within the project area.

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the All Night Creek IV Addition 2 project prior to on-the-ground project work (BFO no. 70060206). ARCAIDIS Greystone Environmental Consultants conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. G.L. "Buck" Damone, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following cultural resources are

located in or near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48CA1559	Historic Homestead	Eligible
48CA5454	Lithic Scatter	Not Eligible

3.7. Other Mineral Resources

There are no other mineral resources that will be adversely impacted by the proposal.

4. ENVIRONMENTAL CONSEQUENCES

4.1. Vegetation & Soils Direct and Indirect Effects

Overall impacts to vegetation and soils from surface disturbance should be minor, based on the operator's plans and BLM applied mitigation. Of the proposed well locations, none are on existing or reclaimed conventional well pads, the 4 proposed wells will definitely require constructed (cut & fill) well pads. As such, minor surface disturbance would occur with the drilling of these 4 wells. This disturbance would only involve minor digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 10 x 30 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 4 wells would involve approximately 0.1 acre/well for 0.4 total acres. This would be a short-term, minor impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in Conditions of Approval (COAs).

No improved roads would be constructed to provide access to various well locations. Approximately 1.18 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. No pipelines would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

Proposed drainage crossings are shown on the Master Surface Use Plan and the Water Management Plan 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 only 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult." (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad Constructed Pad	0 4	0.1/acre or Site Specific	0 0.4	 Long Term
Gather/Metering Facilities	1	Site Specific	0.005	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0	Long Term
Impoundments On-channel Off-channel Water Discharge Points	 1 1	 Site Specific Site Specific Site Specific or 0.01 ac/WDP	 2.2 0.1	Long Term
*Wetlands Filled	----	Site Specific	0.0	
Channel Disturbance Headcut Mitigation* Channel Modification Pipeline Crossing* Road Crossing*	 0 0 2	 Site Specific Site Specific Site Spec or 0.01 acres Site Spec or 0.01 acres	 0.0 0.0 0.0 0.1	
Improved Roads No Corridor With Corridor	0.0	40' Width or Site Specific	0.0	Long Term
2-Track Roads No Corridor With Corridor	1.18	12' Width or Site Specific 20' Width or Site Specific	1.61	Long Term
Pipelines No Corridor With Corridor	0.0	20' Width or Site Specific	0.0	Short Term
Buried Power Cable No Corridor	0.0	12' Width or Site Specific	0.0	Short Term
Overhead Powerlines	0.0	15' Width	0.0	Long Term
Additional Disturbance		Site Specific	5.0	

*Already included in other categories of disturbance, but separated here for USCOE General Permit 98-08 reporting.

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 Direct and Indirect Effects

The only wetland or riparian area within the POD is located at the current outfall. This wetland was created by discharges of water produced as a result of CBNG production. Isolated cottonwood stands exist downstream of this outfall and reservoir near the farmstead but not along the drainage. Extensive cottonwood tree development does not exist along these upper reaches of the Belle Fourche River.

4.1.2. Invasive Species Direct and Indirect Effects

The operator has included a noxious weed management plan with their plan. In this plan the operator has committed to work with the Campbell County Weed and Pest office as well as any impacted landowner regarding a treatment program. As part of the management plan, they will educate their employees and contractors in identification and awareness of weeds of interest and the proper way to deal with them.

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

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 relative to this project are anticipated to be minimal for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Belle Fourche drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 29% of that total (see section 4.4.2.1)
- The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into the Upper Belle Fourche River.
- The water management plan for the All Night Creek 4 Addition 2 POD proposes that produced water will not contribute to significant flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, habitat for pronghorn antelope, mule deer, and white-tailed deer 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. The Pinedale Anticline study suggests mule deer do not readily habituate to human activities. 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). Elk are typically more sensitive to disturbance and human activities than mule deer, while pronghorn and white-tailed deer are less sensitive.

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. No additional mitigation measures are required.

4.2.2. Aquatics Direct and Indirect Effects

There will be no effect to aquatic species or habitat.

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

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

Stock tanks provide attractive watering sites for migratory birds, which can become trapped within the

tanks and drown. Ramps or similar structures within the tanks can provide a means for trapped birds to escape. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

There are no timing restrictions or survey requirements in place with the BLM to offer protection to nesting migratory birds. Raptor timing restrictions from February 1 through July 31 will offer some protection, however not all migratory bird habitat will have raptor timing restrictions and the restrictions may not cover the entire nesting season.

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. No additional mitigation measures are required.

4.2.4. Raptors Direct and Indirect Effects

One well (Federal 41-18) is within ¼ mile of the nest location. The well was not moved out of line of sight of the nest. The nest is separated from the project by Hwy 387 and located at the intersection of Hwy 50 and Hwy 387. The intersection experiences high volumes of traffic. Across the highway intersection from the nest is the Pine Tree compressor station. Any raptors that use the area for nesting are probably accustomed to vehicular traffic. An annual timing limitation shall be applied to the wells within .5 miles.

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.

4.2.4.2. Threatened and Endangered and Sensitive Species

4.2.4.2.1. Threatened and Endangered Species Direct and Indirect Effects

Table 4.2 (T&E table)

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 80 acres.	NP	NE	No habitat in project area.
Threatened				
Bald eagle (*Haliaeetus leucocephalus*)	Mature stands of trees and reliable prey base.	NS	NE	No overhead power associated with project.
Utes ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	Habitat is lacking due to poor soils, vegetation cover, and lack of perennial water.

4.2.4.2.2. Black-footed ferret

Because it is highly unlikely ferrets are present and there is no habitat, implementation of the proposed development should have **"*no effect*"** on the black-footed ferret.

4.2.4.2.3. Bald eagle

Produced water will flow into one existing reservoir which may potentially attract eagles if reliable prey is present. The reservoir attracts waterfowl however; other reliable food sources are not present in the project area. The effect of the reservoir 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.

Bald eagles are not expected to use the project area. The proposed project should have "***no effect"*** on bald eagles due to the paucity of nesting and roosting trees in the project area and the lack of new overhead power.

4.2.4.2.4. Ute's Ladies Tresses Orchid

Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed coal bed natural gas project should have "***no effect"*** on the Ute ladies'- tresses orchid.

4.2.4.3. Sensitive Species Direct and Indirect Effects

Table 4.3 (Sensitive Species table)

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*Rana pipiens*)	Beaver ponds, permanent water in plains and foothills	S	MIIH	Additional water will affect existing waterways.
Spotted frog (*Ranus pretiosa*)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Grasslands, weedy fields	S	MIIH	Grassland habitats will be impacted.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush will be impacted by the proposed action
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	NP	NI	No prairie dog colonies present.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Raptor timing may protect raptors.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush habitats will be disturbed.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Scattered shrubs may be affected
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Grasslands will be affected.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	NP	NI	No habitat in project area.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (*Falco peregrinus*)	cliffs	NP	NI	No nesting habitat present.
Sage sparrow (Amphispiza billneata)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sage brush will be impacted by the action
Sage thrasher (Oreoscoptes montanus)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Sage brush will be impacted by the action
Trumpeter swan	Lakes, ponds, rivers	NS	NI	Existing reservoir present,

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
(Cygnus buccinator)				species not expected to occur.
White-faced ibis (Plegadis chihi)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (Coccyzus americanus)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present
Fish				
Yellowstone cutthroat trout (Oncoryhynchus clarki bouvieri)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Fringed myotis (Myotis thysanodes)	Habitat is typically dry with mature coniferous and deciduous trees and grassland edge components and abundant snags.	NP	NI	Habitat not present
Black-tailed prairie dog (*Cynomys ludovicianus*)	Grasslands	NP	NI	No prairie dog colonies in project area.
Long-eared myotis (Myotis evotis)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (Euderma maculatum)	Cliffs over perennial water, basin-prairie shrub	NP	NI	Cliffs & perennial water not present.
Swift fox (Vulpes velox)	Grasslands	S	MIIH	Habitat will be impacted.
Townsend's big-eared bat (Corynorhinus townsendii)	Forests, basin-prairie shrub, caves and mines	NP	NI	Habitat not present.
Plants				
Porter's sagebrush (Artemisia porteri)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (Cymopterus williamsii)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

4.2.4.3.1. Black-tailed prairie dog

No prairie dog colonies were identified in the project area therefore this project should not affect prairie dogs.

4.2.4.3.2. Greater sage grouse

Wells and other infrastructure located within sagebrush communities will result in direct habitat loss. Sage-grouse avoidance of these facilities produces even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage- grouse and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). Well houses and power poles may provide habitats for mammal and avian predators increasing sage grouse predation. Overhead power lines may also present a collision risk for sage-grouse. Sage-grouse may avoid suitable habitat containing overhead power lines to reduce their exposure to predation.

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).

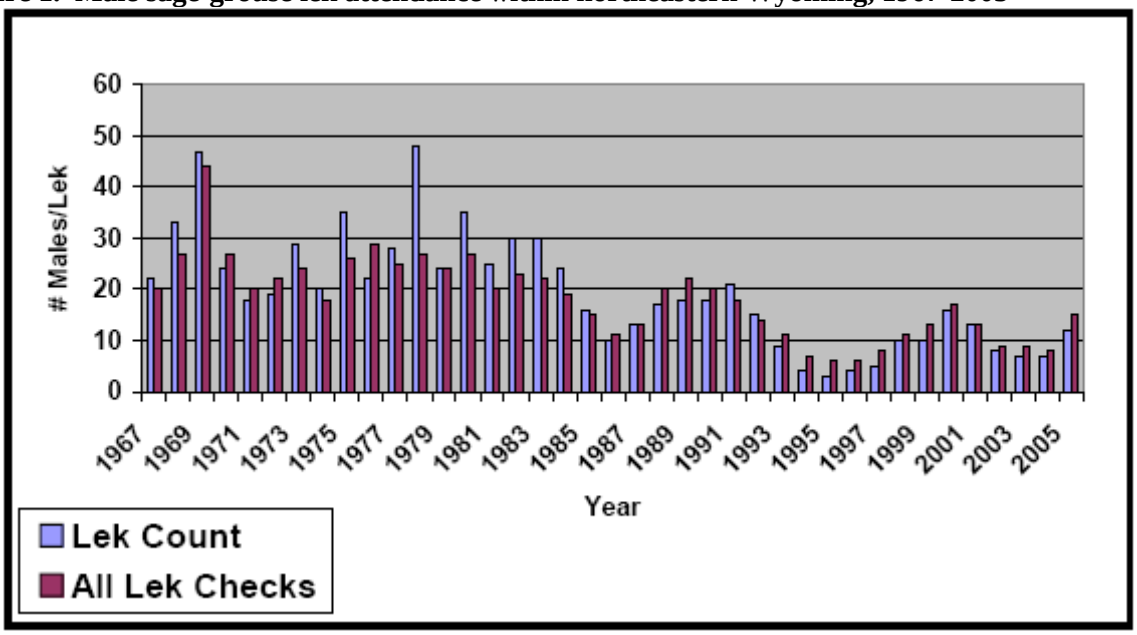
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently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

4.2.4.4. Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-271. No additional mitigation measures are required.

4.3. West Nile Virus

The PRB FEIS and ROD included a programmatic mitigation measure that states, "The BLM will consult with appropriate state agencies regarding WNV. If determined to be necessary, a condition of approval will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant." 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. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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 Belle Fourche River and makes 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), should minimize project area and downstream potential impacts from proposed water management strategies.

The WDEQ has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The Wyoming State Engineers Office (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 5.0 gpm per well or 20.0 gpm (0.04 cfs or 32 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Belle Fourche River drainage, the projected volume produced within the watershed area was 85,761 acre-feet in 2006, which was the year of predicted maximum production. As such, the volume of water resulting from the production of these wells is 0.04% of the total volume projected for 2006 which will result in an insignificant increase to the present volume of water produced from coal bed natural gas in the Powder River Basin. 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 28% to groundwater aquifers and coal zones in the Upper Belle Fourche River drainage area under alternative 2A (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 6 gpm will infiltrate at or near the discharge points and impoundments (10 acre-feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "…the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). However, there is potential for infiltration of produced water to influence the quality of the antecedent groundwater. The WDEQ requires that operators determine initial groundwater quality below impoundments to be used for CBNG produced water storage. If high quality water is detected (Class 3 or better) the operator is required to establish a groundwater monitoring program at those impoundments.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level in the water wells in the area. The permitted water wells in the area produce from alluvial zones above the targeted coal bed natural gas producing zones (220-1313 feet in depth for the stock and miscellaneous wells compared to 1193-1253 feet to the Big George). As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence of the proposed wells.

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

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

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

Shallow ground water monitoring is ongoing at 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.

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 CBM 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

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 704.0 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of direct 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.

A maximum flow rate of 5.0 gallons per minute (gpm) is projected to be produced from these 4 wells, for a total of 20.0 gpm for the POD. The quality for the water produced from the Big George coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. That water quality was determined to be 1160.0 µmhos/cm electrical conductivity (EC)**,** 704.0 mg/1 total dissolved solids (TDS) and 8.2 sodium adsorption ratio (SAR). By comparison, proposed Upper Belle Fourche River water quality limits for Belle Fourche River water entering South Dakota are an SAR of 10 and an EC from 2000 to 2500 µmhos/cm. For more information, please refer to the Water Management Plan (WMP) included in this POD.

Based on the onsite review of the discharge point, it has been appropriately sited and utilizes an appropriate water erosion dissipation design. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

Table 4.4 Summary of Water Management Strategy

Primary Watershed

100 % Direct Discharge P through a dam
0 % Containment Pond P
0 % Infiltration Pond P
0 % Injection P
0 % Active Treatment P
0 % Passive Treatment P
0 % LAD P
0 % Other P

To manage the produced water, 1 existing impoundment (2.8 acre feet) will be used within the project area. This impoundment has disturbed approximately 2.2 acres including the dam structure. This is an on-channel impoundment and has been upgraded to include a principle spillway (trickle tube). All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 3 gpm below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of the channel and address any problems resulting from this discharge. Discharge from the impoundment will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation in the impoundment will occur, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundment will be submitted and approved when it is no longer necessary for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Belle Fourche River of 61 cfs (PRB FEIS pg 4-80). The predicted maximum discharge rate from these 4 wells is anticipated to be a total of 20.0 gpm or 0.04 cfs to an impoundment. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74), the produced water re-surfacing in this drainage as a result of this action (0.04 cfs) may add a maximum 0.03 cfs to the Upper Belle Fourche River flows, or 0.05% of the predicted total CBNG produced water contribution. This incremental volume, while not statistically below the measurement capabilities of the U.S. Geological Survey, will not make a significant contribution to the volume of flow in the Upper Belle Fourche River (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). The addition of the water produced from these wells will not significantly impact the water quantity in the mainstem of the Upper Belle Fourche River. For more information regarding the maximum predicted water impacts to the Powder River resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The reservoir, in addition to loss through evaporation and infiltration, would allow flexibility in the timing and quantity of surface discharge to receiving channels. This would minimize erosion problems and potentially allow for streambed enhancement through wetland-riparian species establishment.

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 3). Based on the area of the South Prong of the Belle Fourche watershed above the POD (32 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 256 wells which could produce a maximum produced water flow rate of 1280 gpm or 2.9 cfs. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 2.9 cfs, is much less than the run off estimated from the 2-year storm event for this drainage. Therefore, the estimated volume of water produced from the full development in the watershed above the project area is significantly less than the natural run off from the area.

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at the 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 modification of its Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WY0048551, part I page 2):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
Total Dissolved Solids	5000 mg/l max
Specific Conductance	2000 µmhos/cm max
Sulfates	3000 mg/l max
Radium 226	1 pCi/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	820 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	3.1 µg/l max
Chlorides	46 mg/l

The maximum permitted water discharge rate allowed by this WYPDES permit is 1.42 MGD (2.2 cfs). The analysis for the permit included produced water from a total of 56 Fee, State and Federal wells which the operator has drilled or has proposed to drill within the Upper Belle Fourche area.

The WYPDES permit (WY0048551), issued by the WDEQ, addresses existing downstream concerns, such as irrigation use, in the conditions of approval for the permit. The designated point of compliance identified for this permit is the end of the discharge pipe.

The WDEQ limits applied to waters of the Upper Belle Fourche River, water quality parameters for groundwater, and the expected quality of the produced water are listed in table 4.5 below. The representative water sample was collected from a well located in section 6 of township 42N, range 74W.

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 –		10	2000
Least Restrictive Proposed Limit		10	2500
Belle Fourche River below Moorcroft, WY Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 3.81 6.77	 1532 2755
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
WDEQ Water Quality Requirement for NPDES Permit # WY0048551 At discharge point	5000	10	2000
Predicted Produced Water Quality Big George	704	8.1	1160

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 which will be capable of being sampled at the wellhead. The well will be sampled at the wellhead for analysis, using WDEQ procedures and analyte lists, 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 Water Management Plan for the All Night Creek 4 Addition 2 POD prepared by and 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 Belle Fourche River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2005, all producing CBNG wells in the Upper Belle Fourche River watershed have discharged a cumulative volume of 82,792 acre-ft of water compared to the predicted 281,188 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and in tabular format in Table 4.6 following. This volume is 71% less than the total predicted produced water analyzed in the PRB FEIS for the Upper Belle Fourche River watershed.

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

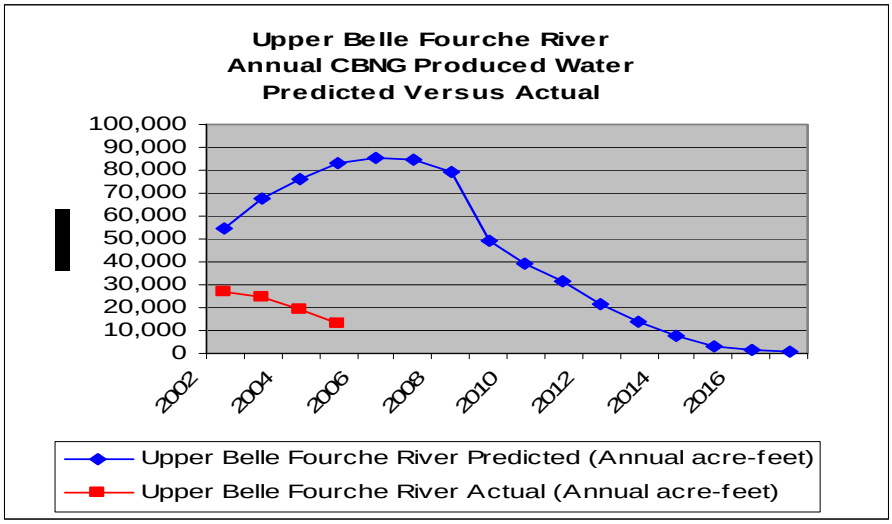


Table 4.6 Actual vs predicted water production in the Upper Belle Fourche River watershed *2005 Data Updated 4-5-06*

Year	Upper Belle Fourche Predicted (Annual acre-feet)	Upper Belle Fourche Predicted (Cumulative acre-feet from 2002)	Upper Belle Fourche Actual (Annual acre-feet)		Upper Belle Fourche Actual (Cumulative acre-feet from 2002)	
			Actual Ac-ft	% of Predicted	Cum Ac-ft	% of Predicted
2002	54,735	54,735	26,761	48.9	26,761	48.9
2003	67,481	122,216	24,309	36.0	51,070	41.8
2004	76,259	198,475	18,906	24.8	69,975	35.3
2005	82,713	281,188	12,817	15.5	82,792	29.4
2006	85,761	366,949				
2007	84,507	451,456				
2008	79,493	530,949				
2009	49,435	580,384				
2010	39,170	619,554				
2011	31,277	650,831				
2012	21,215	672,046				
2013	13,495	685,541				
2014	7,630	693,171				
2015	3,347	696,518				
2016	1,849	698,367				
2017	790	699,157				
Total	**699,157**		**69,975**			

The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and Sodium Adsorption Ratio (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 BLM requires each POD approved under the PRB FEIS to have a designated reference well to be sampled within 60 days of initial production. There is also a series of monitoring wells that are providing additional data. This new data will be evaluated periodically to assess effects.

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 relative to this project are anticipated to be minimal for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Upper Belle Fourche drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 29% of that total (see section 4.4.2.1).
2. The WDEQ/WQD enforcement of the terms and conditions of the NPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator) to monitor the volume of water flowing into the Upper Belle Fourche River.

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

No additional mitigation measures are required.

4.5. Cultural Resources

The Bureau electronically notified the Wyoming State Historic Preservation Officer (SHPO) following section V (B) of the Wyoming State Protocol that no historic properties were affected in the proposed project area. Access for the project will pass through a previously recorded eligible historic homestead (48CA1559). The two-track ranch road shall not be widened, graveled, or otherwise improved. The existing header to be used for the All Night Creek 4 Addition 2 POD was placed beyond the crest of a ridge south of the ranch to avoid viewshed impacts during the previous project. The proposed two-track and utility corridor for the current project will extend from the header south to the project area and will also not impact the historic ranch viewshed.

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 Conditions of Approval*** (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite?
Sara Needles	Wyoming SHPO	Wyoming SHPO	No
Randee Jespersen	Landperson	Williams RMT Production	Yes
Kristin Mackey	Eng., Technician	Williams RMT Production	Yes
Brent Reynolds	Production Lead	Williams RMT Production	Yes

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

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