**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD**
**FOR**
**Williams Production RMT Company**
**Kingwood 3**
**ENVIRONMENTAL ASSESSMENT –WY-070-09-148**

DECISION: BLM's decision is to approve a combination of alternatives C and D as summarized below and described in the attached EA and authorize Williams Production RMT Company's Kingwood 3 Coal Bed Natural Gas (CBNG) POD comprised of the following 33 Applications for Permit to Drill (APDs) and rights-of-way authorizations:

| | Well Name | Well # | Qtr/Qtr | Section | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 1 | KINGWOOD 3 BRUBAKER | 41-1 | NENE | 1 | 45N | 77W | WYW0266651 |
| 2 | KINGWOOD 3 BRUBAKER | 42-1 | SENE | 1 | 45N | 77W | WYW89851 |
| 3 | KINGWOOD 3 FEDERAL | 12-1* | SWNW | 1 | 45N | 77W | WYW89851 |
| 4 | KINGWOOD 3 FEDERAL | 21-1 | NENW | 1 | 45N | 77W | WYW89851 |
| 5 | KINGWOOD 3 FEDERAL | 14-1 | SWSW | 1 | 45N | 77W | WYW89851 |
| 6 | KINGWOOD 3 FEDERAL | 23-1 | NESW | 1 | 45N | 77W | WYW89851 |
| 7 | KINGWOOD 3 FEDERAL | 32-1 | SWNE | 1 | 45N | 77W | WYW0266651 |
| 8 | KINGWOOD 3 FEDERAL | 34-1 | SWSE | 1 | 45N | 77W | WYW89851 |
| 9 | KINGWOOD 3 FEDERAL | 23-2 | NESW | 2 | 45N | 77W | WYW146848 |
| 10 | KINGWOOD 3 FEDERAL | 14-2 | SWSW | 2 | 45N | 77W | WYW146848 |
| 11 | KINGWOOD 3 FEDERAL | 12-12 | SWNW | 12 | 45N | 77W | WYW89851 |
| 12 | KINGWOOD 3 FEDERAL | 21-12 | NENW | 12 | 45N | 77W | WYW89851 |
| 13 | KINGWOOD 3 FEDERAL | 32-12 | SWNE | 12 | 45N | 77W | WYW89851 |
| 14 | KINGWOOD 3 FEDERAL | 14-12 | SWSW | 12 | 45N | 77W | WYW146848 |
| 15 | KINGWOOD 3 FEDERAL | 23-12 | NESW | 12 | 45N | 77W | WYW146848 |
| 16 | KINGWOOD 3 FEDERAL | 41-12 | NENE | 12 | 45N | 77W | WYW89851 |
| 17 | KINGWOOD 3 FEDERAL | 12-26 | SWNW | 26 | 46N | 77W | WYW89858 |
| 18 | KINGWOOD 3 FEDERAL | 14-26 | SWSW | 26 | 46N | 77W | WYW89858 |
| 19 | KINGWOOD 3 FEDERAL | 21-26 | NENW | 26 | 46N | 77W | WYW89858 |
| 20 | KINGWOOD 3 FEDERAL | 23-26 | NESW | 26 | 46N | 77W | WYW89858 |
| 21 | KINGWOOD 3 FEDERAL | 32-26 | SWNE | 26 | 46N | 77W | WYW16066 |
| 22 | KINGWOOD 3 FEDERAL | 41-26 | NENE | 26 | 46N | 77W | WYW16066 |
| 23 | KINGWOOD 3 FEDERAL | 43-26 | NESE | 26 | 46N | 77W | WYW40634 |
| 24 | KINGWOOD 3 FEDERAL | 12-27 | SWNW | 27 | 46N | 77W | WYW89858 |
| 25 | KINGWOOD 3 FEDERAL | 32-27 | SWNE | 27 | 46N | 77W | WYW89858 |
| 26 | KINGWOOD 3 FEDERAL | 41-27 | NENE | 27 | 46N | 77W | WYW89858 |
| 27 | KINGWOOD 3 FEDERAL | 23-35 | NESW | 35 | 46N | 77W | WYW89865 |
| 28 | KINGWOOD 3 FEDERAL | 32-35 | SWNE | 35 | 46N | 77W | WYW128464 |
| 29 | KINGWOOD 3 FEDERAL | 34-35 | SWSE | 35 | 46N | 77W | WYW89865 |
| 30 | KINGWOOD 3 FEDERAL | 43-35 | NESE | 35 | 46N | 77W | WYW89865 |
| 31 | KINGWOOD 3 FEDERAL | 12-35 | SWNW | 35 | 46N | 77W | WYW128464 |

| | Well Name | Well # | Qtr/Qtr | Section | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 32 | KINGWOOD 3 FEDERAL | 14-35 | SWSW | 35 | 46N | 77W | WYW89865 |
| 33 | KINGWOOD 3 FEDERAL | 21-35 | NENW | 35 | 46N | 77W | WYW128464 |

No new impoundments were proposed with the water management strategy for the Kingwood III POD. Water produced with this POD will be managed with existing pipelines, outfalls and impoundments constructed with other PODs.

**Rights-of-way:**

**WYW-159912 Amendment #2** for road, water pipeline and buried power in: T.45N., R.77W., sections 1, 2, 11, 12, 14 and 15; T. 46N., R. 77W., sections 22, 23, 26, 27, 34 and 35. Utilities will corridor with access routes.
Existing and proposed improved roads (template or engineered); including proposed water pipeline and buried electric: Shall not exceed 50 foot width.
Existing and proposed primitive roads including proposed water pipeline, and buried electric cable: Shall not exceed 30 foot width.
Water pipeline will extend approximately 13.1 miles; buried electric will extend approximately 8.0 miles; all access roads will extend approximately 7.3 miles.

**WYW-170042** for 3" to 4" gas pipeline in T. 46N., R. 77W., sections 22, 23, 26, 27, 34, 35; T. 45N., R. 77W., sections 1, 2, 12. The pipeline will extend approximately 7.89 miles and will corridor with access routes.

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

**SUMMARY OF SELECTED ALTERNATIVE**

The selected alternative is a combination of Alternatives C and D as described in the EA that will alleviate site specific impacts to sage-grouse and habitat, reduce surface disturbance and guide reclamation of disturbed areas.

The following items summarize components of Alternative D included in the selected alternative:

The following 2 wells and their associated infrastructure are being deferred due to fragmentation of high quality sage-grouse habitat:

| | | | | | | |
|---|---|---|---|---|---|---|
| KINGWOOD 3 FEDERAL | 34-26 | SWSE | 26 | 46N | 77W | WYW40634 |
| KINGWOOD 3 FEDERAL | 41-35 | NENE | 35 | 46N | 77W | WYW128464 |

The deferral of these 2 wells will be in effect until the proponent proposes, in coordination with the BLM and the Wyoming Game & Fish Department, mitigation that addresses the potential impacts to sage-grouse and their habitats. For further detail, see Section 4 of this EA. In accordance with Onshore Order #1, Williams Production RMT Company will have 2 years from the above approval date of this EA to take this action.

**RATIONALE:** The decision to authorize the selected alternative, as summarized above, is based on the following:

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

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

3. The selected alternative will not result in any undue or unnecessary environmental degradation.
   - 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. Furthermore, approval of this development will help meet the nation's future needs for energy reserves, and will help to stimulate local economies by maintaining stability for the workforce.

4. The selected alternative incorporates appropriate local sage-grouse research and the best available science from across the species' range in development of the attached conditions of approval.

5. Mitigation measures from the range of alternatives were selected to best meet the purpose and need and will be applied by the BLM to alleviate environmental impacts. The following will reduce impacts to sage-grouse:
   - Proposed power will be buried in this POD, to reduce negative impacts to sage-grouse.
   - Defer 2 wells and their associated infrastructure from an extensive intact patch of high quality sage-grouse habitat.
   - Prohibit surface disturbance (for brood rearing) from March 15 to June 30 for two wells.

6. Approval of this alternative is in conformance with the *Powder River Basin Oil and Gas Project Environmental Impact Statement and Proposed Plan Amendment* (PRB FEIS), *Record of Decision and Resource Management Plan Amendments for the Powder River Basin Oil and Gas Project* (PRB FEIS ROD), ((refer to Appendix E of that document relative to adaptive management), and the Approved Resource Management Plan (RMP) for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), April 2001

7. The selected alternative incorporates components of the Wyoming Governor's Sage Grouse Implementation Team's "core population area" strategy and executive order and local research to provide appropriate protections for sage-grouse, while meeting the purpose and need for the Kingwood 3 Project.

**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 the selected alternative, and, therefore, an environmental impact statement is not required.

In conformance with Appendix E of the PRB FEIS ROD, the BLM BFO has initiated actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

1. Early initiation of a Resource Management Plan (RMP) revision, based on the evaluation of monitoring data generated under the mitigation monitoring and reporting plan (MMRP) in the PRB FEIS Record of Decision

2. Establishment of sage-grouse Focus Areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of alternatives during the RMP process (Appendix 1).

3. Initiation of a population viability analysis in the Powder River Basin. This is a 24-month project involving the U.S. Geological Survey (USGS), BLM Miles City Field Office, BLM BFO, and the University of Montana.

4. Development of alternatives that modify the proposed action to reflect the findings of the best available science regarding sage-grouse management.

5. Development of conditions of approval, specific to sage-grouse management, that incorporate some recommendations from recent research, the Northeast Local Sage-grouse Working Group, the Wyoming Game and Fish Department (WGFD), BLM, and the Petroleum Association of Wyoming.

The implementation of the selected alternative best meets the stated purpose and need for the proposed action. With the application of mitigating measures selected from alternatives C and D, sage-grouse population viability in the Powder River Basin will not be compromised due to the larger scope of planning actions and research initiated by the BLM, BFO.

**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: 9/29/09

**BUREAU OF LAND MANAGEMENT**
**BUFFALO FIELD OFFICE**
**ENVIRONMENTAL ASSESSMENT (EA)**
**FOR**
**Williams Production RMT Company**
**Kingwood 3**
**PLAN OF DEVELOPMENT**
**WY-070-09-148**

## 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 BLM Buffalo Field Office (BFO). This project environmental assessment (EA) addresses site-specific resources and impacts that were not covered within the PRB FEIS.

## 1. PURPOSE AND NEED

The purpose and need of this EA is to determine how and under what conditions to allow Williams Production RMT to exercise lease rights granted by the United States to develop the oil and gas resources on federal leaseholds as described in their proposed action.

Development of the Kingwood 3 wells would return royalties to the federal Treasury as well as stimulate local economies.

### Agency Responsibilities

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

This action responds to the goals and objectives outlined in the 1985 Buffalo RMP and the PRB FEIS. This action helps move the project area toward desired conditions for mineral development with appropriate mitigation consistent with the goals, objectives and decisions outlined in these two documents.

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

The proposed action conforms to the terms and the conditions of the 1985 Buffalo RMP and the PRB FEIS, as required by 43 CFR 1610.5. The BFO RMP is currently under revision.

For the RMP revision, BFO established Focus Areas with rigorous interim protections in order to preserve "decision space" during the revision process. Outside the Focus Areas, BFO continues to apply appropriate, but far less rigorous, site-specific mitigating measures for high-quality sage-grouse habitat with well densities up to 80-acre spacing and may include site-specific mitigating measures suggested by the best available science. Actions within BFO Focus Areas will be limited to impacts consistent with 640 acre spacing, and must have a plan of development that demonstrates that the proposal can be

managed in a manner that effectively conserves sage-grouse habitats (in Focus Areas) affected by the proposal.

The Kingwood 3 does not occur within a core or focus area. However, high quality sage-grouse habitat, as indicated by the University of Montana model, occurs throughout the project area.

## 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Four alternatives, A, B, C and D, were evaluated in determining how to best meet the stated purpose and need of the proposed action. A brief description of each alternative follows. For the complete detailed description of each alternative, including the alternatives considered but not analyzed in detail, see Appendix A.

### 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

Alternative B, the "proposed action" alternative, summarizes the Kingwood 3 Project as originally submitted to the BLM by Williams Production RMT, prior to any BLM review or modifications.

The specific details for the Williams' Kingwood 3 proposed action are described in detail in Appendix A.

### 2.3. Alternative C – Modified Proposed Action

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 of the initial project proposal (Alternative B) identified by BLM and the operator. 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.

Alternative C also incorporates the results of sage-grouse habitat mapping efforts in the project area and on-site verification of habitat suitability. This alternative represents BFO efforts to reduce project-specific impacts to sage-grouse habitat, while maintaining proposed spacing and infrastructure requirements consistent with the purpose and need of the proposed action.

The specific changes identified for the Kingwood 3 are described in detail in Appendix A.

### 2.4. Alternative D-Sage-Grouse Emphasis

Alternative D represents a modification of Alternative C based on the application of mitigating measures designed to reduce impacts to sage-grouse and sage-grouse habitat. Alternative D is the same as Alternative C with the addition of the project-level modifications identified by BLM, guided by seven years of sage-grouse research in the project area and additional studies from across the species' range.

Alternative D represents BFO efforts to reduce project-specific impacts to sage-grouse habitat, while maintaining proposed spacing and infrastructure requirements consistent with the purpose and need of the proposed action.

In conjunction with project-level modifications, site-specific measures applied for specific wells and infrastructure would maintain open corridors for sage-grouse, provide contiguous habitat patches, and reduce disturbance in and adjacent to sage-grouse habitat.

This alternative incorporates mitigation designed around site-specific habitat characteristics to minimize habitat fragmentation and accelerate return to habitat effectiveness at reclamation.

The specific changes identified for the Kingwood 3 are described in detail in Appendix A.

### 2.5. Alternatives considered but not analyzed in detail

Alternatives considered but not analyzed in detail for the Kingwood 3 are described in detail, if applicable, in Appendix A.

## 3. DESCRIPTION OF AFFECTED ENVIRONMENT

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.

Applications to drill were received on May 30th, 2008. Field inspections of the proposed Kingwood 3 CBNG project were conducted on 4/21, 22 and 5/5, 6 and 7, 2009 by:

| NAME | TITLE | AGENCY |
|---|---|---|
| Dan Sellers | NRS | BLM |
| Seth Lambert | Archaeologist | BLM |
| Warren Niemi | Hydrologist | BLM |
| Bill Ostheimer | Biologist | BLM |
| Brain Cox | Asst. Field Manager | BLM |
| Pat Cole | Biologist | BLM |
| Penney Bellah | Permitting Agent | Williams |
| Don Mc Andrew | Operations | Williams |
| Mr. Bolerjack | Operations | Williams |
| Randy Materi | Operations | Williams |
| Richard Janis | Operations | Williams |
| Jerry Means | Consultant | Magna |
| Chris Witty | Consultant | Arcadis |
| Mark Deibert | Consultant | Western Lands Service |
| Allen Jones | Consultant | Western Lands Service |
| Bill Bellah | Consultant | Grouse Mountain |

### 3.1. Topographic Characteristics of Project Area

The area is comprised of breaks with sagebrush/grasslands and ephemeral draws. Elevations range from 4,400' to 4,800' above sea level. Major tributaries include Pumpkin Creek and Willow Creek. Windmill Draw lies between these two drainages. The draws in the area are gentle to steeply sloped, and rise to sagebrush grasslands. Average precipitation is 12" annually. Current land uses in the area include livestock production, hunting, and CBNG & oil production.

### 3.2. Vegetation & Soils

Species typical of short grass prairie comprise the project area flora. Specific species observed throughout the project area include: western wheatgrass, threadleaf sedge, Sandberg bluegrass,prairie junegrass, green needlegrass, bluebunch wheatgrass, needle & thread, blue grama, ,cheatgrass, little bluestem, prairie sandreed, rubber rabbitbrush, prickly pear cactus, fringed sagewort, hairy goldaster, vetch sp., scarlet globemallow, flax sp. scurfpea., dandelion, yucca, Wyoming big sagebrush, silver sagebrush and juniperDifferences in dominant species within the project area vary with soil type, aspect and topography.

#### 3.2.1. Soils

<u>Summary of Soils and Ecological Sites for the 10-14" PZ NP</u>

Using the Natural Resource Conservation Service, (NRCS, USDA), Technical Guides for the Major Land Resource Area 58B Northern Rolling High Plains, in the 10-14" Northern Plains precipitation zone, the soils of this project area vary from sandy loam to primarily sandy clay loams, and the major ecological sites are Shallow Loamy and Shallow Sandy/Sands. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from one to three inches on ridges to 12 inches plus 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. Approximately 94% of the project area is rated as poor reclamation potential while 6% is rated as fair reclamation potential. Successful reclamation is expected with adequate moisture, use of "Best Management Practices", applied mitigation, and time.

Shallow Loamy Ecological Sites:

This site occurs on steep slopes and ridge tops, but may occur on all slopes. Landform: Hill sides, ridges and escarpments. The soils of this site are shallow (less than 20"to bedrock) well-drained soils formed in alluvium over residuum or residuum. 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 surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin ineffectual layers of other textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

The main soil limitations include: depth to bedrock, low organic matter content, and soil droughtiness. The low annual precipitation should be considered when planning a seeding.

Shallow Sands Ecological Sites:

This site occurs on nearly level to 50% slopes. Landform: Hill sides, ridges and escarpments.

The soils of this site are shallow (less than 20"to bedrock) well-drained soils formed in eolian deposits or alluvium over residuum or residuum. These soils have moderately rapid to rapid permeability and may occur on all slopes. The bedrock may be of any kind except igneous or volcanic and is virtually impenetrable to plant roots. The surface soil will be one or more of the following textures: fine sandy loam, sandy loam, loamy fine sand, loamy sand, or sand. Thin ineffectual layers of other soil textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

The main soil limitations include: depth to bedrock, low organic matter content, soil droughtiness, low

water holding capacity, and high wind erosion potential. The low annual precipitation should be considered when planning a seeding.

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

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

**Table 3.1 Summary of Ecological Sites**

| Ecological Site | Acres | Percent |
|---|---|---|
| SHALLOW-LOAMY & LOAMY(10-14NP) | 3222 | 74 |
| Sands/SANDY (10-14NP) | 1131 | 26 |
| SALINE LOWLAND (10-14NP) | 11 | 0.1 |

Note: similar ecological sites were combined.

#### 3.2.2. Wetlands/Riparian

Wetland vegetation is sparse in area affected by POD development, with the exception of narrow riparian strips along channel reaches recently perrenialized by CBNG discharge and reservoirs holding CBNG water.

#### 3.2.3. 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) and by the operator and BLM personal:

- Weed 1-Buffalobur
- Weed 2-Canada thistle
- Weed 3-Common cocklebur
- Weed 4-Diffused knapweed
- Weed 5-Scotch thistle
- Weed 6-Tamarix

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

### 3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Arcadis U.S. Inc (Arcadis 2009a,b,c,). The consultant performed surveys for mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) protocols. Surveys were conducted for suitable Ute ladies'-tresses orchid habitat. No formal surveys were conducted for black footed ferret or blowout penstemon. PRBIWG accepted protocols are available on the CBM Clearinghouse website (www.cbmclearinghouse.info). Western Land Services assessed sage-grouse habitat in the project area.

A BLM biologist conducted field visits on April 21, 22 and May 5-7, 2009. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species that have been identified in the project area or that have been noted as being of special importance are described below.

### 3.3.1. Big Game

Big game species expected to be within the Kingwood 3 project area include pronghorn antelope and mule deer. The WGFD has determined that the project area contains yearlong range for pronghorn antelope. Winter/yearlong mule deer range and yearlong mule deer range in the northeast ½ of the project area.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. Yearlong use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions.

Deer and antelope populations within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

The affected environment for pronghorn is discussed in the PRB FEIS on pp. 3-117 to 3-122 and for mule deer on pp. 3-127 to 3-132.

### 3.3.2. Aquatics

The project area is drained by ephemeral tributaries of the Powder River. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

Aquatic invertebrate communities, which can be indicators of the quality of aquatic environments (Peterson 1990), are discussed in the PRB FEIS (pp. 3-153 to 3-154). Perennial streams within northeastern Wyoming have been sampled regularly by USGS and WGFD, and generally support invertebrate communities that included taxa adapted to flowing water. Ephemeral stream communities generally were composed of taxa adapted to standing water (Peterson 1990).

### 3.3.3. Migratory Birds

Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the year. According to Instruction Memorandum No. 2008-050, BLM must include migratory birds in every NEPA analysis of actions that have the potential to affect migratory bird species of concern in order to fulfill its obligations under the Migratory Bird Treaty Act.

The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified three groups of high-priority bird species in Wyoming: Level I – those that clearly need conservation action, Level II – species where the focus should be on monitoring, rather than active conservation, and Level III – species that are not otherwise of high priority but are of local interest. Vegetation types that occur in the project area include shortgrass prairie and shrub-steppe. Many species that are of high management concern use these areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds have declined more consistently in the last 30 years than any other ecological association of birds (WY 2009). Species that may occur in these vegetation types, according to the Wyoming Bird Conservation Plan, are listed in Table 3.2 and are grouped by Level as identified in the Plan.

**Table 3.2 Wyoming Bird Conservation Plan Prioritization Levels**

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

The affected environment for migratory birds is discussed in the PRB FEIS (pp. 3-150 to 3-153). This discussion includes a list of habitat requirements and foraging patterns for the species listed above, with the exception of upland sandpipers, common poorwills, and Say's phoebes, which are discussed here. Upland sandpipers prefer Great Plains grasslands, dryland grass pastures, hayfields, and alfalfa fields. They nest in grass-lined depressions in the ground and feed on insects and seeds on the ground where grasses are low and open. Common poorwills inhabit sparse, rocky sagebrush; open prairies; mountain-foothills shrublands; juniper woodlands; brushy, rocky canyons; and ponderosa pine woodlands. They prefer clearings, such as grassy meadows, riparian zones, and forest edges for foraging. They lay eggs directly on gravelly ground, flat rock, or litter of woodland floor. Nests are often placed near logs, rocks, shrubs, or grass for some shade. They feed exclusively on insects, catching them by leaping from the ground or a perch, or picking them up from the ground. Say's phoebes inhabit arid, open country with sparse vegetation, including shrub-steppe, grasslands, shrublands, and juniper woodlands. They nest on a variety of substrates such as cliff ledges, banks, bridges, eaves, and road culverts and often reuse nests in successive years. They eat mostly insects and berries.

### 3.3.4. Raptors

The affected environment for raptors is discussed in the PRB FEIS on pp. 3-141 to 3-148. The affected environment for golden eagles is discussed in the PRB FEIS on pp. 3-145 to 3-146. Golden eagles are listed as a Bird of Conservation Concern (BCC) by USFWS for Bird Conservation Region (BCR) Region 17, which encompasses the project area. BCCs are those species that represent USFWS's highest conservation priorities, outside of those that are already listed under ESA. The goal of identifying BCCs is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. Golden eagles were also identified as a Level III species in the Wyoming Bird Conservation Plan. Golden eagles are sensitive to extensive human activity around nest sites and are

threatened by loss of nesting habitat to industrial development, powerline executions, and other factors (Nicholoff 2003). The WGFD Wyoming Bird Conservation Plan habitat objectives for golden eagles include maintaining open country to provide habitat for small mammals as a food source. Recommendations for management include restricting human activities near nests during peak breeding season; protecting, enhancing, and restoring prey populations; and protecting known nesting territories.

Thirty raptor nest sites were identified by Arcadis and BLM within 0.5 mile of the project boundary. These are listed in the table below. Of the nests listed, four were active in 2008 (#3981 golden eagle, #3986 long-eared owl, #3991great horned owl, and #6486 golden eagle). One nest (#3981 golden eagle) was active in 2009. This nest has been active with golden eagles since 2005.

**Table 3.3 Documented raptor nests within the Kingwood 3 project area.**

| BLM ID | UTMs | Legal | Sub-strate | Year | Condition | Status | Species |
|---|---|---|---|---|---|---|---|
| 3080 | 410520E 4864900N | S28 T46N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Good | INAC | n/a |
| | | | | 2006 | Fair | ACTI | LOOW |
| | | | | 2004 | Good | INAC | n/a |
| 3593 | 413845E 4865750N | S23 T46N R77W | CTL | 2009 | Gone | INAC | n/a |
| | | | | 2008 | Remnants | INAC | n/a |
| | | | | 2007 | Gone | INAC | n/a |
| | | | | 2006 | Fair | INAC | n/a |
| | | | | 2005 | Fair | ACTI | RETA |
| | | | | 2004 | Gone | INAC | n/a |
| 3608 | 414370E 4864061N | S25 T46N R77W | CTL | 2009 | Gone | INAC | n/a |
| | | | | 2008 | Remnants | INAC | n/a |
| | | | | 2006 | Poor | INAC | n/a |
| | | | | 2005 | Poor | INAC | n/a |
| | | | | 2004 | Gone | INAC | n/a |
| 3915 | 412096E 4858722N | S15 T45N R77W | CTL | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Good | INAC | n/a |
| | | | | 2007 | Good | INAC | n/a |
| | | | | 2006 | Poor | INAC | n/a |
| 3918 | 413573E 4860470N | S11 T45N R77W | CTL | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Unknown | INAC | n/a |
| | | | | 2006 | Remnants | INAC | n/a |
| 3919 | 413335E 4861837N | S2 T45N R77W | CTL | 2009 | Fair | INAC | n/a |
| | | | | 2006 | Good | ACTI | RETA |
| 3921 | 414001E | S11 T45N | CTL | 2009 | Fair | INAC | n/a |

| BLM ID | UTMs | Legal | Sub-strate | Year | Condition | Status | Species |
|---|---|---|---|---|---|---|---|
| | 4859484N | R77W | | | | | |
| | | | | 2008 | Good | INAC | n/a |
| | | | | 2007 | Poor | INAC | n/a |
| | | | | 2006 | Good | INAC | n/a |
| 3975 | 412074E 4862313N | S34 T46N R77W | CTL | 2009 | Gone | INAC | n/a |
| | | | | 2008 | Gone | INAC | n/a |
| | | | | 2007 | Gone | INAC | n/a |
| | | | | 2006 | Good | ACTI | GRHO |
| 3981 | 412611E 4858403N | S14 T45N R77W | CTL | 2009 | Excellent | ACTI | GOEA |
| | | | | 2008 | Good | ACTI | GOEA |
| | | | | 2007 | Good | ACTF | GOEA |
| | | | | 2006 | Good | ACTI | GOEA |
| | | | | 2005 | Good | ACTI | GOEA |
| 3982 | 413514E 4858850N | S14 T45N R77W | CTL | 2009 | Good | INAC | n/a |
| | | | | 2009 | Remnants | INAC | n/a |
| | | | | 2008 | Unknown | ACTI | BBMA |
| | | | | 2007 | Poor | INAC | n/a |
| | | | | 2006 | Good | INAC | n/a |
| 3985 | 415438E 4859982N | S12 T45N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Poor | INAC | n/a |
| | | | | 2007 | Fair | INAC | n/a |
| | | | | 2006 | Poor | ACTI | LOOW |
| 3986 | 415423E 4859716N | S12 T45N R77W | JUN | 2009 | Good | INAC | n/a |
| | | | | 2008 | Poor | INAC | n/a |
| | | | | 2007 | Good | ACTI | BBMA |
| | | | | 2006 | Good | ACTI | LOOW |
| 3991 | 410796E 4859894N | S9 T45N R77W | CTL | 2009 | Excellent | INAC | n/a |
| | | | | 2008 | Poor | ACTI | GRHO |
| | | | | 2007 | Good | ACTI | GRHO |
| | | | | 2006 | Good | ACTI | RETA |
| 4143 | 411799E 4862275N | S34 T46N R77W | JUN | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Gone | INAC | n/a |
| | | | | 2007 | Poor | INAC | n/a |
| 4313 | 416975E | S7 T45N R76W | CTL | 2009 | Fair | INAC | n/a |

| BLM ID | UTMs | Legal | Sub-strate | Year | Condition | Status | Species |
|---|---|---|---|---|---|---|---|
| | 4860502N | | | | | | |
| | | | | 2008 | Gone | INAC | n/a |
| | | | | 2006 | Remnants | INAC | n/a |
| 4321 | 414520E 4864502N | S25 T46N R77W | CTL | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Poor | INAC | n/a |
| | | | | 2006 | Good | ACTI | RETA |
| 4394 | 413711E 4865513N | S23 T46N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Fair | INAC | n/a |
| | | | | 2006 | Good | OCCU | UNOW |
| 4395 | 414472E 4864511N | S25 T46N R77W | CTL | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Fair | INAC | n/a |
| | | | | 2006 | Good | INAC | n/a |
| 5925 | 413438E 4865657N | S23 T46N R77W | CTL | 2009 | Good | INAC | n/a |
| 5926 | 413435E 4865660N | S23 T46N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Good | INAC | n/a |
| 5927 | 413706E 4864959N | S26 T46N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Poor | INAC | n/a |
| 6482 | 415504E 4859938N | S12 T45N R77W | CTL | 2009 | Gone | INAC | n/a |
| | | | | 2008 | Fair | INAC | n/a |
| 6483 | 414950E 4859599N | S12 T45N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Good | INAC | n/a |
| 6484 | 413438E 4865657N | S23 T46N R77W | CTL | 2008 | Good | INAC | n/a |
| 6486 | 411700E 4865475N | S27 T46N R77W | CLF | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Good | ACTI | n/a |
| 6487 | 413435E 4865660N | S23 T46N R77W | CTL | 2009 | Good | INAC | n/a |
| 6488 | 412407E 4862771N | S34 T46N R77W | CTL | 2009 | Good | INAC | n/a |
| 6489 | 412258E 4863672N | S34 T46N R77W | CTL | 2008 | Remnants | INAC | n/a |
| 6490 | 413757E 4863524N | S35 T46N R77W | CTL | 2009 | Fair | INAC | n/a |
| | | | | 2008 | Poor | INAC | n/a |

| BLM ID | UTMs | Legal | Sub-strate | Year | Condition | Status | Species |
|---|---|---|---|---|---|---|---|
| 6491 | 413061E 4863217N | S35 T46N R77W | CTL | 2009 | Poor | INAC | n/a |
| | | | | 2008 | Poor | INAC | n/a |

### 3.3.5. Plains Sharp-tailed Grouse

Plains sharp-tailed grouse are discussed in this document because specific concerns for this species were identified during the scoping process for the PRB FEIS. The affected environment for plains sharp-tailed grouse is discussed in the PRB FEIS on pp. 3-148 to 3-150.

Habitats within the Kingwood 3 project area have limited potential to support sharp-tailed grouse. The mosaic of grasslands and sagebrush-grasslands that occurs in the area may provide nesting and brood-rearing habitat, but the lack of wooded draws, shrubby riparian areas, and wet meadows limit the likelihood of plains sharp-tailed grouse occurrence. The nearest known plains sharp-tailed grouse lek is approximately six miles to the northeast of the project area. No plains sharp-tailed grouse were noted in the project area.

### 3.3.6. Sagebrush Obligates

Sagebrush communities are the most common habitat type in the project area. Large-scale development of energy reserves underlying sagebrush ecosystems is placing sagebrush communities and wildlife increasingly at risk (WY 2009). Sagebrush ecosystems support a variety of species, including migratory birds, raptors, big game, reptiles, and small mammals. Several Wyoming BLM sensitive species are associated with sagebrush ecosystems. These include ferruginous hawk, loggerhead shrike, Townsend's big-eared bat, and western burrowing owl.

Sagebrush obligates are species that require sagebrush for some part of their life cycle and cannot survive without it. Sagebrush obligate species within the Powder River Basin that are listed as sensitive species by Wyoming BLM include Brewer's sparrow, sage thrasher, sage sparrow, and greater sage-grouse. All of these bird species require sagebrush for nesting, with nests typically located within or under the sagebrush canopy.

### 3.3.7. Threatened and Endangered and Sensitive Species

#### 3.3.7.1. Threatened and Endangered Species

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

##### 3.3.7.1.1. Black-footed ferret

The black-footed ferret is listed as Endangered under the ESA. The affected environment for black-footed ferrets is discussed in the PRB FEIS on pg. 3-175.

A black-footed ferret population requires at least 1,000 acres of prairie dog colonies, separated by no more than 1.5 km, for survival (USFWS 1989). Limited black-tailed prairie dog colonies exist within 0.25 miles of the project boundary. One colony of ten acres is within 0.25 mile of the POD with a larger colony of 60 acres at 0.5 mile. Due to the paucity of black-tailed prairie dog colonies near the project area, black-footed ferret habitat is not present within the Kingwood 3 project area.

In 2004, WGFD identified seven prairie dog complexes, located partially or wholly within the BFO administrative area, as potential black-footed ferret reintroduction sites (Grenier et al. 2004). The

Kingwood 3 project area is located approximately 11 miles from the Lynch complex, the nearest potential reintroduction area.

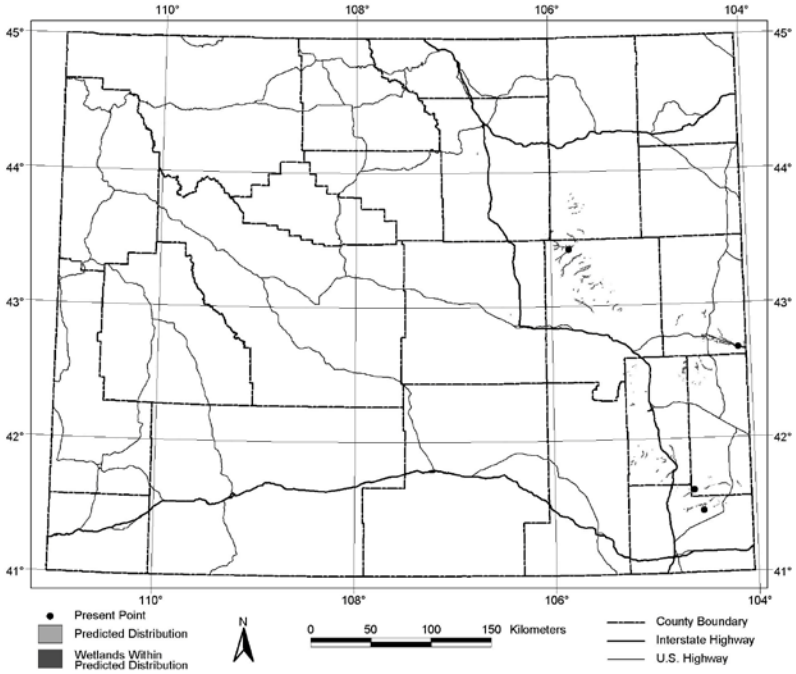
#### 3.3.7.1.2. Ute Ladies'-Tresses Orchid

The Ute ladies'-tresses orchid (ULT) is listed as Threatened under the ESA. The affected environment for ULT is discussed in the PRB FEIS on pg. 3-175.

The PRB FEIS reported that only four orchid populations had been documented within Wyoming, but since the writing of that document, 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 Wind Creek and 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.

There are no proposed actions associated with the Kingwood 3 that have not been analyzed under NEPA that will impact perennial systems. Water discharge will occur at outfalls already analyzed and approved in the Kingwood 2 POD.

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




#### 3.3.7.1.3. Blowout Penstemon

On May 22, 2009 the Buffalo Field Office received a species list from the US Fish and Wildlife (USFWS) that included Blowout Penstemon. This plant occurs on sand dunes or blowouts. No specific surveys for the plant or habitat have been performed for the proposed action. At the time the POD was visited by BLM (April 21, 22 and May 5-7 2009) this species was not in the BFO list. The BLM biologist reviewed onsite notes and photographs of the project area for suitable habitat, consulted with the contracted biologist (Arcadis 2009c) and determined the project area does not support Blowout Penstemon suitable habitat.

#### 3.3.7.2. Sensitive Species

The goals of the Wyoming BLM Sensitive Species policy are:

- Maintain vulnerable species and habitat components in functional BLM ecosystems
- Ensure sensitive species are considered in land management decisions
- Prevent a need for species listing under the ESA
- Prioritize needed conservation work with an emphasis on habitat

The following discussion addresses those sensitive species that are likely to occur in or be affected by the proposed Kingwood 3 POD. The authority for BLM sensitive species policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

##### 3.3.7.2.1. Northern Leopard Frog

This is a WGFD Species of Greatest Conservation Need (SGCN), with a rating of NSS4, indicating that the species is common (widely distributed throughout its native range and populations are stable) and habitat is stable. Northern leopard frog habitat was not found in the project area (POD boundary), however they are expected in reservoirs receiving water. The affected environment for northern leopard frog is discussed in the PRB FEIS on pg. 3-181.

##### 3.3.7.2.2. Baird's Sparrow

In addition to being listed as a Wyoming BLM sensitive species, Baird's sparrows are listed by USFWS as a BCC for BCR Region 17. Suitable habitat is present in the project area. The affected environment for Baird's sparrow is discussed in the PRB FEIS on pg. 3-188.

##### 3.3.7.2.3. Bald Eagle

At the time the PRB FEIS was written, the bald eagle was listed as a threatened species under the ESA. Due to successful recovery efforts, it was removed from the ESA on 8 August 2007. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, the BLM shall continue to comply with all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (PRB Oil & Gas Project BO), #WY07F0075) (USFWS 2007) shall continue to be complied with. The affected environment for bald eagles is described in the PRB FEIS on pg. 3-175.

In addition to being listed as a Wyoming BLM sensitive species, bald eagles are a WGFD SGCN with a NSS2 rating, due to populations being restricted in numbers and distribution, ongoing significant loss of habitat, and sensitivity to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for BCR Region17.

Bald eagle nesting and roosting habitat is present within one mile of Kingwood 3. A bald eagle nest on the Powder River is located two miles to the west of the project area. Large galleries of mature cottonwoods are common along the Powder River and Willow Creek. The river, winter/yearlong mule deer range and nearby sheep operations provide reliable prey sources. Bald eagles are routinely observed along the Powder River in winter. Wintering bald eagles are also seen along Willow Creek, to the south of the POD. In the PRB Oil & Gas Project BO, USFWS defined bald eagle winter roosting habitat as any

mature conifer or deciduous trees where bald eagles consistently perch. A consistent use roost was defined as a location where bald eagles are observed on more than one occasion (at least one week apart) within a single winter or over multiple winters.

#### 3.3.7.2.4. Brewer's Sparrow

In addition to being listed as a BLM Wyoming sensitive species, Brewer's sparrows are a WGFD SGCN, with a rating of NSS4 because populations are declining, habitat is vulnerable with no ongoing loss, and the species is not sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for BCR Region 17. Brewer's sparrow habitat is present throughout the project area, and this species was documented at the onsite. The affected environment for Brewer's sparrow is discussed in the PRB FEIS on pg. 3-200.

#### 3.3.7.2.5. Ferruginous Hawk

In addition to being listed as a Wyoming BLM sensitive species, ferruginous hawks are a WGFD SGCN, with a rating of NSS3 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, they are experiencing ongoing loss of habitat, and they are sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for BCR Region 17. Ferruginous hawk nests are located throughout the Powder River Basin. Foraging habitat and prey is available throughout the project area, and although no ferruginous hawk nests were found in survey efforts, they may occur in the project area. The affected environment for ferruginous hawk is discussed in the PRB FEIS on pg. 3-183.

#### 3.3.7.2.6. Greater Sage-Grouse

In addition to being listed as a Wyoming BLM sensitive species, sage-grouse are listed as a WGFD SGCN, with a rating of NSS2, because populations are declining, and they are experiencing ongoing significant loss of habitat. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for BCR Region 17. The affected environment for greater sage-grouse (herein referred to as sage-grouse) is discussed in the PRB FEIS (pg. 3-194 to 3-199).

In recent years, several petitions have been submitted to USFWS to list sage-grouse as threatened or endangered under the ESA. On January 12th, 2005, 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. In 2007, the U.S. District Court remanded that decision, stating that USFWS's decision-making process was flawed and ordered USFWS to conduct a new Status Review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

The BFO has taken several steps to consider the evolving information on impacts to sage-grouse which could result from development activities on federal lands. These steps include:

- February 2008: BFO consolidated research and data to identify high-quality sage-grouse habitat in the Powder River Basin. University of Montana developed models indicating quality of habitat using topographic and vegetative criteria and habitat selection by radio-collared birds to identify areas with high potential for use by nesting/wintering birds. The models are divided into habitat categories of 1 through 5. Categories 1 & 2 are not considered suitable habitat. Category 3 may have the vegetative components necessary for suitable habitat. Categories 4 & 5 have the vegetative components for suitable habitat, and meet criteria for topography, slope and other

landscape level characteristics that were indicated through analysis of radio-collared sage-grouse. The 4 and 5 categories of habitats are considered "high-quality".

- March 2008: BFO, Wyoming State Office (WYSO) and Washington Office (WO) established the need for a Resource Management Plan (RMP) approach to evaluate impacts to sage-grouse and habitat. A RMP amendment or revision was discussed. The decision to begin a RMP revision was approved two years ahead of the originally scheduled date.

- May 28, 2008: BFO conducted a public meeting to present habitat information developed through research in the Powder River Basin. BFO solicited additional information from the public and energy development companies to refine sage-grouse habitat maps. The objective was to establish areas of interim management for sage-grouse to preserve decision space during the RMP process.

- August 13, 2008: BFO released its *Guidance for general management actions during BFO Resource Management Plan Revision* and a map identifying the Focus Areas. The guidance contained criteria for any proposed development in Focus Areas (Appendix A). For fluid mineral development inside Focus Areas, this guidance includes the following requirement; "The proponent will be asked to demonstrate that the proposal can be managed in a manner that effectively conserves sage-grouse habitats affected by the proposal." The guidance also states that "Efforts will be made to assure that the impacts of surface disturbing projects will be consistent with a well pad density of 640 acres." With the exception of two Focus Areas near the Montana border, the Core Areas and Focus Areas have the same boundaries in the BFO.

  Efforts to minimize impacts to high-quality sage-grouse habitats outside the Focus Areas will be far less restrictive, with well densities up to 80-acre spacing, but may include site-specific mitigating measures suggested by the best available science.

- August 1, 2008: Concurrent with BFO efforts, the Governor of the State of Wyoming issued an Executive Order (EO 2008-2) mandating special management for all lands within sage-grouse Core Population Areas. Lands for special management were identified by the Wyoming Governor's Sage-Grouse Implementation Team, and generally followed the boundaries of the majority of the Focus Areas identified by the BFO. This team also recommended stipulations to be placed on development activities on state lands to ensure existing habitat function is maintained within those areas. EO 2008-2 also identifies objectives outside of Core Areas, including that "…development scenarios should be designed and managed to maintain populations, habitats and essential migration routes outside core population areas."

- August 13, 2008 to the Present: BFO crafted an updated impacts assessment to be included in all project analyses affecting sage-grouse habitat. This analysis included research conducted in the Powder River Basin and other sage-grouse research published since the 2003 PRB FEIS and ROD. The analysis explicitly tied impacts to the impacts accepted under the 2003 ROD.

- October 1, 2008: BFO officially began the RMP revision. This process was accelerated by two years to more rapidly assess impacts to sage-grouse.

- April 14, 2009: BFO/WYSO entered into an agreement with the University of Montana and the Miles City Field Office to conduct a population viability analysis in the Powder River Basin. The emphasis will be on the adequacy of BFO Focus Areas for maintenance of a persistent sage-grouse population. Information gathered will be used in developing alternatives for the RMP revision.

- May, 2009: The WGFD released an updated version of its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats*, which further described management objectives for sage-grouse outside Core Areas: "Non-core areas should not be construed as "sacrifice areas" since this conservation strategy requires habitat connectivity and movement between populations in core areas. The goal in non-core areas is to maintain habitat conditions that will sustain at least a 50% probability of lek persistence over the long term."

In conformance with Appendix E of the PRB FEIS BLM BFO has initiated actions within the PRB FEIS analysis area in response to additional information regarding impacts to sage-grouse. These measures include:

- Early initiation of a RMP revision, based on the evaluation of monitoring data generated under the mitigation monitoring and reporting plan (MMRP) in the PRB FEIS Record of Decision.

- Establishment of sage-grouse Focus Areas, encompassing approximately 1 million acres of sage-grouse habitat. These areas are managed under strict guidelines designed to preserve sage-grouse habitat for development of alternatives during the RMP process (Appendix A).

- Initiation of a population viability analysis in the Powder River Basin. This is a 24-month project involving the USGS, BLM Miles City Field Office, BLM BFO, and the University of Montana.

- Development of alternatives that modify the proposed action to reflect the best available science in sage-grouse management.

- Development of conditions of approval, specific to sage-grouse management, that incorporate some recommendations from recent research, the NE Local Sage-grouse Working Group, and the Petroleum Association of Wyoming.

The 2003 PRB EIS significance threshold and population viability assumptions are based on the analysis that sufficient functioning habitat for sage grouse will remain to support population viability within the project area. The six areas identified as BFO sage-grouse Focus Areas assume that sufficient amounts of sage-grouse habitat remains unfragmented by energy or other man-made infrastructure. It is also assumed that the fragmented portions in the energy areas of sage-grouse habitat provide for the necessary breeding, feeding, and sheltering components to sustain sage-grouse habitat connectivity between the six Focus Areas.

The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008) recommends that impacts be considered for leks within four miles of oil and gas developments. WGFD records indicate that two sage-grouse leks occur within four miles of the project area. These two lek sites are identified in Table 3.4.

**Table 3.4 Sage-grouse leks within 4 miles of the Kingwood 3 project area**

| Lek Name | Legal Location | Distance from Project Area (mi) | Occupied? |
|---|---|---|---|
| Pumpkin Creek II | T46,R77<br>SESW Sec.2 | 3.1 miles to the 41-26 well. | yes |
| Christiansen Ranch IV | T45,R76<br>SENE Sec 19 | 2.17 miles to the 23-12 well. | yes |

Suitable sage-grouse habitat is present in the Kingwood 3 project area. Continuous stands of sparsely to moderately dense sagebrush are present in patches throughout. Stands of sagebrush located near moist draws throughout the project area provide brood rearing and late summer habitat. Sage-grouse habitat models indicate that approximately 95% of the project area contains high quality sage-grouse nesting habitat (Doherty 2008) and high quality wintering habitat (Doherty et al. 2007).

Western Land Services ground-truthed the project area and found the sagebrush cover was, in general, too sparse to be considered high quality nesting habitat (WLS 2008). After reviewing the models, the Western Lands Services report, and assessing the project area at the onsite, the entire project area can be considered suitable greater sage-grouse habitat with portions of the project area representing high quality nesting and winter habitats. The highest quality nesting habitat was located in the North and East Section 35 leading into section 26 T46N, R77W and in section 1 and 12 T45N, R77W.

#### 3.3.7.2.7. Loggerhead Shrike

The affected environment for loggerhead shrike is discussed in the PRB FEIS on pg. 3-187. In addition to being listed as a Wyoming BLM sensitive species, loggerhead shrikes are listed by USFWS as a BCC for BCR Region 17. The Wyoming Bird Conservation Plan rates them as a Level II species, indicating they are in need of monitoring.

Loggerhead shrike habitat is present throughout the project area, and the species is suspected to occur.

#### 3.3.7.2.8. Long-billed Curlew

The affected environment for long-billed curlew is discussed in the PRB FEIS on pg. 3-184. In addition to being listed as a Wyoming BLM sensitive species, long-billed curlews are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, and habitat is vulnerable but not undergoing significant loss. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for BCR Region 17.

Long-billed curlew habitat is present in the project area, and the species may occur.

#### 3.3.7.2.9. Mountain Plover

The affected environment for mountain plover is discussed in the PRB FEIS on pg. 3-177 to 3-178. At the time the PRB FEIS was written, the mountain plover was proposed for listing as a threatened species under the ESA. In 2003, USFWS withdrew the proposal, finding that the population was larger than had been thought and was no longer declining. In addition to being listed as a Wyoming BLM sensitive species, mountain plovers are a WGFD SGCN, with a rating of NSS4, because population status and trends are unknown but are suspected to be stable, habitat is vulnerable without ongoing significant loss, and the species is sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for BCR Region 17.

Marginally suitable mountain plover habitat is present within 0.25 miles of the project area. The small prairie dog colony in section 11 could support this species. The steep topography in most of the project area precludes mountain plover use. No mountain plover were seen during surveys.

#### 3.3.7.2.10. Sage Thrasher

The affected environment for sage thrasher is discussed in the PRB FEIS on pg. 3-199 to 3-200. In addition to being listed as a Wyoming BLM sensitive species, sage thrashers are a WGFD SGCN, with a rating of NSS4, because populations are declining, habitat is vulnerable but not undergoing loss, and the species is not sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a

Level II species, indicating the action and focus should be on monitoring and because Wyoming has a high percentage of and responsibility for the breeding population. They are also listed by USFWS as a BCC for BCR Region 17.

The project area contains marginal habitat for sage thrashers, due to the presence of only moderately dense sagebrush stands. Although they prefer dense stands of shrubs for nesting, sage thrashers may occur throughout the project area.

#### 3.3.7.2.11. Western Burrowing Owl

The affected environment for western burrowing owl (burrowing owl) is discussed in the PRB FEIS on pg. 3-186. In addition to being listed as a Wyoming BLM sensitive species, burrowing owls are a WGFD SGCN, with a rating of NSS4 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, habitat is restricted or vulnerable without recent or on-going significant loss, and it may be sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action, and they are also a USFWS BCC for BCR Region 17.
Current population estimates for the United States are not well known but trend data suggest declines throughout the burrowing owl's North American range (McDonald et al. 2004). Primary threats are habitat loss and fragmentation, mostly due to intensive agricultural and urban development and habitat degradation, due to declines in populations of colonial burrowing mammals (Klute et al. 2003).

The BFO database indicates that one burrowing owl nest has been reported 1.5 miles south of the Kingwood 3 project area in 2006.

#### 3.3.7.2.12. Black-tailed Prairie Dog

The affected environment for black-tailed prairie dogs is discussed in the PRB FEIS (pg 3-179). At the time the PRB FEIS was written, the black-tailed prairie dog was added to the list of candidate species for federal listing in 2000 (USFWS 2000). It was removed from the list in 2004. Wyoming BLM considers black-tailed prairie dogs a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a WGFD SGCN, with a rating of NSS3, because populations are declining, and habitat is vulnerable but not undergoing significant loss.

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 aerial imagery indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001, but aerial surveys conducted in 2003 indicated that approximately 47% of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier et al. 2004). Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems that affect long term population viability, such as landowner poisoning, and disease (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

No prairie dog colonies will be directly impacted by the Kingwood 3 project. One 17 acre colony is located in the middle of section 11 T45N,R77W.

#### 3.3.7.2.13. Fringed Myotis

The affected environment for fringed myotis is discussed in the PRB FEIS on pg. 3-188 to 3-189. In addition to being listed as a BLM WY sensitive species, the fringed myotis is a WGFD SGCN, with a rating of NSS2, because populations are restricted in distribution, they are experiencing ongoing significant loss of habitat, and they are sensitive to human disturbance. The fringed myotis occupies a variety of habitats, including grasslands and basin-prairie shrublands, usually in proximity of drinking

water (Hester and Grenier 2005). After feeding, it uses night roosts, which may include buildings, rock crevices, and bridges (Hester and Grenier 2005), all of which occur in the vicinity of the project area.

No bat surveys were performed for the project. Fringed myotis may occur in the project area, due to availability of roost sites and its proximity to the Powder River.

#### 3.3.7.2.14. Long-eared Myotis

The affected environment for long-eared myotis is discussed in the PRB FEIS on pg. 3-201. In addition to being listed as a BLM WY sensitive species, the long-eared myotis is a WGFD SGCN, with a rating of NSS2, because populations are restricted in distribution, they are experiencing ongoing significant loss of habitat, and they are sensitive to human disturbance. Although long-eared myotis primarily inhabit coniferous forest and woodland, they are occasionally found in cottonwood riparian areas and sagebrush grasslands where roost sites are available (Hester and Grenier 2005). Roosts include cavities in snags, under loose bark, stumps, buildings, and rock crevices (Hester and Grenier 2005), all of which may occur in the vicinity of the project area.

No bat surveys were performed for the project. Because of its proximity to the Powder River and the potential for available roost sites, long-eared myotis may occur in the project area.

#### 3.3.7.2.15. Swift Fox

The affected environment for swift fox is discussed in the PRB FEIS on pg. 3-189. In addition to being listed as a BLM WY sensitive species, swift fox is also listed as a WGFD SGCN, with a rating of NSS4, because population status and trends are unknown but are suspected to be stable, and habitat is vulnerable but is not undergoing significant loss.

No fox surveys were conducted for the project. No occurrences of swift fox have been reported in the project area. Swift fox may occur in the project area.

#### 3.3.7.2.16. Townsend's Big-eared Bat

The affected environment for Townsend's big-eared bat is discussed in the PRB FEIS on pg. 3-189. In addition to being listed as a BLM WY sensitive species, Townsend's big-eared bat is listed as a WGFD SGCN, with a rating of NSS2, because populations are restricted in distribution, they are experiencing ongoing significant loss of habitat, and they are sensitive to human disturbance. Townsend's big-eared bats occur in sagebrush and other shrublands, and roosts include rock outcrops and buildings, which occur in the vicinity of the project area. It may be limited to areas with reliable, accessible sources of drinking water (Hester and Grenier 2005), such as the Powder River. Foraging areas include riparian corridors (Hester and Grenier 2005).

No bat surveys were performed for the project. Townsend's big-eared bat may occur in the project area because of its proximity to potential roost sites and a foraging area along the Powder River.

## 3.4. West Nile Virus

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

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

WNv.

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

**Table 3.5 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 |
| 2008* | 10 | 0 | 0 | 0 |

*Wyoming Department of Health Records.

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

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

Population impacts of WNv on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNv in the PRB in 2003. While birds infected with WNv have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

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

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along

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

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

## 3.5. Water Resources

The project area is within the Upper Powder River drainage system. The Kingwood 3 Pod area is within the Willow Creek and Windmill Draw watersheds that are tributaries to the Powder.

### 3.5.1. Groundwater

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed four registered stock and domestic water wells within 0.5 mile of a federal CBNG producing well in the POD, with depths ranging from 0 to 950 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).

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

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

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

### 3.5.2. Surface Water

The project area is within the Willow Creek and Windmill Draw drainages which are tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated, grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBNG produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Powder River watershed, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, WY, Station ID 06317000 (PRB FEIS page 3-49).

The operator has identified one natural spring within one-half mile of the POD boundary at T46N, R77W, NWSW of Sec 36. The estimated flow of the spring was estimated at 0.5 gpm with a water quality of 3170 µmhos/ cm conductivity, 3080 mg/l TDS and 4.0 SAR.

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

### 3.6. Economics and Recovery of CBNG Resources

Development of this project would have effects on the local, state, and national economies. Based on the estimates in the PRBEIS, the drilling of the 35 proposed wells in the Kingwood 3 will generate approximately 0.35 billion cubic feet of gas (BCFG) per well, over the life of the well. Actual revenue from this amount of gas is difficult to calculate, as there are several variables contributing to the price of gas at any given time. Regardless of the actual dollar amount, the royalties from the gas produced in the Kingwood 3 would have wide-ranging benefit. The federal government collects 12.5% of the royalties from all federal wells, which helps offset the costs of maintaining the federal agencies that oversee permitting. In addition to generating federal income, approximately 49% of the royalties from the Kingwood 3 wells would return to the State of Wyoming. This revenue from mineral development has contributed to Wyoming's strong economy for the past several years, allowing for improvements in state funded programs such as infrastructure and education. The development of the Kingwood 3 project would also provide revenue locally by employing an array of workers, both directly and indirectly.

People would be employed to build the roads and project infrastructure, drill the wells, and maintain and monitor the project area. The large pool of individuals employed to work on the Kingwood 3 project would also have the secondary effect of increased demand for goods and services from nearby communities, primarily those of Gillette, Buffalo, Kaycee and Casper.

### 3.7. Cultural Resources

Class III cultural resource inventory was performed for the Kingwood 3 POD prior to on-the-ground project work (BFO project no. 70080160). Arcadis conducted a block class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports*. Seth Lambert, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located in or near the project area.

| Site Number | Site Type | Eligibility |
|---|---|---|
| 48JO1464 | Prehistoric | E |
| 48JO1516 | Historic | NE |
| 48JO3584 | Prehistoric | NE |
| 48JO4047 | Historic | NE |
| 48JO4048 | Prehistoric | NE |
| 48JO4049 | Prehistoric | NE |
| 48JO4050 | Prehistoric | NE |
| 48JO4051 | Prehistoric | NE |

Some of the project area analyzed in this EA occurs on deep alluvial deposits. Alluvial deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory.

### 3.8. Air Quality

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

Existing air pollutant emission sources within the region include following:

- Exhaust emissions (primarily CO and nitrogen oxides [NOx]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;

- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;

- Transport of air pollutants from emission sources located outside the region;

- Dust (particulate matter) from coal mines;

- NOx, particulate matter, and other emissions from diesel trains and,

- SO2 and NOx from power plants.

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

## 4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternatives C and D as the preferred alternatives. These changes have reduced impacts to the environment which will result from this action. Therefore, only the environmental consequences of Alternative C and Alternative D are described below.

## 4.1. Alternative C

### 4.1.1. Vegetation & Soils Direct and Indirect Effects

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Modification of hill slope hydrology.
- An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (BLM 2003). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily disturbed or destroyed by surface disturbances associated with construction activities.

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

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 35 well locations, one is on an existing or reclaimed conventional well pad, 32 will need a constructed, slotted pad (smaller pad) and 3 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 32 slotted pads would involve blading a level area approximately 30' x 120' (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 25' x 40' x 8'), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 32 wells would involve approximately 0.2 acre/well for 6.4 total acres. The other 3 wells requiring cut & fill pad construction would disturb approximately0 .65 acres/well pad for a total of 1.95 acres. The total estimated disturbance for all 35 wells would be 8.4 acres.

One Pump Station and 4 Central Gathering/Metering Facilities are associated with this POD. The area of surface disturbance for the pump station and associated pit is 2.7 acres. The area of surface disturbance for the central Gathering/Metering Facilities is 200' x 200' per location. Total disturbance for all 4

facilities would be 3.6 acres.

Approximately 8.3 miles of improved roads would be constructed to provide access to various well locations. Approximately 7 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 0.1 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 would ensure land productivity/stability is regained and maximized.

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231). The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved "Reference Site" or NRCS Ecological Site Transition State. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal.

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

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

1. Minimizing disturbance.
2. Salvaging and replacing topsoil as soon as construction is complete.
3. Use of erosion control measures such as, erosion control fabrics, waterbars, seeding, weed control and other applicable "Best Management Practices".
4. Use of a stipulation requiring "surface disturbance must be stabilize during and within 30 days of the start of construction".

Proposed stream crossings, including culverts and 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).

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".

#### 4.1.2. Wetland/Riparian

No additional effects to wetland and riparian areas are projected to occur as a result of development of this POD.

#### 4.1.3. Invasive Species

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

1. Control Methods include physical and chemical methods:
   Physical methods include mowing during the first season of establishment, prior to seed formation, and hand pulling of weeds (for small or new infestations). Chemical methods include the use of herbicides, done in accordance with the existing Surface Use Agreement with the private surface owner.

2. Preventive practices:
   Certified weed-free seed mixtures will be used for re-seeding, and vehicles and equipment will be encouraged to be washed before leaving areas of known noxious weed infestations.

3. Education:
   The company will provide periodic weed education and awareness programs for its employees and contractors through the county weed districts and federal agencies. Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area.

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.

#### 4.1.4. 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 drainage, which is approximately 20.3% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.

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No additional mitigation measures are required.

### 4.1.5. Wildlife

#### 4.1.5.1. Big Game Direct and Indirect Effects

Impacts to mule deer and pronghorn would occur through alterations in hunting and/or poaching, increased vehicle collisions, harassment and displacement from increased noise, dust, alterations in nutritional status, reproductive success, increased fragmentation, loss or degradation of habitats, reduction in habitat effectiveness, and declines in populations. Displacement of mule deer and pronghorn from the action area during construction can be expected. Not all the displaced animals are likely to return to the area during the production phase.

A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). WGFD has determined thresholds for high and extreme impacts that range from greater than two wells per square mile for mule deer and greater than five wells per square mile for pronghorn 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 do not become accustomed to 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, because human activities associated with operation and maintenance will 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 animals lose weight and body condition as the winter progresses. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

Reclamation and other activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that must expend increased energies to avoid such activities. Impacts to big game are discussed in the PRB FEIS on pp. 4-181 to 4-215.

##### 4.1.5.1.1. Big Game Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-181 to 4-215.

#### 4.1.5.2. Aquatics Direct and Indirect Effects

Produced water will be stored in reservoirs permitted and used in earlier Kingwood PODs. Reservoirs are total containment. If reservoirs were to fail, produced water could reach the Powder River. As long as the reservoirs hold, there will be no impact to aquatic communities as a result of implementation of the Kingwood 3 project. Impacts to aquatics are discussed in the PRB FEIS on pp. 4-235 to 4-247.

#### 4.1.5.2.1. Aquatics Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, (pp. 4-247 to 4-249). No additional mitigation measures are required.

### 4.1.5.3. Migratory Birds Direct and Indirect Effects

Direct and indirect effects to migratory birds are discussed in the PRB FEIS (pp. 4-231 to 4-235).

Disturbance of habitat within the project area is likely to impact migratory birds. Native habitats will be lost directly with the construction of wells, roads, and pipelines. Reclamation and other activities that occur in the spring may be detrimental to migratory bird survival. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Activities will likely displace migratory birds farther than the immediate area of physical disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

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

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

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

#### 4.1.5.3.1. Migratory Birds Cumulative Effects

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

### 4.1.5.4. 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 overheating or chilling of eggs or chicks and can result in egg or chick mortality. Prolonged disturbance

can also lead to the abandonment of the nest by the adults. Routine human activities near these nests can also draw increased predator activity to the area and resulting in increased nest predation.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation be located in such a way as to provide adequate biologic buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities. The nests listed in the table below are within 0.5 miles of project infrastructure. Those nests that may be impacted by the proposed project operations are described after the table.

**Table 4.1 Proposed and existing infrastructure within 0.5 mile of documented raptor nests within the Kingwood 3 project area**

| BLM ID | Infrastructure |
|---|---|
| 3921 | • 12-12, 14-12, 23-12 |
| 6483 | • 14-12, 23-12, 32-12, POD building in section 12 |
| 3985/6482 | • 21-12, 32-12, 23-12, POD building in section 12 |
| 3918 | • Corridor to 14-1 |
| 3919/3979 | • 34-35, 23-2, corridor in section 2, |
| 3975 | • 14-35, 23-35 |
| 6611 | • 14-35, 23-35 |
| 6488/6613 | • 12-35, 14-35, 23-35 |
| 6491 | • 12-35, 14-35, 23-35, 21-35, 32-35 |
| 6490 | • 34-26, 21-35, 32-35, 41-35 |
| 3608 | • 41-35, 43-26 |
| 4321/4395 | • 43-26 |
| 5927 | • 32-26, 41-26, 23-26 |
| 4394 | • 41-26, 21-26 |
| 3081/3082/2925/5926/6484 | • 41-26, 21-26 |
| 6486 | • 12-27, 23-22, 32-27, 41-27, |

Golden eagle nest 6486 is a cliff nest. The 21-27 well location was planned within 0.25 mile, and in view of this nest, as was the access between the 23-22 and 12-27 wells. After the onsite, the operator removed the 21-27 well from the proposed action, and committed to access the 12-27 well from the south. The 41-27 well is 0.5 miles from nest 6486, but was moved out of view at the onsite. These measures increase the potential for golden eagles use of this nest location.

Unknown raptor nest 6483 is in a Cottonwood tree. The 23-12 well is located 0.1 mile from this nest with a portion of the access road in view and above the nest. At the onsite, the operator agreed that if the nest was active, then access would be limited to pumper traffic only and the well would be shut-in if it needed maintenance. In the post-deficiency letter the operator stated that they would not commit to shutting in the well if the nest was active and the well needed maintenance. Approval of the 23-12 well without the above restrictions would most likely preclude future use of this nest.

Long-eared owl nest 6611 was not identified at the time of the onsite. It was discovered by another consultant for another POD in 2009. Well 14-35 is 0.13 miles from this nest. The BLM wildlife biologist did not visit the 14-35 well location at the onsite. Routine operations at the 14-35 well would most likely preclude future use of this nest. An alternate location for this well that would provide a sufficient buffer

may exist.

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

#### 4.1.5.4.1. Raptors Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-221. No additional mitigation measures are required.

### 4.1.5.5. Plains Sharp-tailed Grouse Effects

Sharp-tailed grouse are not expected to be impacted by the proposed project because the project area has limited potential to support them.

### 4.1.5.6. Sagebrush Obligates Direct and Indirect Effects

Construction and maintenance activities associated with development of the Kingwood 3 project are likely to cause a decline in sagebrush obligate species. In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001).

#### 4.1.5.6.1. Sagebrush Obligates Cumulative Effects

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of sagebrush-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return for many years after reclamation activities are completed.

### 4.1.5.7. Threatened and Endangered Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.

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

| Common Name (scientific name) | Habitat | Presence | Project Effects | Rationale |
|---|---|---|---|---|
| Endangered | | | | |
| Black-footed ferret (*Mustela nigripes*) | Black-tailed prairie dog colonies or complexes > 1,000 acres. | NP | NE | Suitable habitat of insufficient size. |
| Blowout penstemon (*Penstemon haydenii*) | Unstable, sandy blow-outs and active sand dunes | NP | NE | Depositional sands/dunes not present. |
| Threatened | | | | |
| Ute ladies'-tresses orchid (*Spiranthes diluvialis*) | Riparian areas with permanent water | NP | NE | Suitable habitat is not present. |

#### 4.1.5.7.1. Black-Footed Ferret Direct and Indirect Effects

Direct and indirect effects to black-footed ferret are discussed in the PRB FEIS (pg. 4-251).
Suitable black-footed ferret habitat is not present within the project area. Implementation of the proposed development will have no effect on the black-footed ferret because the species is not likely to occur.

#### 4.1.5.7.2. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

Suitable habitat is not present within the proposed Kingwood 3 project area. 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 will have no effect on the Ute ladies'- tresses orchid.

#### 4.1.5.7.3. Blowout Penstemon Direct and Indirect Effects

Based on the BLM and consultant biologists' knowledge of the project area, there is no suitable Blowout Penstemon habitat that could be disturbed within the proposed action area (Arcadis 2009c). The project will have no effect on Blowout Penstemon.

#### 4.1.5.7.4. Threatened and Endangered Species Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pp. 4-250 to 4-257. No additional mitigation measures are required.

### 4.1.5.8. Sensitive Species

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

The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-273. Table 4.3 summarizes the habitat requirements and potential impacts of the Kingwood 3 project on all Wyoming BLM sensitive species that occur in the BFO administrative area. Some sensitive species are of particular concern in the project area, due to their demonstrated or suspected sensitivity to CBNG development or because they were recently considered for listing under the ESA. These species include bald eagle, black-tailed prairie dog, greater sage-grouse, mountain plover, and western burrowing owl and are discussed in further detail in this section.

**Table 4.3 Summary of Sensitive Species Habitat and Project Effects.**

| Common Name (scientific name) | Habitat | Presence | Project Effects | Rationale |
|---|---|---|---|---|
| ***Amphibians*** | | | | |
| Northern leopard frog (*Rana pipiens*) | Beaver ponds and cattail marshes from plains to montane zones. | S | MIIH | Additional water will affect existing waterways and alter habitat conditions. |
| Columbia spotted frog (*Ranus pretiosa*) | Ponds, sloughs, small streams, and cattails in foothills and montane zones. Confined to headwaters of the S Tongue R drainage and tributaries. | NP | NI | The project area is outside the species' range, and the pecies is not expected to occur . |
| ***Fish*** | | | | |
| Sturgeon chub (*Macrhybopsis gelida)* | Swift, rocky riffles throughout the Powder River. | NP | NI | Amount of water discharged to the Powder River not of sufficient magnitude to have impacts to this species. Changes in water quality not expected to have an impact. |
| Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*) | Cold-water rivers, creeks, beaver ponds, and large lakes in the Upper Tongue sub-watershed | NP | NI | The project area is outside the species' range, and the pecies is not expected to occur . |
| ***Birds*** | | | | |
| Baird's sparrow (*Ammodramus bairdii*) | Shortgrass prairie and basin-prairie shrubland habitats; plowed and stubble fields; grazed pastures; dry lakebeds; and other sparse, bare, dry ground. | S | MIIH | Shortgrass prairie and sagebrush cover will be affected. |
| Bald eagle (*Haliaeetus leucocephalus*) | Mature forest cover often within one mile of large water body with reliable prey source nearby. | K | MIIH | Foraging eagles may be displaced. |
| Brewer's sparrow (*Spizella breweri*) | Sagebrush shrubland | K | MIIH | Sagebrush cover will be affected. |
| Ferruginous hawk (*Buteo regalis*) | Basin-prairie shrub, grasslands, rock outcrops | S | MIIH | Foraging habitat will be impacted and human activities will increase |
| Greater sage-grouse (*Centrocercus urophasianus*) | Basin-prairie shrub, mountain-foothill shrub | K | WIPV | Sagebrush cover will be affected. |
| Loggerhead shrike (*Lanius ludovicianus*) | Basin-prairie shrub, mountain-foothill shrub | S | MIIH | Sagebrush cover will be affected. |

| Common Name (scientific name) | Habitat | Presence | Project Effects | Rationale |
|---|---|---|---|---|
| Long-billed curlew (*Numenius americanus*) | Grasslands, plains, foothills, wet meadows | S | MIIH | Grasslands, meadows will be impacted |
| Mountain plover (*Charadrius montanus*) | Short-grass prairie with slopes < 5% | NP | NI | Marginal habitat present |
| Northern goshawk (*Accipiter gentilis*) | Conifer and deciduous forests | NP | NI | No forest habitat present. |
| Peregrine falcon (*Falco peregrinus*) | Cliffs | NP | NI | No nesting habitat present. |
| Sage sparrow (*Amphispiza billneata*) | Basin-prairie shrub, mountain-foothill shrub | S | MIIH | Sagebrush cover will be affected. |
| Sage thrasher (*Oreoscoptes montanus*) | Basin-prairie shrub, mountain-foothill shrub | S | MIIH | Sagebrush cover will be affected. |
| Trumpeter swan (*Cygnus buccinator*) | Lakes, ponds, rivers | NP | NI | Habitat not present. |
| Western Burrowing owl (*Athene cunicularia*) | Grasslands, basin-prairie shrub | NP | NI | Habitat not present. |
| 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. |
| ***Mammals*** | | | | |
| Black-tailed prairie dog (*Cynomys ludovicianus*) | Prairie habitats with deep, firm soils and slopes less than 10 degrees. | NP | NI | No prairie dog colonies will be impacted. |
| Fringed myotis (*Myotis thysanodes*) | Conifer forests, woodland chaparral, caves and mines | NP | NI | Habitat not present. |
| Long-eared myotis (*Myotis evotis*) | Conifer and deciduous forest, caves and mines | NP | NI | Habitat not present. |
| Spotted bat (*Euderma maculatum*) | Cliffs over perennial water. | NP | NI | Cliffs & perennial water not present. |
| Swift fox (*Vulpes velox*) | Grasslands | S | MIIH | Grasslands will be impacted. |
| Townsend's big-eared bat (*Corynorhinus townsendii*) | Caves and mines. | NP | NI | Habitat not present. |
| Plants | | | | |

| Common Name (scientific name) | Habitat | Presence | Project Effects | Rationale |
|---|---|---|---|---|
| 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 | Project area outside of species' range. |

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

Project Effects
**NI -** No Impact.
**MIIH -** May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
**WIPV -** Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
**BI -** Beneficial Impact

#### 4.1.5.8.1. Bald Eagle Direct and Indirect Effects

Bald eagles have nested along the Powder River to the north and west of the POD (2.2 miles from the 12-27 well). Access from Buffalo to the POD, across the Brubaker bridge, comes within 0.3 miles of the 2009 nest location. Restricting construction and drilling traffic on this portion of road during the breeding/nesting season (Feb 1 – August 15) would protect nesting bald eagles from the noise and dust disturbance associated with large vehicle traffic. Alternate access does exist from the north. No impacts to bald eagles roosting on the Powder River or Willow Creek are anticipated.

Impacts to bald eagles are discussed in the PRB FEIS on pg. 4-251 to 4-253. A more recent study completed in 2004 suggests that two-tracks and improved project roads pose minimal collision risk to bald eagles. In one year of monitoring road-side carcasses the BLM BFO 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; bald and golden eagles were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

#### 4.1.5.8.2. Greater Sage-grouse Direct and Indirect Effects

The proposed action will adversely impact nesting, brood rearing, late summer, and winter habitat, both through loss of habitat and avoidance of habitat in proximity to the development. Proposed project elements that are anticipated to negatively impact grouse include wells, new roads, new pipelines, and increased vehicle traffic on established roads.

The proposed action will add new disturbance to the high quality habitat in the north and east Section 35 leading into section 26 T46N, R77W and in section 1 and 12 T45N, R77W. Wherever possible, road and utility corridor locations were placed in such a way as to minimize fragmentation of intact habitat. The access corridors from the main roads to the 34-26, 21-35 and 14-26, although placed in the least damaging areas, will directly remove high quality habitat. In addition, these corridors will fragment large patches of intact high quality habitat. Timing restrictions prohibiting surface disturbance in identified high quality nesting habitat would allow for at least one more year of production. This restriction would apply to the following well locations and corridor/access: 34-1, 42-1, 14-26, 34-26, 43-26, 12-35, 21-35, 41-35.

In an effort to minimize sage-grouse impacts, as part of the proposed action, the operator has committed to:

1) No new overhead power.
2) Restricting disturbance widths (mowing) for road/utilities to 20 feet through sagebrush. During construction trucks will have to drive outside this width, crushing vegetation.
3) When the operator determined it feasible at the onsite, wells were moved out of sagebrush and into grass dominated locales.

Direct and indirect impacts to sage-grouse are discussed in more detail in the PRB FEIS on pg. 4-257 to 4-273.

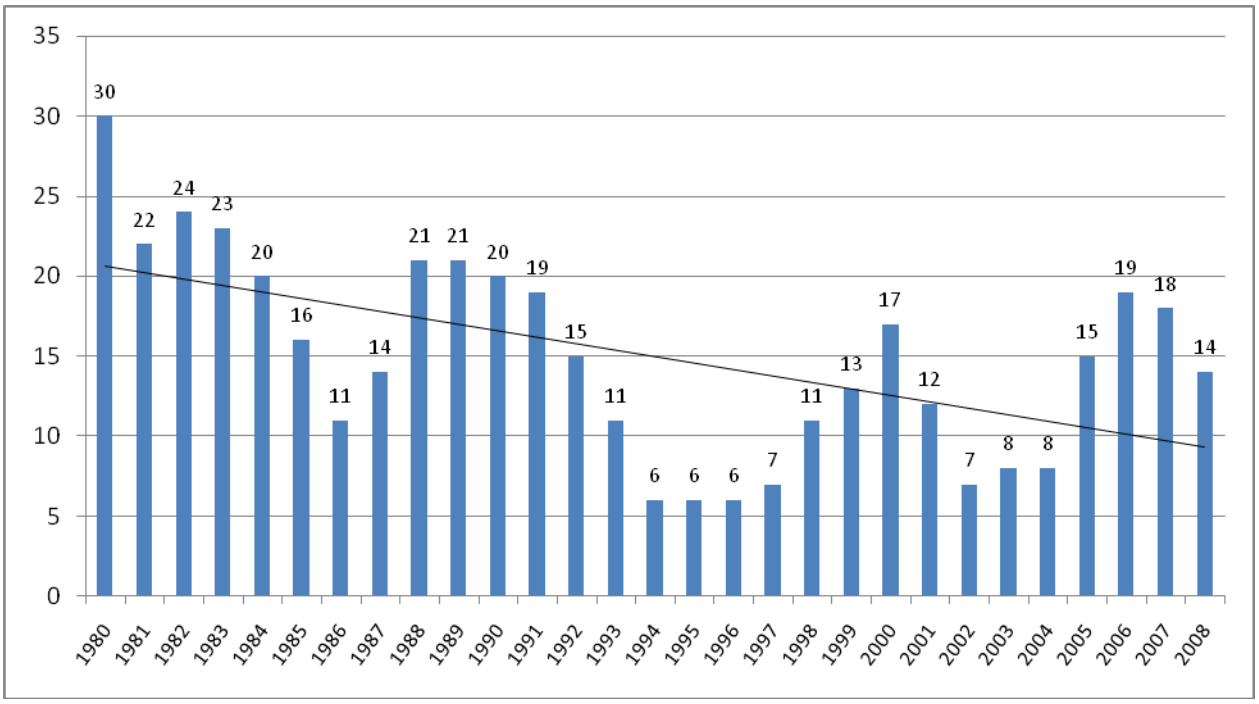
##### 4.1.5.8.2.1. Greater Sage-grouse Cumulative Effects

Recent research suggests that the cumulative and synergistic effects of current and foreseeable CBNG development within the vicinity of the project area are likely to impact the local sage-grouse population, cause declines in lek attendance, and may result in local extirpation. The cumulative impact assessment area for this project encompasses a four mile radius from two sage-grouse leks that occur within four

miles of the project boundary. Analysis of impacts up to four miles was recommended by the State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008).

The sage-grouse population within northeast Wyoming has been exhibiting a steady long term downward trend, as measured by lek attendance (WGFD 2005). The figure illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Long-term harvest trends are similar to that of lek attendance (WGFD 2005) (Figure 3).

**Figure 3 Average number of male sage-grouse per active lek within the WGFD Sheridan region, 1980-2007.**




Research has shown that declines in lek attendance are correlated with oil and gas development. Several studies have shown that well density can be used as a metric for evaluating impacts to sage-grouse, as measured by declines in lek attendance (Braun et al. 2002, Holloran et al. 2005, and Walker et al. 2007). These studies indicated that oil or gas development exceeding approximately one well pad per square mile, resulted in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development 2008).

There are currently 580 wells (Wyoming Oil and Gas Conservation Commission [WOGCC] 07/2009) within the cumulative impact assessment area, an area of 100 square miles, which amounts to a density of approximately 5.8 wells per square mile. Currently, there are approximately 374 proposed wells (including the 33 from this project) within four miles of the two leks (Automated Fluid Minerals Support System [AFMSS] 07/2009). With the addition of the 341 proposed wells that are not associated with this proposed action (580+374=954), the well density within four miles of the leks increases to 9.5 wells/section. With approval of alternative C (33 proposed well locations) the well density remains the same at 9.2 wells/section, well above the one well per square mile recommendation by the State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development.

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (2009), WGFD categorized levels of oil and gas development into thresholds that correspond to moderate, high, and extreme impacts to habitat effectiveness for various species of wildlife, based on well pad densities and acreages of disturbance. All three levels of impact result in a loss of habitat function by directly eliminating habitat; disrupting wildlife access to, or use of habitat; or causing avoidance and stress to wildlife. Impacts to sage-grouse are categorized by number of well pad locations per square mile within two miles of a lek and within identified nesting/brood-rearing habitats greater than two miles from a lek. Moderate impacts occur when well density is between one and two well pad locations per square mile or where there is less than 20 acres of disturbance per square mile. High impacts occur when well density is between two and three well pad locations per square mile or when there are between 20 and 60 acres of disturbance per square mile. Extreme impacts occur when well density exceeds three well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile. Extreme impacts mean those where the function of an important wildlife habitat is substantially impaired or lost
There are no known leks within two miles of the project boundary. Therefore the addition of the 33 proposed Kingwood 3 wells would not change the WGFD lek category for any leks. The closest lek, the Christensen IV, is 2.2 miles away. Currently, it has a total well density of 2.4 wells per square mile, indicating that impacts to this lek as a result of existing oil and gas development are considered by WGFD to be high. Thirty additional wells (none from the Kingwood 3 project) are proposed within two miles of the Chirstensen IV lek, increasing the well density by to 4.8 wells per square mile, moving this lek into the WGFD extreme category.

Declines in lek attendance associated with oil and gas development may be a result of a suite of factors including avoidance (Holloran et al. 2005, Holloran et al. 2007, Aldridge and Boyce 2007, Walker et al. 2007, Doherty et al. 2008, WGFD 2009), loss and fragmentation of habitat (Connelly et al. 2000, Braun et al. 2002, Connelly et al. 2004, WGFD 2004a, Rowland et al. 2005, WGFD 2005, Naugle et al. in press), reductions in habitat quality (Braun et al. 2002, WGFD 2003, Connelly et al. 2004, Holloran et al. 2005) and changes in disease mechanisms (Naugle et al. 2004, WGFD 2004b, Walker et al. 2007, Cornish pers. comm.).

The BFO Resource Management Plan (BLM 2001) and the PRB FEIS Record of Decision (BLM 2003) included a two-mile timing limitation on surface-disturbing activities around sage-grouse leks. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). Wyoming BLM adopted the two-mile recommendation in 1990 (BLM 1990).

The two-mile recommendation was based on early research which indicated between 59% and 87% of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within vast contiguous stands of sagebrush, such as those that occur in Idaho's Snake River plain.

Additional research across more of the sage-grouse's range has since indicated that nesting may occur much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported that only 45% of their sage-grouse hens nested within 1.9 miles of the capture lek. Moynahan and Lindberg (2004) found that only 36% of their sage-grouse hens nested within 1.9 miles of the capture lek. Habitat conditions, and, thus, sage-grouse biology, within the BFO are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

Moynahan's study area occurred in mixed-grass prairie and sagebrush steppe, dominated by Wyoming big sagebrush (Moynahan et al. 2007). In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007). Recent research in the Powder River Basin suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (Walker et al. 2007,

Walker 2008, Naugle et al. *In press*). Based on these studies, the BLM has determined that a two-mile timing limitation is insufficient to reverse the population decline.

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. A timing limitation does nothing to mitigate loss and fragmentation of habitat and changes in disease mechanisms. Rather than limiting mitigation to only timing restrictions, more effective mitigation strategies may include, at a minimum, burying power lines (Connelly et al. 2000b); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007). Walker et al. (2007) recommend maintaining extensive stands of sagebrush habitat over large areas (at least one mile in size) around leks to ensure sage-grouse persistence. The size of such a no-development buffer would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Connelly et al. (2000) recommended locating all energy-related facilities at least two miles from active leks. Other researchers have recommended avoiding areas within four miles of a lek and within areas of mapped nesting and brood-rearing habitat outside the four-mile perimeter (Walker et al. 2007, Walker 2008, Naugle et al. *In press*).

Several guidance documents are available that recommend practices that would reduce impacts of development on greater sage-grouse. These include *Northeast Wyoming Sage-Grouse Conservation Plan* (Northeast Wyoming Sage-grouse Working Group 2006), *Sage-Grouse Habitat Management Guidelines for Wyoming* (Bohne et al. 2007), *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2009), *Bureau of Land Management National Sage-Grouse Habitat Conservation Strategy* (USDI 2004), and *Greater Sage-Grouse Comprehensive Conservation Strategy* (Stiver et al. 2006).

The Powder River Basin Oil and Gas Project FEIS (BLM 2003) states that "the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270)." Based on the impacts described in the Powder River Basin Oil and Gas Project FEIS and the findings of more recent research, the proposed action is not likely to contribute to a decline in male attendance at the two leks that occur within four miles of the project area.

#### 4.1.5.8.3. Mountain Plover Direct and Indirect Effects

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

Occupied mountain plover habitat is present within 0.25 miles of the project area. However, the proposed project is not likely to impact mountain plover, since no prairie dog towns will be impacted and the sagebrush/grasslands in the project area were not suitable for plover in 2009.

Use of roads and pipeline corridors by mountain plovers may increase their vulnerability to vehicle collision. Limiting travel speed to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows mountain plovers sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest likely would still be destroyed. To reduce impacts to nesting mountain plovers, the BLM BFO requires a 0.25 mile timing limitation for potential nesting habitat prior to nest survey completion and a 0.25 mile timing limitation for all occupied nesting habitat for the entire nesting season.

#### 4.1.5.8.4. Western Burrowing Owl Direct and Indirect Effects

Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. CBNG infrastructure such as well houses, compressors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

The USFS Thunder Basin National Grasslands in Campbell County, WY, (who cooperated with the BLM in the creation of the PRB FEIS), recommends a 0.25 mile timing restriction buffer zone for burrowing owl nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to "use the least restrictive stipulations that effectively accomplish the resource objectives or uses." Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to four and one half months from six and one half months and from 0.5 mile to 0.25 mile.

#### 4.1.5.8.5. Sensitive Species Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS (pp. 4-257 to 4-273).

### 4.2. 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.

### 4.3. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists in consultation with the BLM developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies. The water produced from wells in this project will be added to existing water management infrastructure that was approved in and analyzed with the Kingwood 1 and 2 PODs which were designed to manage the water produced from 137 wells. The estimated maximum water production was of 14.5 gpm per well (1987 total gpm for the Federal wells in area). Kingwood 1 and 2 production began in 2006 and 2007.

Water production from the wells has declined from the proposed maximum rate to less than 4 gpm average. The operator estimates that the management capacity of the existing system will be adequate to manage the additional water from the wells in this project. No new outfalls or impoundments are planned with this POD. All figures concerning flow rates found in the discussion of water resources below are based on values taken from the WMP. The number of wells finally approved with this EA may be lower than was originally planned in the WMP, therefore any estimated impacts, which are proportional to the number of wells and the total water production rates, will be conservatively high.

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 14.5 gpm per well or 536.5 gpm (1.2 cfs or 865 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 Powder River drainage, the projected volume produced within the watershed area was 147,481 acre-feet in 2008. As such, the volume of water resulting from the production of these wells is 0.6% of the total volume projected for 2008. This volume of produced water is also within the predicted parameters of the PRB FEIS.

### 4.3.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 214 gpm will infiltrate at or near the discharge points and impoundments (346 acre feet per year) located in adjacent PODs. This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 0 to 950 feet compared to 1,425 feet to the top of the Big George coal. 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 (0.5 mile of a federal CBNG producing well) of the proposed wells.

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

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

adversely impacted by well drilling and completion operations.

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

The BLM has installed shallow groundwater monitoring wells at five impoundment locations in the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. Water quality data has been sampled from these wells on a regular basis. Preliminary data from three sites show increasing TDS level as water infiltrates while two sites are not. On-going shallow groundwater monitoring at four other impoundment locations are less intensive and consist of batteries of between four and six wells. Preliminary data from two of these other sites are showing increasing TDS levels as water infiltrates, while two other sites are not. Due to the limited data available, the uncertainty of the changes occurring due to infiltration, and the extensive variability of site surface and subsurface characteristics at these sites, it is not certain that findings from these monitoring wells are representative of conditions at other impoundment locations across the basin.

In order to address the potential impacts from infiltration on shallow ground water, the WDEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produce Water Impoundments" (June 14, 2004) which can be accessed on their web site. For all new WYPDES permits, the WDEQ requires that the proponent investigate the shallow groundwater at the proposed impoundment locations. As of April of 2009, approximately 1,999 impoundment sites had been investigated through over 2,272 borings. Of these impoundments, 277 met the criteria to require “compliance monitoring” if constructed and used for CBNG water containment. Only 155 impoundments requiring monitoring are presently being used. As of the first quarter of 2009, only 18 of those monitored impoundments caused a change in the “Class of Use” of the underlying aquifer water.

#### 4.3.1.1. 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 Formation – Tongue River Member sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5).” (PRB FEIS page 4-65). No additional mitigation is necessary.

### 4.3.2. Surface Water

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

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

| **Predicted Values** | **TDS, mg/l** | **SAR** | **EC,** μmhos/cm |
|---|---|---|---|
| Most Restrictive Proposed Limit – | | 2.0 | 1,000 |
| Least Restrictive Proposed Limit | | 10.0 | 3,200 |
| Upper Powder River Watershed at Arvada, WY USGS #06317000 Gauging Station<br>Historic Data Average at Maximum Flow<br>Historic Data Average at Minimum Flow | | <br><br>4.76<br>7.83 | <br><br>1,797<br>3,400 |
| WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)<br>Drinking Water (Class I)<br>Agricultural Use (Class II)<br>Livestock Use (Class III) | <br><br>500<br>2,000<br>5,000 | <br><br><br>8 | |
| WDEQ Water Quality Requirements (typical)<br>At discharge point | <br>5,000 | <br>na | <br>7,500 |
| Predicted Produced Water Quality<br>Lower Big George | <br>1,400 | <br>17.1 | <br>2,250 |

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 1,400 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

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 14.5 gallons per minute (gpm) is projected is to be produced from these 37 wells, for a total of 536.5 gpm for the POD. See Table 4.5 .

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

No new impoundments or discharge points would be constructed within the project area for this project. Existing or approved infrastructure from adjacent PODs will be used to manage the water. Existing facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.18 cfs below the lowest reservoir in adjacent PODs(after infiltration and evapotranspiration losses).

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 14.5 wells is anticipated to be a total of 536.5 gpm or 1.2 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and assuming full containment, the produced water re-surfacing in the Powder River from this action (0.18 cfs) may add a maximum 0.14 cfs to the flows, or 0.2% of the predicted total CBNG produced water contribution during July through October of each year. During November through June the WYPDES permit allows the operator to release water from containment impoundments. Assuming a conveyance loss of 20%, the produced water entering into the Powder River from this action (1.2 cfs) may add a maximum 0.96 cfs to the flows, or 1.4% of the predicted total CBNG produced water flow rate contribution from November through June. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

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

The operator has obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.
Permit effluent limits were set at (WYPDES WYW0054593 page 2):

| | |
|---|---|
| pH | 6.5 to 9.0 |
| TDS | 5000 mg/l max |
| Specific Conductance | 7500 mg/l max |
| Dissolved iron | 1000 μg/l max |
| Dissolved manganese | 629 μg/l max |
| Total Barium | 1800 μg/l max |
| Total Arsenic | 7 μg/l max |
| Chlorides | 150 mg/l |

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

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

The development of coal bed natural gas in the area surrounding the existing natural spring (T46N, R77W, NWSW of Sec 36) may affect the flow rate or water quality of the spring. The operator will monitor the spring twice a year for flow rate and water quality to detect impacts.

In-channel downstream impacts are addressed in the WMP for the Kingwood 3 POD prepared by Western Land Services for Williams Production RMT Company.

#### 4.3.2.1. Surface Water Cumulative Effects

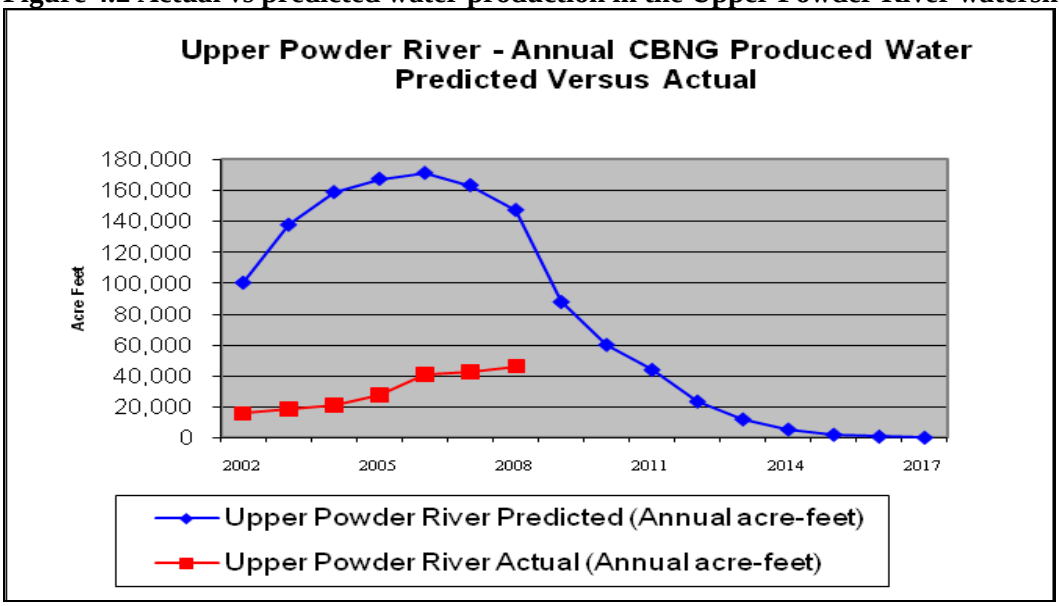
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2008, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 212,522 acre-feet of water compared to the predicted 1,047,521 acre-feet 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 20.3 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

**Table 4.5 Actual vs predicted water production in the Upper Powder River watershed *2008 DataUpdate 06-08-09***

| 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 | 42,112 | 25.8 | 166,096 | 18.5 |
| 2008 | 147,481 | 1,047,521 | 45,936 | 31.1 | 212,522 | 20.3 |
| 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** | | **212,522** | | | |

**Figure 4.2 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)

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 drainage, which is approximately 20.3% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream. No additional mitigation measures are required.
3. The commitment by the operator to monitor the volume of water discharged from impoundments.

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

### 4.4. Economics and Recovery of CBNG Resources

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.

### 4.5. Fluid Minerals

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.

### 4.6. Cultural Resources

When a project is constructed in an area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the State Historic Preservation Office (SHPO) on mitigation or avoidance. Due to the presence of alluvial deposits, the operator will be required to have an archeologist monitor all earth moving activities associated with certain construction, as described in the site specific COA's.

Non-eligible site(s) 48JO1516, 48JO3584, 48JO4047 and 48JO4051 will be impacted by the proposed project. Non-contributing portions of eligible site 48JO1464 will be impacted by the proposed project. No historic properties will be adversely effected by the proposed project. Following the Wyoming State

Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 09/09/09 of a determination of No Adverse Effect. If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

### 4.7. Air Quality

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

## 5. ALTERNATIVE D

Only specific differences from alternative C will be discussed. Alternative D was not explored during the onsite, however, following the onsite inspection, the BLM Interdisciplinary Team (IDT) reviewed the surface use and wildlife data with the changes agreed to in the field. The BLM-IDT identified that further mitigation to reduce the loss of sage-grouse habitat within the project area was warranted. BLM determined that the greatest impact to the habitat from the proposed action is the fragmentation of sage-grouse habitat on a landscape scale, specifically the proposed road segments to various well locations, vertical intrusion from over head power, an increase risk of West Nile virus, and an increase of predators due to increased surface water, travel corridors, habitat edge, and introduction of new nesting substrate proposed in Alternative C. The following proposal will be recommended to the operator as mitigation to reduce the impacts of habitat loss, habitat fragmentation, and West Nile virus within the Kingwood 3.

### 5.1. Vegetation & Soils Direct and Indirect Effects

Trenching construction will remove vegetation while burying proposed and existing overhead power until reclamation restores native habitat. Consolidated linear infrastructure will maintain native soil and vegetation (see below).

#### 5.1.1. Cumulative effects for Vegetation and Soils

No additional mitigation measures are required.

### 5.2. Wildlife

#### 5.2.1. Raptors Direct and Indirect Effects

Alternative D contains the least habitat impact to raptors. Removal of the 34-26 and 41-35 wells in order to reduce impacts to sage-grouse would collaterally increase protection for nest 3918 by eliminating a well and road within 0.25 mile of the nest.

##### 5.2.1.1. Cumulative effects for Raptors

The cumulative effects associated with Alternative D, 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.

##### 5.2.1.2. Sensitive Species Direct and Indirect Effects

###### 5.2.1.2.1. Greater sage-grouse

Alternative D would create the least amount of disturbance to and fragmentation of sage-grouse habitat while meeting the purpose and need of the proposed action. Alternative D would also accelerate a return

to habitat effectiveness at reclamation. At the onsite the BLM biologist recommended the operator remove two wells, the 41-35 and 34-26, from the proposed action to prevent habitat fragmentation of the largest existing contiguous patch of intact sagebrush in the project area. The access to the 41-35 would split approximately 200 acres of intact nesting habitat. Continuing road/utilities construction to the 34-26 well would fragment approximately an additional 200 acres. By deferring these two wells, the structural integrity of the 400 acre sagebrush patch would be preserved, allowing for faster reclamation of the project area into effective sage-grouse habitat.

Burying existing overhead power would help mitigate impacts to sage-grouse by removing vertical intrusions and raptor perches. The operator removed proposed overhead power from the project in Alternative C. Trenching lines would temporarily remove habitat while burying existing overhead power outside of existing corridors. This will cause a short-term disturbance and direct habitat loss; however, effective reclamation should provide some habitat value as these areas are reclaimed and native vegetation becomes established. This alternative would improve sage grouse habitat by removing existing vertical intrusions and consolidating most linear infrastructure with access roads.

Limiting production visits to once a month as well as eliminating surface disturbing or disruptive activities (to include disruptive maintenance activities such as a "work over rig") from March 1 to July 15 would reduce adverse impacts to nesting success.

Muffling the compressor battery in section 7 T45N, R76W would reduce the amount of noise detected in nesting habitat located in section 12 (T45N,R77W). The noise from this compressor battery, located on fee surface/federal mineral lease WYW 0266651, was not measured at the onsite, but was clearly audible in most of section 12 and the south of section 1.

A timing restriction for brood rearing for wells 23-2 and 14-2 could allow grouse to use the drainage without construction activities taking place. To project brood rearing, the WYGFD recommends prohibiting or restricting surface disturbance from March 15 to June 30 (WYGFD 2009, p. 109). Of the above locations, only 34-1 and 42-1 are not covered by raptor timing restrictions, which would provide the requisite protections if all nests, regardless of activity, are protected.

<u>Summary Recommendations:</u>
Remove two wells, the 41-35 and 34-26, from the proposed action
Burying existing overhead power would help mitigate impacts to sage-grouse.
Limit production visits to once a month.
Muffle the compressor battery in section 7 T45N, R76W.
A timing restriction for brood rearing from March 15 to June 30 for the 23-2 and 14-2 wells.

### 5.3. Economics and Recovery of CBNG Resource (Fluid minerals, socio-economics)

The cumulative effects associated with Alternative D 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.

Estimated Lost Gas from Undrilled Federal Locations

| Assuming these wells are not drilled and there are no offsetting wells | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Twp** | **Rng** | **Sec** | **Qtr/Qtr** | **Lease** | **Well Name** | Unrecovered CBM | |
| | | | | | | High | Low |
| 46N | 77W | 26 | SWSE | WYW40634 | Federal 34-26-4677 | 853 | |
| 46N | 77W | 35 | NENE | WYW128464 | Federal 41-35-4677 | 853 | |
| All numbers are in thousands of MCF, Low numbers were not used since there is no production surrounding these wells. | | | | | | | |

| Assuming these wells are not drilled but all surrounding 80s are | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Twp** | **Rng** | **Sec** | **Qtr/Qtr** | **Lease** | **Well Name** | Unrecovered CBM | |
| | | | | | | High | Low |
| 46N | 77W | 26 | SWSE | WYW40634 | Federal 34-26-4677 | 94 | |
| 46N | 77W | 35 | NENE | WYW128464 | Federal 41-35-4677 | 94 | |
| All numbers are in thousands of MCF, Low numbers were not used since there is no production surrounding these wells. | | | | | | | |

### 5.4. Comparison Summary of Effects By Cumulative effects

The cumulative effects associated with Alternative D are within the analysis parameters and impacts described I the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page4-271. No additional mitigation measures are required.

**Table 5.1 Cumulative Effects**

| Resource/Species | Alternative A | Alternative C | Alternative D Sage Grouse emphasis |
|---|---|---|---|
| Wetlands/Riparian Areas | No existing wetlands/riparian areas would be disturbed. | | |
| **Wildlife** | | | |
| Big Game | No habitat loss or fragmentation. Would likely see increased traffic passing through due to surrounding mineral development | Greatest habitat loss. | Least habitat loss. |
| | | Greatest habitat fragmentation. | Least habitat fragmentation. |
| Raptors | No habitat loss. | 19 nests with POD elements within 0.5 miles. | no change |
| | No wells authorized near nests. | | |

| Resource/Species | Alternative A | Alternative C | Alternative D Sage Grouse emphasis |
|---|---|---|---|
| Migratory Birds | No habitat loss. | Greatest habitat loss. | Least habitat loss. |
| | | Greatest habitat fragmentation. | Least habitat fragmentation. |
| | No habitat fragmentation. | | Timing restrictions for sage-grouse habitat will provide one season of protection to migratory birds nesting in those areas. |
| | | Overhead electric poses predation & collision risk. | Removal of overhead power eliminates power-pole perching & collision risk. |
| **Threatened and Endangered Species** | | | |
| Bald eagle | No habitat loss | Existing overhead electricity is a mortality risk from electrocution. | Removal of overhead electricity will eliminate risk from electrocution. Removal of proposed impoundments will reduce West Nile virus impacts to eagles and retain foraging in areas where impoundments will impact prairie dogs. |
| **Sensitive Species** | | | |
| Greater Sage Grouse | No habitat loss. | Greatest habitat loss. | Least habitat loss. |
| | No decision on overhead electricity. Overhead power could be routed through project area on private surface without BLM discretion increasing predation and collision risk. Grouse may avoid overhead power lines. | Greatest predation and collision risk associated with existing overhead power lines. | Least habitat fragmentation. Increase habitat connectivity. Reduce predators in nesting habitat with eliminating water impoundments. Eliminate collision and vertical intrusion from burying overhead power.<br><br>Removal of two wells in intact 400 acre patch of high quality habitat will preserve habitat values in that area and increase the potential for reclamation of the POD to functional sage-grouse habitat. |

| Resource/Species | Alternative A | Alternative C | Alternative D Sage Grouse emphasis |
|---|---|---|---|
| **West Nile Virus** | No Impact | No new reservoirs. Unlikely to have any effect on the overall spread of WNV. | Unlikely to have any effect on the overall spread of WNV. |
| **Water Resources** | | | |
| CBNG Produced Water | 0 gpm water produced | 2,403 gpm of produce water | |
| Groundwater | No Impact | | |
| Surface Water | No Impact | | |
| Long Term Disturbance | No Impact | | |

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.

## 6. CONSULTATION/COORDINATION

| Contact | Title | Organization | Present at Onsite |
|---|---|---|---|
| Mary Hopkins | SHPO Interim | WY SHPO | No |
| | | | |
| | | | |
| | | | |

## 7. 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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## 9. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

Dan Sellers, Natural Resource Specialist
Casey Freise, Supervisory Natural Resource Specialist
Chris Williams, Hydrologist
Stacy Gunderson, Civil Engineer
Matt Warren, Petroleum Engineer
Karen Klaashsen, Legal Instruments Examiner
Seth Lambert, Archaeologist
Bill Ostheimer, Wildlife Biologist
Kerry Aggen, Geologist
Brian Cox, Assistant Field Manager, Resources
Paul Beels, Associate Field Manager, Minerals & Lands
Duane W. Spencer, Field Manager

Interdisciplinary Team Lead: Dan Sellers

**Appendix A**
**Detailed Description of Alternatives B, C, D, and**
**Alternatives Considered but not Analyzed in Detail**
**Williams Production RMT Company**
**Kingwood 3**
**ENVIRONMENTAL ASSESSMENT –WY-070-09-148**

## 1. Alternative B - Proposed Action

Proposed Action Title/Type: Williams Production RMT's, Kingwood 3 Plan of Development (POD) for 37 coal bed natural gas well APD`s and associated infrastructure and rights-of-way applications:

Proposed Well Information: There were 37 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 from1 coal seam. Proposed well house dimensions are 6ft wide x 6ft length x 7 ft height and are fenced in with 16 ft x16 ft panels Well house color is Covert Green, selected to blend with the surrounding vegetation. Proposed wells are located as follows:

| | Well Name | Well # | Qtr/Qtr | Section | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 1 | KINGWOOD 3 BRUBAKER | 41-1 | NENE | 1 | 45N | 77W | WYW0266651 |
| 2 | KINGWOOD 3 BRUBAKER | 42-1 | SENE | 1 | 45N | 77W | WYW89851 |
| 3 | KINGWOOD 3 FEDERAL | 12-1* | SWNW | 1 | 45N | 77W | WYW89851 |
| 4 | KINGWOOD 3 FEDERAL | 21-1 | NENW | 1 | 45N | 77W | WYW89851 |
| 5 | KINGWOOD 3 FEDERAL | 14-1 | SWSW | 1 | 45N | 77W | WYW89851 |
| 6 | KINGWOOD 3 FEDERAL | 23-1 | NESW | 1 | 45N | 77W | WYW89851 |
| 7 | KINGWOOD 3 FEDERAL | 32-1 | SWNE | 1 | 45N | 77W | WYW0266651 |
| 8 | KINGWOOD 3 FEDERAL | 34-1 | SWSE | 1 | 45N | 77W | WYW89851 |
| 9 | KINGWOOD 3 FEDERAL | 23-2 | NESW | 2 | 45N | 77W | WYW146848 |
| 10 | KINGWOOD 3 FEDERAL | 14-2 | SWSW | 2 | 45N | 77W | WYW146848 |
| 11 | KINGWOOD 3 FEDERAL | 12-12 | SWNW | 12 | 45N | 77W | WYW89851 |
| 12 | KINGWOOD 3 FEDERAL | 21-12 | NENW | 12 | 45N | 77W | WYW89851 |
| 13 | KINGWOOD 3 FEDERAL | 32-12 | SWNE | 12 | 45N | 77W | WYW89851 |
| 14 | KINGWOOD 3 FEDERAL | 14-12 | SWSW | 12 | 45N | 77W | WYW146848 |
| 15 | KINGWOOD 3 FEDERAL | 23-12 | NESW | 12 | 45N | 77W | WYW146848 |
| 16 | KINGWOOD 3 FEDERAL | 41-12 | NENE | 12 | 45N | 77W | WYW89851 |
| 17 | KINGWOOD 3 FEDERAL | 12-26 | SWNW | 26 | 46N | 77W | WYW89858 |
| 18 | KINGWOOD 3 FEDERAL | 14-26 | SWSW | 26 | 46N | 77W | WYW89858 |
| 19 | KINGWOOD 3 FEDERAL | 21-26 | NENW | 26 | 46N | 77W | WYW89858 |
| 20 | KINGWOOD 3 FEDERAL | 23-26 | NESW | 26 | 46N | 77W | WYW89858 |
| 21 | KINGWOOD 3 FEDERAL | 32-26 | SWNE | 26 | 46N | 77W | WYW16066 |
| 22 | KINGWOOD 3 FEDERAL | 34-26 | SWSE | 26 | 46N | 77W | WYW40634 |
| 23 | KINGWOOD 3 FEDERAL | 41-26 | NENE | 26 | 46N | 77W | WYW16066 |
| 24 | KINGWOOD 3 FEDERAL | 43-26 | NESE | 26 | 46N | 77W | WYW40634 |
| 25 | KINGWOOD 3 FEDERAL | 12-27 | SWNW | 27 | 46N | 77W | WYW89858 |

| | Well Name | Well # | Qtr/Qtr | Section | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 26 | KINGWOOD 3 FEDERAL | 32-27 | SWNE | 27 | 46N | 77W | WYW89858 |
| 27 | KINGWOOD 3 FEDERAL | 41-27 | NENE | 27 | 46N | 77W | WYW89858 |
| 28 | KINGWOOD 3 FEDERAL | 23-35 | NESW | 35 | 46N | 77W | WYW89865 |
| 29 | KINGWOOD 3 FEDERAL | 32-35 | SWNE | 35 | 46N | 77W | WYW128464 |
| 30 | KINGWOOD 3 FEDERAL | 34-35 | SWSE | 35 | 46N | 77W | WYW89865 |
| 31 | KINGWOOD 3 FEDERAL | 41-35 | NENE | 35 | 46N | 77W | WYW128464 |
| 32 | KINGWOOD 3 FEDERAL | 43-35 | NESE | 35 | 46N | 77W | WYW89865 |
| 33 | KINGWOOD 3 FEDERAL | 12-35 | SWNW | 35 | 46N | 77W | WYW128464 |
| 34 | KINGWOOD 3 FEDERAL | 14-35 | SWSW | 35 | 46N | 77W | WYW89865 |
| 35 | KINGWOOD 3 FEDERAL | 21-35 | NENW | 35 | 46N | 77W | WYW128464 |
| 36 | KINGWOOD 3 FEDERAL | 32-10 | SWNE | 10 | 45N | 77W | WYW128464 |
| 37 | KINGWOOD 3 FEDERAL | 21-27 | NENW | 27 | 46N | 77W | WYW89858 |

Water Management Proposal: No new impoundments or outfalls were proposed for use in association with the water management strategy for the POD.

County: Johnson

Applicant: Williams Production RMT

Surface Owners: Clifford L. Brubaker & Valerie Brubaker (Cross C livestock),

Project Description:
The proposed action involves the following:

- Drilling of 37 total federal CBM wells in the Lower Big George coal zone to depths of approximately 1,666 feet

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

- Well metering shall be accomplished by telemetry/central metering facility/well visitation. Metering would entail multiple visits per month to each well and one visit per day to each central metering facility.

- A Water Management Plan (WMP) will use facilities approved and constructed as part of previous projects to manage water produced in the Upper Powder River watershed. Water will be stored in water impoundments, lost to channel infiltration in channels as it flows between reservoirs, or it will be discharged downstream.

- An unimproved and improved road network.

- Aboveground power lines were proposed with this POD. Aboveground 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 2 power drops.

- A storage tank of 1,000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 9 to 12 months. Fuel deliveries are anticipated to be 2 times per week. Noise level is expected to be 54 to 72 decibels at 100 feet distance or 61 to 82 decibels at 50 feet.

- A buried gas, water and power line network, and 4 central gathering/metering facilities.

- One Pump Station and associated pit.

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 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 COAs 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. Alternative C – Environmentally Preferred

### 2.1. Changes as a result of the on-sites

1. Well 14-1, was moved to reduce surface disturbance.
2. Well 23-1, was changed from a full pad to a smaller slotted pad, to reduce surface disturbance.
3. Well 34-1, was move to reduce surface disturbance.
4. Well 43-1, was moved to reduce impacts to sage-grouse and reduce surface disturbance.
5. Well 14-2, was moved to reduce surface disturbance.
6. Well 14-12, was moved to reduce surface disturbance.
7. Well 32-12, was moved to reduce surface disturbance.
8. Well 41-12 was moved to reduce surface disturbance.
9. Well 12-26, was changed from a pad to a slotted pad, to reduce surface disturbance.
10. Well 14-26, was changed from a pad to a slotted pad, to reduce surface disturbance.
11. Well 41-26, was moved to avoid a cultural site.
12. Well 43-26, was moved “out of line of sight” of a raptor nest.
13. Well 32-27, was changed from a pad to a slotted pad and the access road moved to reduce surface disturbance.

14. Well 41-27, was changed from a pad to a slotted pad, to reduce surface disturbance.
15. Well 12-35, was moved "out of line of sight" of a raptor nest.
16. Well 14-35, was changed from a pad to a slotted pad, to reduce surface disturbance.
17. Well 21-35, and its access corridor were moved to reduce surface disturbance.
18. Well 32-10, was dropped, due to the amount of disturbance associated with access.
19. Well 21-27, was dropped due to potential negative impacts to a golden eagle nest.
20. Well and access corridors for wells 14-2, 23-2, 12-27 and the 32-27 will have a "site specific reclamation plan" developed for them.
21. Proposed above ground power lines will be buried. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 2 power drops.

### 2.2. Description of Mitigation Measures (applied as Conditions of Approval):

The operator is responsible for the COAs attached to this EA and will be issued an Incident of Non-Compliance if found to be in violation of any COA.

## 3. Programmatic and Site specific mitigation measures, Alternative C

### 3.1. 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.

#### 3.1.1. Wildlife

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

2. 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. 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.

##### 3.1.1.1. Threatened, Endangered, or Sensitive Species

###### 3.1.1.1.1. Bald Eagle

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

2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.

3. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimal disturbance buffer zone of one mile will be established for all bald eagle nest sites (February 15 – August 15).

4. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle 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.

5. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).

6. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

#### 3.1.2. 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.

#### 3.1.3. Water Management

##### 3.1.3.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which was approved September, 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM requires that operators comply with the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

##### 3.1.3.2. Surface Water

1. Channel Crossings:
   a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

#### 3.1.1.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.

#### 3.1.2. Wetland/Riparian

1. 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.

2. No waste material will be deposited in riparian areas, floodplains or in natural drainage ways.

3. Soil or other material stockpiles will be located outside active floodplains.

4. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.

5. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

### 3.2. Site Specific Conditions of Approval, Alternative C

#### 3.2.1. General

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

#### 3.2.2. Surface Use

1. Because of the extent of "poor reclamation potential", shallow soils and steep terrain, the entire POD will have all surface disturbing activities stabilized during and within 30 days of the start of construction.
2. Need to include a "Site Specific Reclamation Plan" for well 23-2 and the access corridor running NE in the draw.
3. Wells 23-1, 42-1, 14-2, 12-26, 32-26, 12-27, 32-27, 14-35 and their access corridors, maintain a 20 foot, undisturbed, vegetated buffer near slopes and draws.
4. The operator will drill or broadcast seed, then rake, on the contour to a depth of less than 0.5 inch, followed by cultipaction to compact the seedbed and minimize 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 seed mix desired by the surface owner, use the following:

**10-14" Precipitation Zone**

**Use this seed mix for all Shallow Loamy/Loamy sites:**

| Shallow Loamy Ecological Site Seed Mix | | |
|---|---|---|
| **Species** | **% in Mix** | **Lbs PLS*** |
| ***Thickspike Wheatgrass*** (Elymus lanceolatus ssp. lanceolatus) | 50 | 6.0 |
| ***Bluebunch wheatgrass*** (Pseudoroegneria spicata ssp. Spicata) | 35 | 4.2 |
| ***Prairie coneflower*** (Ratibida columnifera) | 5 | 0.6 |
| ***White or purple prairie clover*** (Dalea candidum, purpureum) | 5 | 0.6 |
| ***Rocky Mountain beeplant*** (Cleome serrulata) | 5 | 0.6 |
| Chapter 2 Totals | **100%** | **12 lbs/acre** |

**Use the following seed mix for all Shallow Sandy/Sand sites:**

| Shallow Sandy Ecological Site Seed Mix | | |
|---|---|---|
| **Species** | **% in Mix** | **Lbs PLS*** |
| ***Thickspike Wheatgrass*** (Elymus lanceolatus ssp. lanceolatus) | 25 | 3.0 |
| ***Bluebunch Wheatgrass*** (Pseudoroegneria spicata ssp. Spicata) | 25 | 3.0 |
| ***Prairie sandreed*** (Calamovilfa longifolia) | 35 | 4.2 |
| ***Prairie coneflower*** (Ratibida columnifera) | 5 | 0.6 |
| ***White or Purple Prairie Clover*** (Dalea candidum, purpureum) | 5 | 0.6 |
| ***Blue flax***(Linum lewisii) | 5 | 0.6 |
| Chapter 3 Totals | **100%** | **12 lbs/acre** |

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

### 3.2.3. Civil Engineering

1. The operator will install, 15 mile per hour speed limit signs to inform travelers of the speed limit enforced. The following roads will have a 10 mph design speed posted on both sides of the road to inform travelers of the reduced stopping sight distance and reduced meeting sight distance:
   a) 14-26-4677
   b) 14-35-4677
   c) 41-27-4677

2. Turnouts will be provided on single lane roads for opposing traffic. They will be placed every 1000' or visible in both directions, whichever is less, per BLM Manual 9113 .45 E 7
3. All Low Water Crossings will be upgraded to template design (i.e. spot upgrade for the LWC's). All LWC's will require filter fabric that will be keyed in above the 25-year high water level. The filter fabric will overlap a minimum of 18" at all joints. As well, the rock rip-rap will be keyed into the native ground. The stream bed will be prepared according to the textile manufacturer's specifications.
4. Before any road work starts the top soil must be moved to the side of the road and stored for future use during interim reclamation
5. All engineered road segments must be completed, including any culverts, low water crossings and required surfacing, before the drilling rig or other drilling equipment moves onto the pad.
6. The proposed crown and ditch road that originates in the NE corner of the NW corner of Section 36 and extends through Sections 36, 35, 34, and 27 will have aggregate surfacing material that meets the grading requirement for Grading W as outlined in the Wyoming Highway Department's "Standard Specification for Road and Bridge Construction."

### 3.2.4. Wildlife

#### 3.2.4.1. Bald Eagle

1) No project related actions shall occur within one mile of The Powder River or Willow Creek from November 1 through April 1, annually, prior to a winter roost survey, or from February 1 through August 15, annually, prior to a nesting survey. All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive.

2) If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.

3) If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile will be established for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle nest sites (February 1 - August 15). The access from Brubaker Bridge across the Powder River to section 21 T46N, R77W will be restricted due to the Brubaker bald eagle nest. There is to be no disturbance to the nesting eagles from project related travel on that route from February 1 to August 15, or until completion, submission, and review of nesting surveys.

Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have an adverse affect to bald eagles or their habitat.

#### 3.2.4.2. Greater Sage-Grouse

1) No surface disturbing activities are permitted for the following wells and access corridors from 1 March to 15 June for the life of the project. 34-1, 42-1, 14-26, 43-26, 12-35, 21-35.

2) A sage-grouse lek survey will be conducted for all known leks within 2 miles of the POD by a biologist following the most current WGFD protocol. All survey results shall be submitted annually, in writing, to a Buffalo BLM biologist by 31 July. Currently, this includes the Gilkie Ranch, Kauffman Draw, Upper Kauffman Draw, and Cottonwood leks but will also include any new leks discovered over the life of the project.

3) If an active lek is identified within 0.25 miles of any project-related activities, no surface disturbing activities will be allowed within 0.25 miles of the lek between 1 March and 15 June.

4) Maximum design speed on all operator-constructed and maintained roads (except county roads) will not exceed 25 miles per hour except travel along roads within 0.5 miles of any known leks.

#### 3.2.4.3. Raptors

1) No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from 1 February through 31 July, annually, prior to a raptor nest occupancy survey. Surveys shall be conducted by a biologist following the most current BLM protocol. All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities. A 0.5 mile timing restriction will be applied if a nest is identified as active. This timing limitation will affect the wells and infrastructure depicted on the Arcadis U.S Raptor COA map dated 9/9/9. This map will be updated yearly and submitted by May 15 each year that surface disturbance is to occur during the nesting season (February-August).

2) Surveys for new raptor nests shall be conducted, annually, within 0.5 miles of the POD boundary on or after 15 April, and prior to or during the first nest occupancy check.

3) Nest occupancy checks shall be completed for all raptor nests identified within a 0.5 mile of any infrastructure associated with the POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy checks shall continue for the first five years on all identified nests within a 0.5 mile of the POD boundary. Survey results will be submitted to a Buffalo BLM biologist in writing no later than 31 July of each survey year.

4) 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.

### 3.2.5. Cultural

All surface disturbing activity in the following areas will be monitored by a BLM cultural resource use permit (CRUP) holder or permitted crew chief. The Bureau has identified these areas as having a high potential for buried cultural deposits. Some portions of the monitoring areas as described may lie outside alluvial deposits and exact monitoring areas are left to the discretion of the archeological monitor. All monitored areas must be plotted on the map provided with the monitoring report. The submission of two copies of a monitoring report to BFO is required within 30 days of the completion of all monitoring work.

1. All surface disturbing activity associated with construction of infrastructure for the12-27 well (NW Sec27 46-77) when the disturbance occurs in alluvial deposits of Windmill Draw. This includes the proposed utilities that run from the KU 23-22-4677 well to the 12-27 well.
2. All surface disturbing activity that occurs in alluvial deposits in Sec2 45-77.
3. All surface disturbing activity associated with construction of the proposed water line in Sections 14 and 15 45-77 when the disturbance occurs in alluvial deposits of Willow Creek.
4. All surface disturbing activities within the site boundary of 48JO1464 will be monitored. Additionally, no surface disturbing activities will occur within 20’ (or the edge of existing disturbance, whichever is closer) of the site feature. The CRUP archaeologist will mark the boundary distance and the operator will install temporary fencing to ensure damage to the resource does not occur. This will require that the proposed utilities be installed on the south side of the road.

Please contact Dan Sellers, Natural Resource Specialist, at (307) 684-1132, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

## 4. Programmatic and Site Specific Mitigation Measures Alternative D-Sage-Grouse Emphasis

The project-level modifications identified for the Kingwood 3, Alternative D, are listed below:

- Burying existing overhead power to remove vertical intrusions.

The site-specific level modifications identified for the Kingwood 3 **A**lternative D, are listed below:

- Remove two wells, 41-35 and 34-26, to maintain continuity of the largest intact patch of nesting habitat.
- Limit production visits to once a month.
- Muffle the compressor battery in section 7 T45N, R76W.
- Prohibit surface disturbance (for brood rearing) from March 15 to June 30 for 23-2 and 14-2 wells.

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 or minimize environmental effects of the operator's proposal.

### 4.1. Programmatic and Site specific mitigation measures

All programmatic and site specific measures from Alternative C apply.

## 5. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposals (Alternative C and Alternative D) are presented below.

**Table 5.1 Summary of the Alternatives**

| Facility | Alternative A (No Action) Existing Number/ Acres/Miles | Alternative B (Original Proposal) Proposed Number/ Acres/Miles | Alternative C (Environmental Alt.) Revised Number/ Acres/Miles | Alternative D (Environmental Alt.2) Revised Number/ Acres/Miles |
|---|---|---|---|---|
| Total CBNG Wells | 1 | 37 | 35 | 33 |
| Well Locations<br>Non-constructed<br>Constructed<br>Slotted | 0.2 ac. | 25 @ 0.2 ac./well=5ac.<br>12 @ 0.7 ac./well=12.7ac. | 3 @ 0.7ac/well=2.1ac.<br>32 @ 0.2ac/well=6.4ac. | 3 @ 0.7ac/well=2.1ac.<br>30 @ 0.2ac/well=6ac. |
| Conventional Wells | 1 @ 0.65 ac. | 0 | 0 | 0 |
| Gather/Metering Facilities<br>Number of Facilities<br>Acreage of Facilities | 0 | 4 @ 0.9 ac each<br>3.6 ac. | 4<br>3.6ac. | 4<br>3.6ac. |
| Compressors<br>Number of Compressors | 0 | 0<br>0.0 | 0<br>0.0 | 0<br>0.0 |
| Ancillary<br>(Staging/Storage Areas) | 0 | Included with Metering Facilities | Included with Metering Facilities | Included with Metering Facilities |
| Template/<br>Spot Upgrade Roads<br>No Corridor<br>With Corridor | 3.3 mi. @ 16’ width | 4.6 mi. @ 80’ width=38ac. | 0.76mi. @ 16’ width=1.5ac.<br>5.5 mi. @ 60’=40ac. | 0.76mi. @ 16’ width=1.5ac.<br>5.5 mi. @ 60’=40ac. |
| Engineered Roads<br>No Corridor<br>With Corridor | 0 | 1.3 mi. widths vary=6ac. | 1.3 mi. width varies=6ac. | 1.3 mi. width varies=6ac. |

| Facility | Alternative A (No Action) Existing Number/ Acres/Miles | Alternative B (Original Proposal) Proposed Number/ Acres/Miles | Alternative C (Environmental Alt.) Revised Number/ Acres/Miles | Alternative D (Environmental Alt.2) Revised Number/ Acres/Miles |
|---|---|---|---|---|
| Primitive Roads<br>No Corridor<br>With Corridor | 1.5 mi. @ 40' width | 11.7 mi. @ 40' width=56.7ac. | 7 mi. @ 30' width=29.8ac. | 6.4 mi. @ 30'width=23.3ac. |
| Buried Utilities<br>No Corridor<br>With Corridor | 0 | 0 | 0.1 mi. @ 20'width=0.24ac.<br>1.3 mi. @ 20' width=3.2ac. | 0.1 mi. @ 20'width=0.24ac.<br>1.3 mi. @ 20' width=3.2ac. |
| Burried Pipeline<br>No Corridor<br>With Corridor | 0 | 0 | 0 | 0 |
| Overhead Powerlines | 1.1 mi.@ 30' width=4ac. | 1.1 mi. @ 30' width=4ac. | 0 | 0.0 |
| Communication Sites | 0 | 0 | 0 | |
| Monitor Wells | 0 | 0 | 0 | 0 |
| Land Application Disposal | 0 | 0 | 0 | 0 |
| Subsurface Drip Irrigation | 0 | 0 | 0 | 0 |
| Treatment Facilities | 0 | 0 | 0 | 0 |
| Impoundments<br>On-channel<br>Off-channel<br>Lined<br>Unlined | 0<br>0<br>0 | 0<br>0<br>0 | 0<br>0<br>0 | 0<br>0<br>0 |
| Water Discharge Points | 0 | 0 | 0 | 0 |

| Facility | Alternative A (No Action) Existing Number/ Acres/Miles | Alternative B (Original Proposal) Proposed Number/ Acres/Miles | Alternative C (Environmental Alt.) Revised Number/ Acres/Miles | Alternative D (Environmental Alt.2) Revised Number/ Acres/Miles |
|---|---|---|---|---|
| Channel Disturbance | 0 | | | |
| Headcut Mitigation | | 0.0 | 0.0 | 0.0 |
| Channel Modification | | 0.0 | 0.0 | 0.0 |
| **TOTAL ACRES DISTURBANCE** | **17.15 acres** | **126 acres** | **92.8 acres** | **85.9acres** |