

**DECISION RECORD
FOR
Fidelity Exploration and Production
Hill Prong North Plan of Development
ENVIRONMENTAL ASSESSMENT –WY-070-11-045**

DECISION:

The BLM approves Fidelity Exploration and Production’s (Fidelity) Hill Prong North coalbed natural gas (CBNG) plan of development (POD) as described in Alternative B of the environmental assessment (EA) WY-070-11-045. This POD includes: 5 applications for permit to drill (APDs), a water management plan (WMP) for the use of federal water in 5 impoundments, associated infrastructure.

Compliance. This decision complies with:

- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701).
- Mineral Leasing Act of 1920 (30 U.S.C. 181); to include On Shore Order No. 1.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- Migratory Bird Treaty Act (16 USC 703).
- Bald and Golden Eagle Protection Act (BGEPA) (16 USC 703).
- Powder River Basin Final Environmental Impact Statement (PRB FEIS), April 2003.
- Buffalo Resource Management Plan (RMP) 1985, Amendments 2001, 2003.
- DOI Order 3310.

Details of the approval of Alternative B are summarized below. The project description, including specific changes made at the onsites, and site-specific mitigation measures, is included in the EA, p. 6.

Well Sites:

BLM approves the following 5 APDs and associated infrastructure:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Hill Prong North Carter Fed	12-0871*	SWNW	8	57	81	WYW175191
2	Hill Prong North Carter Fed	21-0871	NENW	8	57	81	WYW175191
3	Hill Prong North Carter Fed	41-0871	NENE	8	57	81	WYW175191
4	Hill Prong North Carter Fed	12-0971	SWNW	9	57	81	WYW175191
5	Hill Prong North SRCattle Fed	12-1771	SWNW	17	57	81	WYW155749

* BFO internal identification

Water Management:

BLM approves the use of federal water in the following water management infrastructure:

	Facility Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (acre feet)	Surface Disturbance (acres)	Lease #
1	14-0971	SWSW	9	57	81	33.92	4.71	NA
2	33S-1671	NWSE	16	57	81	52.67	7.2	NA
3	44-0771	SESE	7	57	81	41.26	4.3	NA
4	44-1671	SESE	16	57	81	44.18	6.1	NA
5	Kane 07-07-5781	NENE	7	57	81	104	9.3	NA

Limitations: See conditions of approval (COAs) associated with the EA.

THE FINDING OF NO SIGNIFICANT ACTION. Analysis of Alternative B of the EA, WY-070-11—45, and the FONSI found the POD will have no significant impacts on the human environment, beyond those described in the PPRB FEIS thus an EIS is not required.

COMMENT OR NEW INFORMATION SUMMARY.

Scoping was discussed in the EA, Section 1.5, and is incorporated here by reference. Since early development of the Hill Prong North proposal BLM received FWS coordination on eagles and a new Interior Department policy on wilderness.

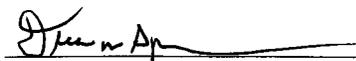
DECISION RATIONALE:

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

1. Mitigation measures were included to reduce environmental impacts while meeting the project's purpose and need. For a complete description of all site-specific COA's associated with this approval, see the COAs associated with the EA. The operator incorporated several measures to alleviate resource impacts into their Master Surface Use Plan (MSUP), submitted on 07-23-2010. Refer to the MSUP for complete details of operator committed measures.
2. The selected alternative will not result in any undue or unnecessary environmental degradation.
3. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State, and Local laws and regulations (MSUP pg. 4).
 - 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 (MSUP pg. 4) .
 - Offer water well agreements to the owners of record for permitted water wells within 0.5 mile of a federal CBNG producing well in the POD (MSUP pg. 4) .
 - Provide water analysis from a designated reference well in each coal zone (MSUP pg. 49).
4. The Operator certified it has a Surface Use Agreement with the Landowners (MSUP Appendix A-1).
5. The Hill Prong North POD area is clearly lacking in wilderness characteristics as it contains no federal surface.

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

3/25/11

Date

**FINDING OF NO SIGNIFICANT IMPACT
FOR
Fidelity Exploration and Production
Hill Prong North Plan of Development
ENVIRONMENTAL ASSESSMENT –WY-070-11-045**

FINDING OF NO SIGNIFICANT IMPACT:

On the basis of the information contained in the environmental assessment (EA) (WY-070-11-045), and all other information available to me, it is my determination that:

- 1) the approval of Alternative B will not have significant environmental impacts beyond those already addressed in Powder River Basin Environmental Impact Statement (PRB EIS) to which the EA is tiered;
- 2) Alternative B is in conformance with the Buffalo Field Office Resource Management Plan (RMP) (1985, 2001, 2003); and
- 3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Therefore, an environmental impact statement is not necessary and will not be prepared.

This finding is based on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), both with regard to the context and to the intensity of the impacts described in EA WY-070-11-045, which is incorporated here by reference.

CONTEXT:

Mineral development (coal, oil and gas, bentonite, and uranium) is a long-standing and common land use within the PRB. More than 40% of the nation's coal production comes from the PRB. The PRB FEIS reasonably foreseeable development predicted and analyzed the development of 51,000 coalbed natural gas (CBNG) wells and 3,200 oil wells (PRB FEIS ROD pg. 2). The additional CBNG development approved in Alternative B is insignificant within the national, regional, and local context.

INTENSITY:

The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment (EA, Sec 4). Design features and mitigation measures were included in Alternative B to prevent significant adverse environmental effects, (EA, Sec 2.2).

The preferred alternative does not pose a significant risk to public health and safety. The geographic area of the activity does not contain unique characteristics identified within the RMP, 2003 PRB FEIS, or other legislative or regulatory processes.

Relevant scientific literature and professional expertise were used in preparing the EA. The scientific community is reasonably consistent with their conclusions on environmental effects relative to oil and gas development. Research findings on the nature of the environmental effects are not highly controversial, highly uncertain, or involve unique or unknown risks.

CBNG development of the nature proposed with this project and similar projects was predicted and analyzed in the PRB FEIS; the selected alternative does not establish a precedent for future actions with significant effects.

There are no cultural or historical resources present that will be adversely affected by the selected alternative (EA, Sec. 4.2.6). The project area is clearly lacking in wilderness characteristics as it has no public land. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected (EA, Sec. 4.2.3.1). The selected alternative will not have any anticipated effects that would threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment

John W. Ap
Field Manager

3/25/11
Date

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Fidelity Exploration and Production
Hill Prong North
COALBED NATURAL GAS PLAN OF DEVELOPMENT
ENVIRONMENTAL ASSESSMENT –WY-070-11-045**

1. 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 (EIS) 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) and on our website. This project environmental assessment (EA) analyzes site-specific resources and impacts that were below the level of the broader analysis of the PRB FEIS.

1.1. Background

Fidelity Exploration and Production (Fidelity) submitted the Hill Prong North POD (plan of development) on 07-23-2010 to the BFO with 5 applications for permit to drill (APD's) to develop and produce natural gas resources within coal bearing formations of the Powder River Basin (PRB).

The operator collaborated with the BLM in the planning of the POD. Representatives met with the BLM to discuss the locations of the wells and infrastructure. The well sites were visited prior to POD preparation on 03-31-2010. Once the POD was submitted, additional onsite visits were conducted on 10-20-2010 and 02-16-2011 to evaluate the final proposal which included modifications that alleviated environmental impacts. BLM sent post-onsite deficiencies on 10-14 and 10-28-2010. The project proposal and APDs were complete when BLM received the operator's response to the post onsite deficiencies on 11-24-2010. Proposed COAs were sent to the operator on 12-17-2010.

1.2. Purpose and Need for the Proposed Action

The purpose and need for the action is the requirement to obtain approval for the development of an Oil and Gas Lease through an APD on public lands managed by the BLM under Onshore Order No. 1, pursuant to the authority of the Mineral Leasing Act, as amended and supplemented, (30 U.S.C. 181 et seq.) and prescribed in 43 CFR Part 3160, the Federal Land Policy Management Act (FLPMA), and other laws and regulations in manners that advance mineral recovery and environmental protection.

1.3. Decision to be Made

The BLM will decide whether or not to approve the proposed development of oil and gas resources on the federal leasehold, and if so, under what terms and conditions.

1.4. Conformance with Land Use Plan and Other Applicable Laws, Regulations, and Policies

The proposed action conforms to the terms and the conditions of the 1985 Buffalo RMP, Amendment of 2001, and the 2003 PRB FEIS & RMP Amendment. The proposed action is in compliance with all Federal laws, regulations, and policies. This includes, but is not limited to, the FLPMA (1976), the National Historic Preservation Act, the Endangered Species Act (1973), the Migratory Bird Treaty Act (1918), the Clean Water Act (1972), the Clean Air Act (1970), and the National Environmental Policy Act (1969).

1.5. Scoping and Issues

External scoping was not conducted for this EA. Extensive external scoping was conducted for the PRB FEIS and is discussed beginning on pg. 15 of the ROD and beginning on pg. 2-1 of the FEIS. This action is similar in scope to the numerous other CBNG PODs that BFO analyzed. External scoping would unlikely identify new issues - as was verified by the POD EAs that were externally scoped such as the Clabaugh POD (WY-070-EA08-134) and Hollcroft/Stotts Draw POD (WY-070-EA07-021).

The BLM interdisciplinary team (ID team) conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resource and land uses. Appendix B identifies those resources and land uses present and affected by the proposed action; those resources and land uses that are either not present, not affected, or were adequately covered by the PRB FEIS will not be discussed in this EA. The ID team identified significant issues for the affected resources to further focus the analysis. This EA addresses those site-specific impacts that were not disclosed within the PRB FEIS that would help in making a reasoned decision or may be related to a potentially significant effect. Issues for this project include:

- **Soils and vegetation:** invasive species
- **Wildlife:** raptor productivity, greater sage-grouse lek occupancy and persistency
- **Water:** ground water depletion, quality and quantity of produced water
- **Social and Economic:** revenue potential, local economics.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Two alternatives, A and B, were evaluated. A brief description of each alternative is included in the following sections. Programmatic Mitigation Measures, as determined in PRB FEIS Record of Decision apply to all alternatives, including the No Action Alternative (Alternative A), and are included in Appendix A. Standard Mitigation Measures, Operator-committed Mitigation Measures, and site-specific Conditions of Approval (COAs) would apply only to action alternatives (Alternative B) and also are included in Appendix A.

2.1. Alternative A - No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1, pp. 2-54 to 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, BLM would deny the operator’s proposal.

2.2. Alternative B - Operator Proposed Action

Alternative B contains complete APDs and is based on the operator and BLM working to reduce environmental impacts. This alternative summarizes the POD as it was finally, after site visits, submitted to the BLM by Fidelity on 12-15-10.

Proposed Action Title/Type: Fidelity Exploration and Production’s Hill Prong North CBNG POD.

Proposed Well Information: There are 5 wells proposed within this POD; the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from up to 12 coal seams. Proposed fenced well dimensions are 10 ft wide x 15 ft length x 4 ft height. Wells will be blanketed with a heating sleeve which is Covert Green, selected to blend with the surrounding vegetation. There will be no well house. A list of proposed wells is included in Table 2.1.

Table 2.1 Proposed Wells – Alternative B

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	Hill Prong North Carter Fed	12-0871*	SWNW	8	57	81	WYW175191
2	Hill Prong North Carter Fed	21-0871	NENW	8	57	81	WYW175191
3	Hill Prong North Carter Fed	41-0871	NENE	8	57	81	WYW175191
4	Hill Prong North Carter Fed	12-0971	SWNW	9	57	81	WYW175191
5	Hill Prong North SRCattle Fed	12-1771	SWNW	17	57	81	WYW155749

* BFO internal identification

Water Management Proposal (WMP): Table 2.2 includes the water management infrastructures proposed for use in association with this POD.

Table 2.2 Proposed Water Management Facilities – Alternative B

	Facility Name / Number	Qtr/Qtr	Sec	TWP	RNG	Capacity (acre feet)	Surface Disturbance (acres)	Lease #
1	14-0971	SWSW	9	57	81	33.92	4.71	NA
2	33S-1671	NWSE	16	57	81	52.67	7.2	NA
3	44-0771	SESE	7	57	81	41.26	4.3	NA
4	44-1671	SESE	16	57	81	44.18	6.1	NA
5	Kane 07-07-5781	NENE	7	57	81	104	9.3	NA

County: Sheridan

Applicant: Fidelity Exploration and Production

Surface Owners: Kane, Carter, Hutton

Drilling and Construction:

- Wells will be drilled to multiple coal zones (see table below) and production commingled.

Coal Zone	Depth to Coal Top, feet	Predicted Thickness, feet
Smith	572 to 762	3
Dietz 1	674 to 869	22
Dietz 3	849 to 1064	13
Monarch	1018 to 1232	12
Carney	1190 to 1383	21

- 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 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. Site visit may be made 1 to 2 times per week or 4 to 6 times per month to each well for routine maintenance checks.
- A WMP that involves the following infrastructure and strategy: 5 existing discharge points and 5 existing off channel pits within the Upper Tongue River that would provide full containment of

discharged water from this POD. The operator obtained a Wyoming Pollutant Discharge Elimination System (WYPDES) permit from the Wyoming Department of Environmental Quality (WDEQ) for the discharge of water produced from this project. Alternatively, the operator may use 1 of 3 permitted injection wells, existing land application or subsurface drip irrigation to dispose of the water.

- A road network consisting of 0.3 miles of improved road and 1.7 miles of primitive road.
- A buried gas, water and power line network, and no new central gathering/metering facilities and no new compression facilities.

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

2.3. Alternatives Considered but Not Analyzed in Detail

Fidelity submitted the original POD for the Hill Prong North 7-23-10 with 5 APDs. Prior to submittal, Fidelity and the BLM coordinated to identify the most appropriate access routes and well locations. After submittal, additional onsite visits occurred between BLM and Fidelity based on the initial project proposal. Access routes were relocated to minimize proximity to and potential disturbance to eagle roosting and raptor nesting locations. A new location for the 12-0871 well and an alternate route from the 12-0871 well to the 21-0871 well were discussed at the February 16 onsite visit. However, it was determined that the additional mitigation measures proposed by Fidelity would help to alleviate impacts from this infrastructure, and that relocating these features was not warranted.

The above changes as documented in a revised project description provided as Fidelity's response to BLM's deficiency letter, resulted in a refined proposed project, which is discussed in this document as Alternative B. The initial POD, the post-onsite deficiency letter, and the company's response to the deficiency letter are included in the project administrative record, available for review at the BFO.

2.4. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure proposed by the operator (Alternative B) are presented in Table 2.3.

Table 2.3 Summary of Alternatives

Facility	Alternative A (No Action) Existing Number/ Acres/Miles	Alternative B (Operator Proposal) Proposed Number/ Acres/Miles
Total CBNG Wells	0	5
Well Locations		
Nonconstructed	0	5 (1.7 acres)
Constructed		
Slotted		
Conventional Wells	0	0
Number of Gather/Metering Facilities	0	0
Compressors	0	0
Number of Ancillary Facilities (Staging/Storage Areas)	0	0
Acres (Miles) of Template/ Spot Upgrade Roads		
No Corridor	0	0
With Corridor	0	0
Acres (Miles) of Engineered Roads		
No Corridor	0	0
With Corridor	0	0.3 (1.4 acres)
Acres (Miles) of Primitive Roads		
No Corridor	0	0
With Corridor	0	1.7 (5.8 acres)
Miles of Buried Power		
No Corridor	0	1.0
With Corridor	0	2.0 (1.2 acres)
Miles of Pipeline		
No Corridor	0.4 (0.5 acres)	0
With Corridor	0	0.1(0.1 acre)
Miles of Overhead Powerlines	1.5 (7.7 acres)	0.0
Number of Communication Sites	0	0
Number of Monitor Wells	0	0
Acres of Land Application Disposal	50 Acres	0
Acres of Subsurface Drip Irrigation	0	0
Number of Treatment Facilities	0	0
Number of Impoundments		
On-channel	0	0
Off-channel	5 (31.6 acres) Outside POD	0
Lined	1	0
Unlined	4	0
Water Discharge Points	5	0
TOTAL ACRES DISTURBANCE	58.2	10.2

3. DESCRIPTION OF AFFECTED ENVIRONMENT

This section describes the environment affected by implementation of the proposed alternatives described in Section 2. Aspects of the affected environment described here focus on the relevant major issues. A screening of all resources and land uses potentially affected is included in Appendix B. Resources that would be unaffected, or not affected beyond the level analyzed within the PRB FEIS, are not discussed within the EA.

Applications to drill were received on 07/23/2010. Field inspections of the proposed Hill Prong North CBNG project were conducted on 10/20/2010 and 02-16-2011. Personnel attending the field inspections are identified in section 5, Consultation and Coordination.

3.1. Project Area Description

The Hill Prong North POD is located along Badger Creek in north central Sheridan County, WY, situated on either side of the Badger Creek floodplain in mostly flat topography. Elevations in the area range from 3720 to 4020 feet above sea level. Sheridan County Road 122 (Badger Creek Road) provides the primary access to the project. Flatter areas throughout the region are irrigated for hay production.

There are 2 residences located along the county road outside the northern portion of the POD. There is also 1 occupied ranch to the south west of the POD. Project area surface estate is all privately held.

There are no active permitted mineral or gravel extraction projects in the immediate area. Primarily, this area was historically used for ranching activity and stock raising; but experienced development for coal bed natural gas production in recent years, with wells existing on most of the fee locations at 80 acre spacing intervals.

Adjacent to the POD boundary on the north is an active game ranch which introduced elk.

3.2. Soils, Vegetation, and Ecological Sites

3.2.1. Soils

The PRB is composed of relatively young soils which have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams. Soils have surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive, though varies with texture, slope and other characteristics. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 2 inches on ridges to 8+ inches in bottomland.

The map unit symbols for the soils identified above for the identified soil map unit symbols found within the POD boundary are listed in Table 3.1 below. Ecological Site Descriptions are soil and vegetation community descriptions compiled by the Natural Resources Conservation Service (NRCS) for the purpose of resource identification, and providing management and reclamation recommendations.

Table 3.1 Dominant Soils Affected by the Proposed Action

Map Unit	Map Unit Name	Acres	Percent
269	SHINGLE-THEEDLE-KISHONA ASSOCIATION, MOIST, 3 TO 30 PERCENT SLOPES	138	31
261	SHINGLE, MOIST-ROCK OUTCROP COMPLEX, 30 TO 50 PERCENT SLOPES	82	19
320	ZIGWEID-KISHONA-CAMBRIA LOAMS, MOIST, 6 TO 9 PERCENT SLOPES	57	13

Map Unit	Map Unit Name	Acres	Percent
193	NUNCHO LOAM, 3 TO 6 PERCENT SLOPES	48	11
115	BIDMAN, MOIST-ULM LOAMS, 0 TO 6 PERCENT SLOPES	28	6
317	ZIGWEID-KISHONA-CAMBRIA COMPLEX, 6 TO 15 PERCENT SLOPES	28	6
117	CAMBRIA-FORKWOOD COMPLEX, 0 TO 15 PERCENT SLOPES	23	5
260	SHINGLE-ROCK OUTCROP COMPLEX, 30 TO 50 PERCENT SLOPES	23	5
114	BIDMAN-ULM, DRY, COMPLEX 0 TO 6 PERCENT SLOPES	14	3

Soils within the project area were identified from the Sheridan County Survey Area, Wyoming (WY633).

The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

There are areas within the POD boundary that are susceptible to erosion and areas that have steep slopes, but the operator has planned the project so that there construction will not impact those areas. There are also small areas within and surrounding the POD boundaries that would be classified as wetland or riparian areas. However, the operator will not disturb these areas with this project.

3.2.1.1. Invasive Species

A database containing invasive species locations and other data is maintained by the Wyoming Energy Resource Information Clearinghouse (WERIC). The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. The potential for infestations of leafy spurge was identified by a search of the WERIC database (www.weric.info).

Additionally, the operator or BLM confirmed the following infestations and/or documented additional weed species during field investigations:

- Cheat grass
- Canada thistle

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).

3.2.2. Ecological Sites

Ecological Site Descriptions (Table 3.2) provide site and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area for this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information.

Table 3.2 Map Units and Ecological Sites

Map Unit	Ecological Site
114	Loamy
115	Loamy
117	Loamy
193	Loamy
260	Shallow Loamy
261	Shallow Loamy

Map Unit	Ecological Site
269	Loamy
317	Loamy
320	Loamy

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure are Loamy and Shallow Loamy.

Loamy Ecological Sites: The landforms and soils of this site are deep to moderately deep (greater than 20" to bedrock), well-drained and moderately permeable. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. These layers consist of the A horizon with very fine sandy loam, loam, or silt loam texture and may also include the upper few inches of the B horizon with sandy clay loam, silty clay loam or clay loam texture.

This site has land ranging from level to having 50% slopes. Landforms common are hill slopes with associated alluvial fans and stream terraces. The main soil limitations are landslides may occur on all slopes, but they are dominant on the steep and very steep slopes that have a south or east facing aspect.

Mixed Sagebrush/Grass Plant Community

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

Dominant grasses include needleandthread, western wheatgrass, and green needlegrass. Grasses of secondary importance include blue grama, prairie junegrass, and Sandberg bluegrass. Forbs commonly found in this plant community include plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear can also occur.

When compared to the Historic Climax Plant Community, sagebrush and blue grama increased. Production of cool-season grasses, particularly green needlegrass, is reduced. The sagebrush canopy protects the cool-season mid-grasses, but this protection makes them unavailable for grazing. Cheatgrass (downy brome) has invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope. This plant community is resistant to change. A significant reduction of big sagebrush can only be accomplished through fire or brush management. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

Shallow Loamy Ecological Sites: These sites are similar to Loamy sites, except that 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. This site occurs on steep slopes and ridge tops, but may occur on all slopes, hill sides, ridges and escarpments. 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.

Mixed Sagebrush/Grass Plant Community

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

Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, and blue grama. Grasses of secondary importance include little bluestem, prairie junegrass, and Sandberg bluegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Big sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur.

When compared to the Historical Climax Plant Community, big sagebrush and blue grama have increased. Bluebunch wheatgrass has decreased, often occurring only where protected from grazing by the sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the state. The overstory of big sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope.

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

A summary of the ecological sites within the project area are listed in Table 3.3 along with the individual acreage and the percentage of the total area identified within the POD boundary.

Table 3.3 Summary of Ecological Sites

Ecological Site	Acres	Percent
Loamy	335.7	76.3
Shallow Loamy	104.2	23.7

PRIME AND UNIQUE FARMLAND: The POD contains 48 acres of prime farmland soil mapping units (designated by the USDA-NRCS). Prime farmland is land having the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding (USDA-NRCS, 2003).

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).

Hayden-Wing Associates, LLC (HWA) performed habitat assessments and wildlife inventory surveys for sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in 2007, 2008 and 2010. Surveys were conducted for Ute ladies'-tresses orchid habitat and mountain plover only in 2007. Surveys for bald eagles were conducted in 2007 and 2010. PRBIWG accepted protocol is available on the BLM Buffalo Field Office website (http://www.blm.gov/wy/st/en/field_offices/Bufalo.html).

A BLM biologist conducted field visits on 10-20-2010 and 02-16-2011. 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.

WGFD is the agency responsible for management of wildlife populations in the state of Wyoming. WGFD developed several guidance documents that BLM BFO wildlife staff relies upon in evaluating impacts to wildlife and wildlife habitats. WGFD documents used to analyze the proposed project under the current analysis are referenced in this section.

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2009a), WGFD developed impact thresholds to evaluate impacts to wildlife from oil and gas development. For species or habitats discussed in this EA where impact thresholds have been developed, those thresholds will be disclosed and discussed both in relation to the current conditions (Affected Environment) and in relation to reasonable foreseeable development, including development associated with the proposed project (Impacts Analysis). Moderate impacts occur when impairment of habitat function becomes discernable. High impacts occur when impairment of habitat function increases. Extreme impacts occur where habitat function is substantially impaired. Mitigation for each level of impact is discussed in the guidelines. Thresholds for impacts are generally determined by well densities.

3.3.1. Habitat Types

The project area is located approximately 17 miles east-northeast of Sheridan, Wyoming in sections 8, 9, and 17, T57N R81W, in shrub-steppe habitat. Topography throughout the area is characterized by gentle to medium sloped hills with some rock outcrops and ridgelines, rising from flat areas along the Badger Creek drainage.

Wyoming big sagebrush is the dominant shrub in the upland areas, occurring in sparse to moderately dense stands in a mosaic throughout the project area. Native grasses and forbs are mixed within the sagebrush understory. Ephemeral stream channels in the area are characterized by native grasses and forbs, with scattered shrubs.

Mature trees are sparsely distributed throughout the drainage and its tributaries, including cottonwood, boxelder, and juniper. One small stand of mature cottonwoods (approximately 10-15) occurs in the project area in NWSW Section 8 T57N R81W.

Only two mapped black-tailed prairie dog towns occur within 0.25 miles of the Hill Prong North POD, totaling approximately 2.1 acres in area. The colonies are located in NENE and SWNE Section 8. During onsite visits, the BLM biologist determined the activity in these colonies to be low, based on grass height (approximately 10-14 inches) in the area. Rolling topography (slopes > 5%) occurs adjacent to the towns. In 2008, these colonies were classified as active by HWA, but were classified inactive in 2010 (HWA 2010).

Current uses within the project area include coal bed natural gas development and grazing. Several irrigation systems have been installed along the drainage, converting native shrub/grasslands to hay/alfalfa fields, and a wild game farm borders the area.

3.3.2. Threatened, Endangered, Proposed, Candidate, and BLM Sensitive Species

3.3.2.1. Threatened and Endangered Species

Threatened, Endangered, Candidate and Proposed species that will be impacted beyond the level analyzed within the PRB FEIS are described below.

3.3.2.1.1. 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.

This nocturnal predator is closely associated with prairie dogs. The ferret depends almost entirely upon prairie dogs for food and uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1,000 acres, separated by no more than 1.5 km of black-tailed prairie dog colonies for survival (USFWS 1989).

Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

Black-footed ferret habitat is not present within the Hill Prong North project area. A detailed description of prairie dog colonies is located in section 3.3.1.1(Habitat Types). The combined acreage of the colonies is not equal to the 1000 acres necessary for ferret habitat requirements. The project area is located approximately 13 miles from the Sheridan prairie dog complex, a potential black-footed ferret reintroduction area identified by WGFD, and 21 miles from the Arvada prairie dog complex, another potential reintroduction area. USFWS has determined that black-footed ferrets do not occur in Wyoming outside of the Shirley Basin, and the species has been block cleared for the rest of the state.

3.3.2.1.2. Blowout Penstemon

Blowout penstemon is listed as Endangered under the ESA. It is a regional endemic species with documented populations in the Sand Hills of west-central Nebraska and the northeastern Great Divide Basin of Carbon County, Wyoming. Suitable blowout penstemon habitat consists of sparsely vegetated, early successional, shifting sand dunes and blowout depressions created by wind. In Wyoming, the habitat is typically found on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges. The BLM biologist assessed the area during the October onsite, and the Hill Prong North project area does not contain areas with these characteristics, and blowout penstemon is not expected to occur.

3.3.2.1.3. 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.

This orchid is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Wyoming Natural Diversity Database model predicts undocumented populations may be present particularly within southern Campbell and northern Converse Counties.

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

Badger Creek is intermittent, while its tributaries are ephemeral. HWA conducted a Ute ladies-tresses orchid habitat survey on 21 August and 24 August 2007 (HWA 2007). Areas that may provide potential suitable habitat were identified from USGS topographic maps (i.e. waterways, ponds, springs), in addition to other water sources found in the field during surveys. Seventeen areas were identified by HWA as having the potential to contain suitable habitat (HWA 2007). Surveys revealed that no ULT or suitable habitat occurs in the project area based on the following: draws are steep with ephemeral water, drainage is dominated by upland vegetation, and heavy clay and alkaline soils.

3.3.2.2. Proposed Species

3.3.2.2.1. 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. USFWS withdrew the proposal in 2003 but reinstated it again in 2010. USFWS will submit a final listing determination in 2011. Mountain plover is a WGFN Species of Greatest Conservation Need (SGCN), 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 species with highest conservation priority, indicating they are clearly in need of conservation action. They are also listed by USFWS as a Bird of Conservation Concern (BCC) for Region 17, which includes 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.

Suitable mountain plover habitat is not present within the project area. Please see section 3.3.1(Habitat Types) for a description of prairie dog colonies that would be considered potential habitat. Currently, the general density and height (6-8) inches of grasses within the project area preclude plover use. If colonies were to become active in the future, grass height may be reduced, however rough topography in the immediate vicinity would likely also preclude plover use. The probability that these colonies will become active again is slight due to their small size, proximity of proposed infrastructure, and current land uses.

3.3.2.3. Candidate Species

3.3.2.3.1. Greater Sage-grouse

The affected environment for greater sage-grouse (sage-grouse) is discussed in the PRB FEIS (pp. 3-194 to 3-199).

In 2010, USFWS determined that the sage-grouse is warranted for federal listing across its range, but listing is precluded by other higher priority listing actions. In addition to being listed as a Wyoming BLM sensitive species, sage-grouse are listed as a WGFN species of greatest conservation need, because populations are declining and they are experiencing ongoing habitat 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 Region 17.

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 4 miles of oil and gas developments. WGFD records indicate that 1 sage-grouse lek occurs within 4 miles of the project area. This lek site is identified in the following table.

Table 3.4 Sage-grouse leks within 4 miles of the Hill Prong North project area

Lek Name	Legal Location	Distance from Project Area (mi)	Year: Peak Males	WGFD Category of Impact
Badger Creek	NENW S16 T57N R81W	0.50	2010: 0 2009: 8 2008: 7 2007: 13 2006: 17 2005: 9	Moderate

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (2009), WGFD categorized impacts to sage-grouse by number of well pad locations per square mile within 2 miles of a lek and within identified nesting/brood-rearing habitats greater than 2 miles from a lek. Moderate impacts occur when well density is between 1 and 2 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 2 and 3 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 3 well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile.

Sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas. They depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003).

Suitable sage-grouse habitat is present in the project area. Sparse to moderately dense stands of sagebrush with mixed grasses and forbs are present throughout the project area. Riparian areas and draw bottoms along the tributaries of Badger Creek contain a diverse mix vegetation that could support sage-grouse and their broods during summer and early fall. Sage-grouse habitat models indicate that approximately 52 percent of the project area contains high quality sage-grouse nesting habitat and approximately 56 percent of the project area contains high quality sage-grouse wintering habitat (Walker et al. 2007). In 2009, a transmission power line was erected within 100 meters of the Badger Creek lek (HWA 2010).

3.3.2.4. Sensitive Species

Wyoming BLM prepared a list of sensitive species on which management efforts will focus towards maintaining habitats under a multiple use mandate. The goals of the policy are to:

- 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 authority for the sensitive species policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; FLPMA; and the Department Manual 235.1.1A. BLM Wyoming sensitive species that impacted beyond the level analyzed within the PRB FEIS are described below.

3.3.2.4.1. Northern Leopard Frog

The affected environment for northern leopard frog is discussed in the PRB FEIS on pg. 3-181. 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.

The project area is bounded by 5 existing off-channel pits used to manage water produced from existing fee gas wells. These impoundments may provide marginal habitat and the northern leopard frog is suspected to occur in the project area.

3.3.2.4.2. Baird's Sparrow

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

Sagebrush/grassland vegetation in the project area provides suitable habitat for Baird's sparrows and the species is suspected to occur.

3.3.2.4.3. Bald Eagle

The affected environment for bald eagles is described in the PRB FEIS on pg. 3-175. 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 August 8, 2007. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

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 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 Region 17.

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base.

The diets of wintering bald eagles are often more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, carcasses of domestic sheep and big game may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

Bald eagle winter roosting habitat is present in the project area. Existing woodlands in the project area are described in section 3.3.1(Habitat Types). Observations of bald eagles using the area during winter and early spring were made by both the landowners and Fidelity personnel, and were imparted to the BLM biologist during the on site visit by both parties. HWA reported 3 bald eagles perched in the cottonwood stand in NWSW Section 8 T57N R81W on January 20, 2009. HWA conducted bald eagle winter roost surveys on December 8, 2010 and January 6 and 25, 2011. Two bald eagles were observed roosting in the cottonwood stand in Section 8 on both the December 6 and the January 6th surveys (HWA 2011). In addition, on 14 December 2010, the BLM biologist received a phone call from the landowner with new observations of 2 bald eagles using the area (Christine Carter, personal communication, 12/14/2010). An adult bald eagle was documented by volunteers on January 8, 2011, perched in the aforementioned cottonwood stand during the Wyoming mid winter bald eagle survey. Personnel from the BLM, USFWS,

and Fidelity also observed 1 adult perched in the cottonwood stand on February 16, 2011. The cottonwood stand in Section 8 meets the criteria to be a winter roost.

3.3.2.4.4. Brewer's Sparrow

The affected environment for Brewer's sparrow is discussed in the PRB FEIS on pg. 3-200. 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 Region 17.

Sagebrush/grassland vegetation in the project area provides suitable habitat for Brewer's sparrows and the species is suspected to occur.

3.3.2.4.5. 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 Region 17. The Wyoming Bird Conservation Plan rates them as a Level II species, indicating they are in need of monitoring.

Sagebrush/grassland vegetation, as well as mature junipers, in the project area provides suitable habitat for loggerhead shrikes and the species is suspected to occur.

3.3.2.4.6. 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 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 Region 17.

Shrub/grasslands, irrigated meadows, and grasslands near the reservoirs in the project area provide suitable habitat for long-billed curlews and the species is suspected to occur.

3.3.2.4.7. Sage Sparrow

The affected environment for sage sparrow is discussed in the PRB FEIS on pg. 3-200 to 3-201. Sage sparrows are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, habitat is restricted but not undergoing substantial loss, 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 Region 17.

Sagebrush/grassland vegetation in the project area provides suitable habitat for sage sparrows and the species is suspected to occur.

3.3.2.4.8. 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 Region 17.

Sagebrush/grassland vegetation in the project area provides suitable habitat for sage thrashers and the species is suspected to occur.

3.3.2.4.9. Trumpeter Swan

The affected environment for trumpeter swan is discussed in the PRB FEIS on pg. 3-193. In addition to being listed as a Wyoming BLM sensitive species, trumpeter swans are a WGFD SGCN, with a rating of NSS2, because populations are restricted in numbers and distribution, they are experiencing ongoing and substantial 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.

The project area is bounded by 5 existing off-channel pits used to manage water produced from existing fee gas wells. These impoundments may provide marginal habitat to trumpeter swans migrating through the area and the species is suspected to occur.

3.3.2.4.10. Black-tailed Prairie Dog

The affected environment for black-tailed prairie dogs is discussed in the PRB FEIS (pg 3-179). Please see section 3.3.1(Habitat Types) for a description of prairie dog colonies occurring within 0.25 miles of proposed wells and infrastructure.

3.3.2.4.11. 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 substantial loss.

Grasslands and irrigated meadows in the project area, as well as an active prairie dog colony occurring in the vicinity of the project (NE S16 T57N R81W), provide suitable habitat and prey source for swift fox and the species is suspected to occur.

3.3.2.5. Big Game

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

The project contains yearlong range for pronghorn antelope and winter yearlong range for mule deer. 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. 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. Both antelope and mule deer were observed in the area by the BLM biologist during the onsite.

3.3.2.6. Migratory Birds

The affected environment for migratory birds is discussed in the PRB FEIS (pp. 3-150 to 3-153). Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the year. The BLM signed an MOU in 2010 with the USFWS to promote the conservation of migratory birds, as directed through Executive Order 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the Migratory Bird Treaty Act.

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the

calendar year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds have declined more consistently than any other ecological association of birds over the last 30 years (WGFD 2009).

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. Those species that are anticipated to occur in the project area are listed in Table 3.5.

Table 3.5 High priority bird species that are suspected to occur within the Hill Prong North project area (Nicholoff 2003).

Level	Species	Wyoming BLM Sensitive
Level I	Baird’s sparrow	Yes
	Brewer’s sparrow	Yes
	Ferruginous hawk	Yes
	Greater sage-grouse	Yes
	Long-billed curlew	Yes
	McCown’s longspur	
	Sage sparrow	Yes
	Short-eared owl	
	Upland sandpiper	
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
Northern harrier		
Say’s phoebe		

3.3.2.7. Raptors

The affected environment for raptors is discussed in the PRB FEIS on pp. 3-141 to 3-148.

Five raptor nest sites were identified by HWA and BLM within 0.5 miles of the project boundary. These are listed in the Table 3.6 below. One additional nest was also identified as being gone and not included in this analysis. In addition, HWA presented anecdotal evidence that nest 12251 may have been used by nesting golden eagles in 2009.

Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities. Suitable nesting habitat is present throughout the project area.

Table 3.6 Documented raptor nests within 0.5 miles of the Hill Prong North project area.

BLM ID	UTMs	Legal	Substrate	Year	Condition	Status	Species
211	369122E 4976608N	S8 T57N R81W	Cottonwood - Live	2010	Remnants	Inactive	n/a
				2008	Poor	Inactive	n/a
				2007	Poor	Inactive	n/a
212	369154E 4976568N	S8 T57N R81W	Cottonwood - Live	2010	Excellent	Active	Red-tailed Hawk
				2002	Unknown	Active	Red-tailed Hawk
12248	370088E 4975316N	S17 T57N R81W	Juniper	2010	Excellent	Inactive	Unknown Raptor
12251	369136E 4976563N	S8 T57N R81W	Cottonwood - Live	2010	Excellent	Active - Failed	Red-tailed Hawk
				2008	Excellent	Active - Failed	Golden Eagle
				2007	Good	Active	Golden Eagle
12253	370100E 4976802N	S8 T57N R81W	Boxelder	2010	Good	Inactive	n/a
				2008	Good	Inactive	n/a

3.3.2.8. Plains Sharp-tailed Grouse

The affected environment for plains sharp-tailed grouse is discussed in the PRB FEIS on pp. 3-148 to 3-150.

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

The Hill Prong North project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Two occupied sharp-tailed grouse leks are located within 2 miles of the project area in SENE S30 and SENW S28 T57N R81W. Both leks were active in 2010 with 7 and 10 peak males respectively (HWA 2010). It is likely that grouse nest in the area, and sharp-tailed grouse were documented nesting in the Dow 2 project area which is directly west of Hill Prong North (EA –WY-070-EA08-168).

3.3.3. 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 in Table 3.7. Reported data from the Powder River Basin (PRB) includes Campbell, Sheridan and Johnson counties.

Table 3.7 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Equine 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
2009	10	1	1	No record
2010	6	0	0	0

Source: Wyoming Department of Health, http://diseasemaps.usgs.gov/wnv_wy_human.html

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.

3.4. Water Resources

The project area is located along Badger Creek, which is tributary to the Upper Tongue River.

The Wyoming Department of Environmental Quality (WDEQ) has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state. The Wyoming Oil and Gas Conservation Commission (WYOGCC) has authority for permitting and bonding off channel pits that are located over State and fee minerals.

3.4.1. Groundwater

The groundwater in this project area has historically been used for stock water or domestic purposes. A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 10 registered stock and domestic water wells within a one mile of a federal CBNG producing well in the POD with depths ranging from 50 to 820 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).

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following general limits for Total Dissolved Solids (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). For additional water quality limits for groundwater, please refer to the WDEQ web site.

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

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

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;

- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and
- Shallow groundwater wells would be installed and monitored where necessary.

The production of CBNG necessitates the removal of some degree of the water saturation in the coal zones to temporarily reduce the hydraulic head in the coal. The Buffalo Field Office has been monitoring coal zone pressures as expressed in depth to water from surface since the early 1990s in the PRB as is depicted in Figure 3.3.

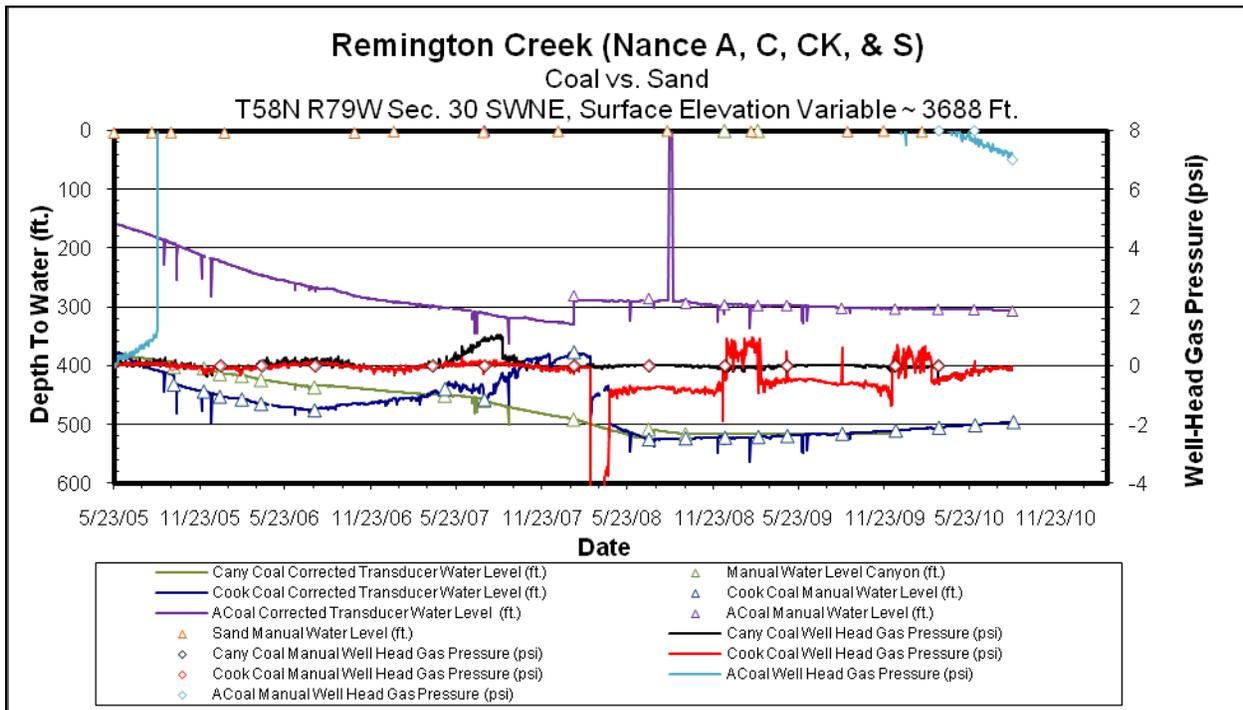
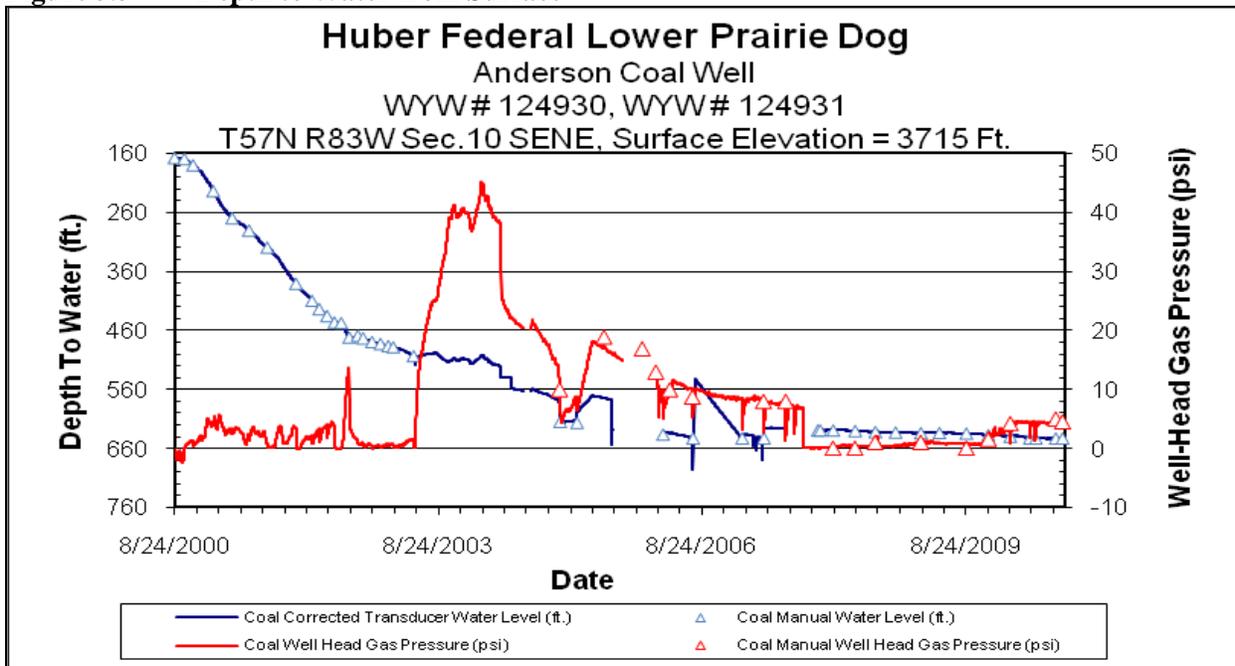
The Hill Prong POD is proposed in an area which is on the northeastern front of CBNG production in the Badger Creek drainage. There has been substantial development to the west and south of this project with at least one well drilled per location every 80 acres by Fidelity E&P as well as several other operators. Production began as early as 2007 from some of these wells.

As a result, the target coal zone pressure may have been reduced through offset water production. The Lower Prairie Dog Groundwater monitoring well was installed by JM Huber in 2000 as a part of the BLM deep groundwater monitoring program. The initial water level of the Anderson Coal, which is indicative of the pressure in the coal zone, was recorded at 168 feet below ground level. The most recent measurement, dated September 2010, recorded the water level at 648 feet below ground level, for a decline of 480 feet since the well was completed. This monitor well set is located 9.2 miles west of the Hill Prong North POD area. The Remington Creek Monitor well set is located 10.2 miles to the northeast of the Hill Prong North POD boundary. This well set was drilled and completed in 2005 and includes wells completed in the Cook and Canyon formations, as well as the Anderson.

This level of depressurization is within the potential predicted in the PRB FEIS which was determined through the Regional Groundwater Model for that document. For additional information, please refer to the PRB FEIS Chapter 4 Groundwater and the Wyoming State Geological Survey's Open File Report 2009-10 titled "1993-2006 Coalbed Natural Gas (CBNG) Regional Groundwater Monitoring Report: Powder River Basin, Wyoming" which is available on their website at <http://www.wsgs.uwyo.edu>

Monitor Well Name	QtrQtr	Sec	T N	RW	Distance from Hill Prong North POD, mi	Total Depth, ft	Initial WL, ft depth from surface	Most Recent WL, ft depth from surface	Drilled by	Date Installed
Lower Prairie Dog Anderson	SENE	10	57	83	9.2	653	168	643	JM Huber	8/2000
Remington Creek Anderson	SWNE	30	58	79	10.2	336	160	306	Nance	6/2005
Remington Creek Cook	SWNE	30	58	79	10.2	639	378	496	Nance	6/2005
Remington Creek Canyon	SWNE	30	58	79	10.2	802	378	639	Nance	6/2005

Figure 3.3 Depth to Water from Surface



3.4.2. Surface Water

The project area is within the Badger Creek drainage which is tributary to the Upper Tongue 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 $\mu\text{mhos/cm}$) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters “illustrate the variability in ambient EC and SAR in streams within the Project Area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Tongue River, the EC ranges from 318 at Maximum monthly flow to 731 at Low monthly flow and the SAR ranges from 0.36 at Maximum monthly flow to 0.86 at Low monthly flow. These values were determined at the USGS station located near Decker, WY, (PRB FEIS page 3-49).

The operator has not identified any natural springs within this POD boundary

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

3.5. Cultural Resources

A Class III cultural resource inventory was performed for the Hill Prong North POD prior to on-the-ground project work (BFO project no. 70110022). Clint Crago, BLM Archaeologist conducted a class III inventory following the 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. No cultural resources were discovered in the area of potential effect.

3.6. 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 [NO_x]) 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

This section describes the environmental consequences of the proposed action, alternative B. The effects analysis addresses the direct and indirect effects of implementing the proposed action, the cumulative effects of the proposed action combined with reasonably foreseeable Federal and non-federal actions,

identifies and analyzes mitigation measures (COAs), and discloses any residual effects remaining following mitigation.

4.1. Alternative A

The No Action Alternative was analyzed as Alternative 3 in the PRB FEIS, and is incorporated by reference into this EA. Information specific to resources for this alternative is included within the PRB Final EIS on pages listed in Table 4.1.

Table 4.1 Location of Discussion of the No Action Alternative in the PRB FEIS

Resource		Type of Effect	Page(s) of PRB FEIS	
Project Area Description	Geologic Features and Mineral Resources	Direct and Indirect Effects	4-164 and 4-134	
		Cumulative Effects	4-164 and 4-134	
Soils, Vegetation, and Ecological Sites	Soils	Direct and Indirect Effects	4-150	
		Cumulative Effects	4-152	
	Vegetation	Direct and Indirect Effects	4-163	
		Cumulative Effects	4-164	
	Wetlands/Riparian	Direct and Indirect Effects	4-178	
		Cumulative Effects	4-178	
Wildlife	Sensitive Species - Greater Sage-Grouse	Direct and Indirect Effects	4-271	
		Cumulative Effects	4-271	
	Aquatic Species	Direct and Indirect Effects	4-246	
		Cumulative Effects	4-249	
	Migratory Birds	Direct and Indirect Effects	4-234	
		Cumulative Effects	4-235	
	Waterfowl	Direct and Indirect Effects	4-230	
		Cumulative Effects	4-230	
	Big Game	Direct and Indirect Effects	4-186	
		Cumulative Effects	4-211	
	Raptors	Direct and Indirect Effects	4-224	
		Cumulative Effects	4-225	
	Water	Ground Water	Direct and Indirect Effects	4-63
			Cumulative Effects	4-69
Surface Water		Direct and Indirect Effects	4-77	
		Cumulative Effects	4-69	
Economics and Recovery of CBNG Resources	Direct and Indirect Effects	4-362		
	Cumulative Effects	4-370		
Cultural Resources	Direct and Indirect Effects	4-286		
Air Quality	Direct and Indirect Effects	4-386		
	Cumulative Effects	4-386		

4.2. Alternative B

4.2.1. Project Area Description

The Hill Prong North POD consists of 440 acres within the POD boundary. It is located along Badger Creek in north central Sheridan County, WY along the creek floodplain in mostly flat topography. Elevations in the area range from 3720 to 4020 feet above sea level. Project area surface estate is all privately held.

There are no active permitted mineral or gravel extraction projects in the immediate area. **Primary historical use in this area is ranching activity and stock raising. Some of the area is irrigated. The area received coal bed natural gas development in recent years, with wells existing on most of the fee locations at 80 acre spacing intervals.** Adjacent to the POD boundary on the north is an active game ranch where elk have been introduced.

4.2.2. Soils and Ecological Sites

4.2.2.1. Soils

4.2.2.1.1. Direct and Indirect Effects

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

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

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are dependent on soil, climate, topography and cover.
- Soil compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery.
- Alteration of surface runoff characteristics.
- 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.

There are areas within the POD boundary that are susceptible to erosion and areas that have steep slopes, but the operator has planned the project so that there construction will not impact those areas. There are also small areas within and surrounding the POD boundaries that would be classified as wetland or riparian areas. However, the operator will not disturb these areas with this project.

4.2.2.1.1. Cumulative Effects

The designation of the duration of disturbance is defined in the PRB FEIS (pp. 4-1 and 4-151). Most soil

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

Geomorphic effects of roads and other surface disturbance range from chronic and long-term contributions of sediment into waters of the state to catastrophic effects associated with mass failures of road fill material during large storms. Roads can affect geomorphic processes primarily by: accelerating erosion from the road surface and prism itself through mass failures and surface erosion processes; directly affecting stream channel structure and geometry; altering surface flow paths, leading to diversion or extension of channels onto previously unchanneled portions of the landscape; and causing interactions among water, sediment, and debris at road-stream crossings.

These impacts, singly or in combination, could 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.

4.2.2.1.2. Mitigation Measures

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

4.2.2.1.3. Residual Effects

Residual Effects were also identified in the PRB FEIS at page 4-408 such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established.

4.2.2.2. Ecological Sites

4.2.2.2.1. Direct and Indirect Effects

Direct effects to ecological sites would occur from ground disturbance caused by construction of well pads, compressor stations, ancillary facilities, associated pipelines and roads. Short term effects would occur where vegetated areas are disturbed but later reclaimed within 1 to 3 years of the initial disturbance. Long-term effects would occur where well pads, compressor stations, roads, water-handling facilities or other semi-permanent facilities would result in loss of vegetation and prevent reclamation for the life of the project.

Sagebrush does not come back easily after human disturbance such as urban or agricultural development, or even after natural occurrences such as wildfire. It takes years, maybe lifetimes, for sagebrush to fully grow back. Sagebrush still hasn't returned to some areas of the Columbia Basin burned by a large fire 40 years ago (Pacific Northwest National Laboratory Shrub Steppe Ecology Series May 2010).

The Prime and Unique Farmland identified in this area is so designated by the NRCS only if irrigated. There are 2 separate areas of about 20 acres each. A portion of 1 of these areas (W1/2NW Sec 8) is irrigated by the landowner. For the past few years, the source of water has been from local fee CBNG production. The landowner has coordinated with the operator to manage the volume of water applied as well as mitigate the high SAR in the produced water by amending the soil with gypsum and sulfur in the irrigated area. The addition of the water produced from this project will not alter the volume of water

being applied nor the quality of that water. The other Prime and Unique Farmland area (W1/2 NE Sec 8) is not artificially irrigated.

The operator designed the access roads and corridors in this project to skirt irrigated areas for ease of access. In both fields, the access road and pipeline corridors are on the west edges of the fields. Surface disturbance in the areas designated as Prime and Unique Farmland will be minimal and expediently reclaimed.

4.2.2.2.2. Cumulative Effects

Cumulative effects to ecological sites and biological diversity are discussed in the PRB FEIS, pages 4-153 to 4-172. Cumulative effects to ecological sites include the further alteration of disturbance regimes from the increased activity, increase in noxious weeds, and alterations in vegetation community's diversity and cover.

Surface disturbances would result in impacts to grasses and forbs related to construction activities. Disturbed areas would be seeded with seed mixes which provide site stabilization and introduce forbs which are easy to establish.

Final reclamation would re-disturb all sites disturbed by construction and operation activities, including those previously stabilized when wells were in production. Disturbance associated with final reclamation activities would reintroduce native plant to mimic species composition in adjacent undisturbed areas.

4.2.2.2.3. Mitigation Measures

No additional mitigation is necessary due to operator committed measures provided in the master surface use plan and water management plan.

4.2.2.2.4. Residual Effects

Residual Effects were also identified in the PRB FEIS at page 4-408 such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established.

4.2.2.2.5. Invasive Species

4.2.2.2.5.1. Direct and Indirect Effects

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.

4.2.2.2.5.2. Cumulative Effects

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.

4.2.2.2.5.3. Mitigation Measures

The operator has committed to the control of noxious weeds and species of concern using a combination of the following measures identified in their Noxious Weed Control Plan:

1. Control Methods include physical, biological, 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). Biological methods include the use of domestic animals, or approved biological agents. 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 washed before entering this POD to prevent contamination from infested areas outside this POD.

4.2.2.2.5.4. Residual Effects

Control efforts by the operator are limited to the surface disturbance associated the implementation of the project. Cheat grass and other invasive species that are present within non-physically disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser extent, Japanese brome (*B. japonicus*) are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time; these annual bromes would continue to be found within the project area.

4.2.3. Wildlife

4.2.3.1. Threatened, Endangered, Proposed and Candidate Species

4.2.3.1.1. Threatened and Endangered Species

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

Common Name (scientific name)	Habitat	Project Effects	Rationale
<i>Endangered</i>			
Black-footed ferret	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NE	Habitat not of sufficient area and no active colonies within the project area.
Blowout penstemon	Sparsely vegetated, shifting sand dunes	NE	Habitat not present
<i>Threatened</i>			
Ute ladies'-tresses orchid	Riparian areas with permanent water	NE	No suitable habitat in the project area.
<i>Proposed</i>			
Mountain Plover	Short-grass prairie with slopes < 5%	NE	Habitat not suitable due to grass height (> 4 inches) and topography (slopes > 5%).
<i>Candidate</i>			
Greater Sage-grouse	Basin-prairie shrub, mountain-foothill shrub	MIIH	Habitat is present and will be affected.
Project Effects LAA – Likely to adversely affect NE – No Effect NLAA – May Affect, not likely to adversely affect individuals or habitat. NLJ – Not likely to jeopardize the continued existence of the species MIIH – May impact individuals and habitat NP – Habitat not present and species unlikely to occur within the project area.			

4.2.3.1.1.1. Black-Footed Ferret

4.2.3.1.1.1.1. Direct and Indirect Effects

Suitable ferret habitat is not present in the project area and implementation of the proposed project will have **“no effect”** on the black-footed ferret.

4.2.3.1.1.1.2. Cumulative Effects

The cumulative effects to black-footed ferrets are discussed in the PRB FEIS (pg. 4-251).

4.2.3.1.1.1.3. Mitigation Measures

No mitigation is proposed with alternative B.

4.2.3.1.1.1.4. Residual Effects

No residual effects are anticipated.

4.2.3.1.1.2. Blowout penstemon

4.2.3.1.1.2.1. Direct and Indirect Effects

Habitat is not present in the project area and implementation of the proposed project will have “no effect” on blowout penstemon.

4.2.3.1.1.2.2. Cumulative Effects

The proposed project will not affect blowout penstemon.

4.2.3.1.1.2.3. Mitigation Measures

No mitigation is proposed in alternative B.

4.2.3.1.1.2.4. Residual Effects

No residual impacts are anticipated.

4.2.3.1.1.3. Ute Ladies’-Tresses Orchid

4.2.3.1.1.3.1. Direct and Indirect Effects

Suitable habitat is not present in the project area and implementation of the proposed project will have “no effect” on ULT.

4.2.3.1.1.3.2. Cumulative Effects

The cumulative effects to ULT are discussed in the PRD FEIS (pg. 4-253 to 4-254).

4.2.3.1.1.3.3. Mitigation Measures

No mitigation is proposed in alternative B.

4.2.3.1.1.3.4. Residual Effects

No residual impacts are anticipated.

4.2.3.1.2. Proposed Species

4.2.3.1.2.1. Mountain Plover

4.2.3.1.2.1.1. Direct and Indirect Effects

Impacts to mountain plover are discussed in the PRB FEIS. Suitable habitat is not present in the project area and implementation of the proposed project will have “no effect” on mountain plover.

4.2.3.1.2.1.2. Cumulative Effects

The cumulative effects to mountain plover are discussed in the PRB FEIS (pg. 4-245 to 4-255).

4.2.3.1.2.1.3. Mitigation Measures

No mitigation measures are proposed with alternative B.

4.2.3.1.2.1.4. Residual Effects

No residual impacts are anticipated.

4.2.3.1.3. Candidate Species

4.2.3.1.3.1. Greater Sage-grouse

4.2.3.1.3.1.1. Direct and Indirect Effects

Impacts to sage-grouse associated with energy development are discussed in detail in the *12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (USFWS 2010). Impacts to sage-grouse are generally a result of loss and fragmentation of sagebrush habitats associated with roads and infrastructure. Research indicates that sage-grouse hens also avoid nesting in developed areas.

Infrastructure occurring within 2 miles of occupied sage grouse leks is shown in Figure 4.1 below. In March 2010, a pre-planning onsite was conducted for the POD, in order to give BLM the opportunity to make recommendations about facility placement and design. The BLM biologist made specific recommendations to avoid placement of facilities in sagebrush to reduce direct loss of sage-grouse habitat.

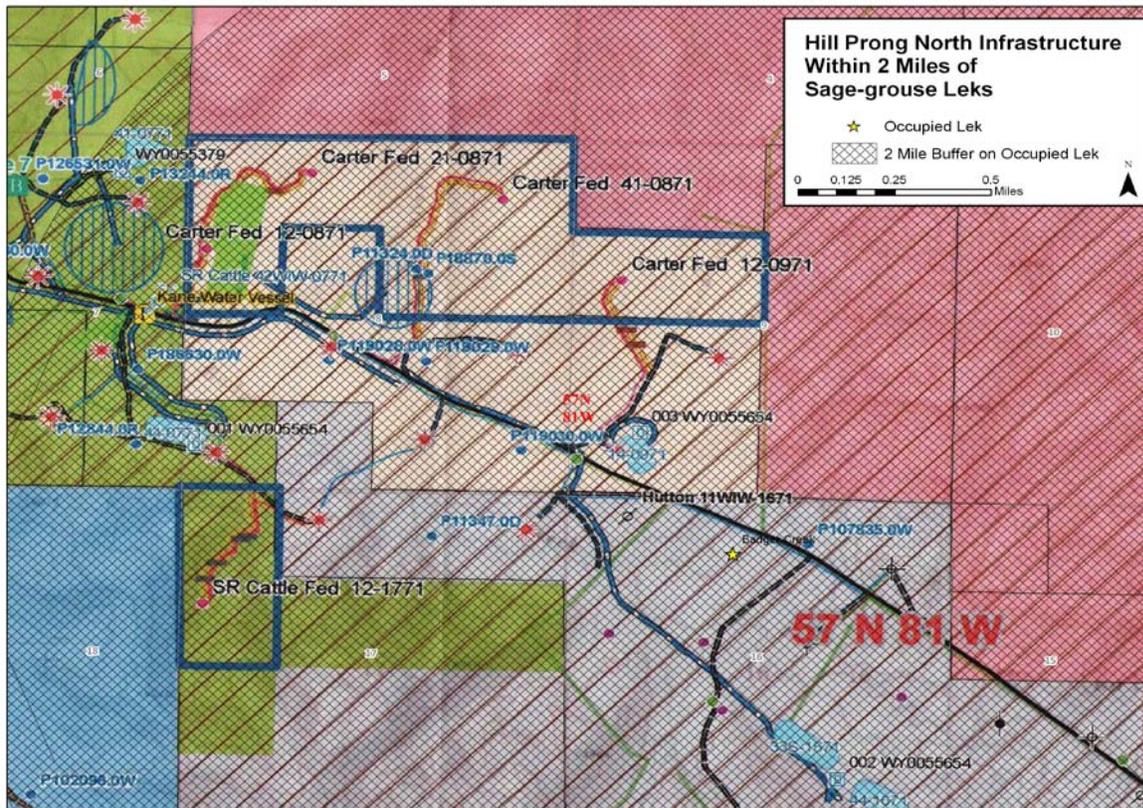
According to habitat models, the Carter Fed 12-0871, 21-0871, 41-0871, and 12-0971 wells (and associated infrastructure) are all located within high quality nesting habitat. Carter Fed 41-0871 and 12-0971 (and associated infrastructure) are located in areas that provide quality winter habitat for sage grouse. Construction of access roads, utility corridor, and proposed well locations for the Carter Fed 12-0871 and Carter Fed 21-0871 wells will result in a direct loss of sagebrush. The access road to these wells skirts a side-roll irrigated field, which may provide brood rearing habitat to sage-grouse. Although the nesting habitat surrounding 12-0871 is marginal, construction at the 21-0871 well will directly impact quality nesting habitat for sage-grouse estimated at approximately 0.4 acres. A portion of the road to access the 21-0871 well will be engineered and an additional 0.9 acres of sagebrush will be lost from construction of this road and associated utility corridor. Implementation of the proposed project will impact sage-grouse habitat and individuals.

4.2.3.1.3.1.2. 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 the project area and the area that is encompassed by a four mile radius around the 1 sage-grouse lek that occurs within 4 miles of the project boundary. Analysis of impacts up to 4 miles was recommended by the State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008).

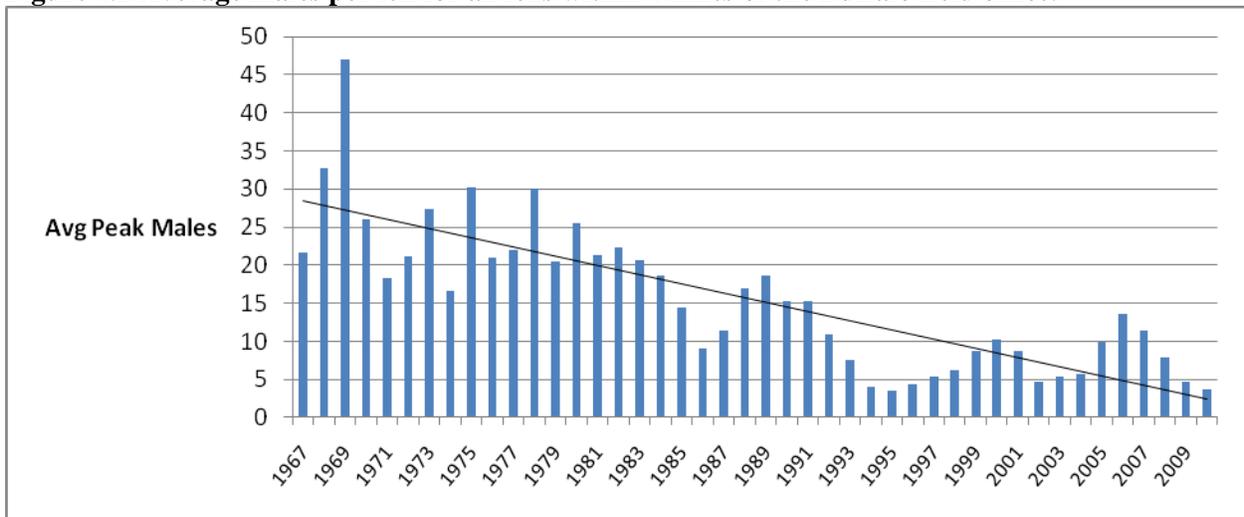
The sage-grouse population within northeast Wyoming is exhibiting a steady long term downward trend, as measured by lek attendance (WGFD 2010). Figure 4.2 illustrates a 10-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Research suggests that these declines may be a result, in part, of CBNG development, as discussed in detail in USFWS (2010).

Figure 4.1 Infrastructure occurring within 2 miles of the Badger Creek Lek.



Currently, 66 fee, state, and federal wells exist within the analysis area. Excluding the Hill Prong North project, there are an additional 14 approved wells that have not been drilled yet. (Automated Fluid Minerals Support System [AFMSS] 12/14/2010) within the cumulative effects analysis area. With the addition of these wells, well density would increase from 1.32 to 1.6 wells per square mile. With approval of Alternative B (5 proposed well locations) well density would increase to 1.7 wells per square mile, slightly above the one well per square mile recommendation by the State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development. Badger Creek lek would still remain in the moderate WGFD category of impact.

Figure 4.2 Average males per lek for all leks within 4 miles of the Buffalo field office.



The PRB 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 may contribute to a decline in male attendance at the one lek that occurs within four miles of the project area, and, potentially, extirpation of the local grouse population.

4.2.3.1.3.1.3. Mitigation Measures

In order to reduce the likelihood that activities associated with noise, construction, and human disturbance, BLM will implement a timing limitation on all surface-disturbing activities within and adjacent to identified nesting habitat across the project area. Because nesting grouse have been shown to avoid infrastructure by up to 0.6 miles, the intent of this timing restriction is to decrease the likelihood that grouse will avoid these areas and increase habitat quality by reducing noise and human activities during the breeding season.

4.2.3.1.3.1.4. Residual Effects

A timing limitation does nothing to mitigate loss and fragmentation of habitat or changes in disease mechanisms. Suitability of the project area for sage-grouse will be negatively affected due to habitat loss and fragmentation and proximity of human activities associated with CBNG development.

4.2.3.2. 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 4-265. Effects to sensitive species are described in Table 4.3 and sections 4.2.3.4 (migratory birds) and 4.2.3.2.1 (bald eagle) below.

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<i>Amphibians</i>				
Northern leopard frog (<i>Rana pipiens</i>)	Beaver ponds and cattail marshes from plains to montane zones.	S	MIIH	Existing off-channel reservoirs that may be being used by frogs will receive water produced from the proposed project. Noise produced by surface disturbing and maintenance activities may impact ability to hear vocalizations within population.
Columbia spotted frog (<i>Rana pretiosa</i>)	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 species is not expected to occur .
<i>Fish</i>				
Yellowstone cutthroat trout (<i>Oncorhynchus clarki bouvieri</i>)	Cold-water rivers, creeks, beaver ponds, and large lakes in the Upper Tongue sub-watershed	NP	NI	All water produced will be fully contained in off-channel reservoirs, and implementation of the project will not impact habitat.
<i>Birds</i>				
Baird's sparrow (<i>Ammodramus bairdii</i>)	Shortgrass prairie and basin-prairie shrubland habitats; plowed and stubble fields; grazed pastures; dry lakebeds; and other sparse, bare, dry ground.	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area. Impacts will be mitigated by limitation on timing of activities.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Mature forest cover often within one mile of large water body with reliable prey source nearby.	K	MIIH	Surface disturbing and maintenance activities may impact wintering eagles and the species may avoid the area. Impacts will be mitigated by limitation on timing of activities.
Brewer's sparrow (<i>Spizella breweri</i>)	Sagebrush shrubland	K	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area. Impacts will be mitigated by limitation on timing of activities.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Ferruginous hawk (<i>Buteo regalis</i>)	Basin-prairie shrub, grasslands, rock outcrops	NS	MIIH	Nesting and foraging habitat may be impacted and human activities will increase.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Basin-prairie shrub, mountain-foothill shrub	K	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area. Impacts will be mitigated by limitation on timing of activities.
Long-billed curlew (<i>Numenius americanus</i>)	Grasslands, plains, foothills, wet meadows	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area. Impacts will be mitigated by limitation on timing of activities.
Northern goshawk (<i>Accipiter gentilis</i>)	Conifer and deciduous forests	NP	NI	Habitat not present.
Peregrine falcon (<i>Falco peregrinus</i>)	Cliffs	NP	NI	Habitat not present.
Sage sparrow (<i>Amphispiza billneata</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area. Impacts will be mitigated by limitation on timing of activities.
Sage thrasher (<i>Oreoscoptes montanus</i>)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Nesting and foraging habitat may be impacted by dust, noise, human activities, and direct loss. Species may avoid area. Impacts will be mitigated by limitation on timing of activities.
Trumpeter swan (<i>Cygnus buccinator</i>)	Lakes, ponds, rivers	S	MIIH	Off-channel reservoirs receiving produced water may attract swans during migration periods. The species may be disturbed by dust, noise, and human activities.
Western Burrowing owl (<i>Athene cunicularia</i>)	Grasslands, basin-prairie shrub	NS	MIIH	Nesting and foraging habitat may be impacted and human activities will increase. Currently no active prairie dog colonies are present within 0.25 miles of the project area.
White-faced ibis (<i>Plegadis chihi</i>)	Marshes, wet meadows	NP	NI	Habitat not present.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Open woodlands, streamside willow and alder groves	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
<i>Mammals</i>				
Black-tailed prairie dog (<i>Cynomys ludovicianus</i>)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	The Carter Fed 41-0871 and associated infrastructure are proposed in an area historically occupied by prairie dogs, however, these colonies are currently inactive.
Fringed myotis (<i>Myotis thysanodes</i>)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Construction may impact foraging areas and alter habitat conditions.
Long-eared myotis (<i>Myotis evotis</i>)	Conifer and deciduous forest, caves and mines	NP	NI	Construction may impact foraging areas and alter habitat conditions.
Swift fox (<i>Vulpes velox</i>)	Grasslands	S	MIIH	Dust, noise, and human activities may cause the species to avoid the area.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Caves and mines.	NP	NI	Construction may impact foraging areas and alter habitat conditions.
<i>Plants</i>				
Porter's sagebrush (<i>Artemisia porteri</i>)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (<i>Cymopterus williamsii</i>)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Project area outside of species' range.
<p>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.</p> <p>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</p>				

4.2.3.2.1. Bald Eagle

4.2.3.2.1.1. Direct and Indirect Effects

Impacts to bald eagles are discussed in the PRB FEIS on pg. 4-251 to 4-253. Additional site-specific information is provided here.

Human activities, traffic, and construction associated with implementation of the project may displace winter roosting or foraging eagles that use habitats along the Badger Creek drainage, specifically the stand of cottonwoods located in NWSW Section 8 T57N R81W which are documented as a consistent use bald eagle winter roost. Present activities and traffic include the landowner irrigating, cutting, harvesting, drying, and bailing hay, and the adjacent county road. The stand is approximately 0.2 miles from the Carter Fed 12-0871 well, and 0.46 miles from the Carter Fed 21-0871. The entire access road to these 2 wells is within 0.5 miles of the roost as well. Fidelity agreed to relocate the access road to the 12-0871 well. The new route accesses the well from an existing injection well located to the southwest. The roost is shielded from the new access road by a small ridge, and traffic accessing the well will not be in view of the roost until they reach the well site. The access road from the 12-0871 well to the 21-0871 well, and the well itself are in the direct line of sight of the roost. Romin and Muck found that stopped vehicles provoke negative responses from perching raptors, especially when occupants exit the vehicle (1999). The proximity of proposed disturbance to the roost may cause eagles to avoid or abandon the roost, increasing the potential to harm eagles by forcing them to expend rather than conserve energy during critical time periods.

Produced water will be stored in five existing reservoirs, which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to benefit bald eagles by increasing their food supply or adversely affect them, from an increase in potential contaminants or by increasing collisions because of proximity to roads or powerlines.

4.2.3.2.1.2. Cumulative Effects

The cumulative effects for bald eagles are described in the PRB FEIS (pp. 4-251 to 4-253). In addition to the federal development, there will be fee development associated with the project that has similar impacts on bald eagles. Livestock grazing also occurs in the area, which may provide some of the prey base for bald eagles that winter in the area. If bald eagles rely on the prairie dog colonies for prey, practices such as poisoning or shooting of prairie dogs or other intentional methods of extermination in order to increase forage for livestock can potentially harm bald eagles through a reduction in their prey base.

4.2.3.2.1.3. Mitigation Measures

To reduce the risk of disruption to the winter roosting activities of bald eagles, BFO will require a timing limitation on surface disturbing activities within 1 mile of the roost between November 1 and April 1, annually.

The USFWS recommended that the 12-0871 well and the access road to this and the 21-0871 well be relocated in order to screen the roost from infrastructure and human disturbance associated with maintenance of the wells, in addition to timing limitations during the winter roosting season. In order to mitigate potential impacts from the proximity of wells 12-0871 and 21-0871 to the roost, Fidelity has proposed the following to be incorporated as conditions of approval:

- Between November 1 and April 1 (Eagle Winter Roost), Fidelity would confine access to the locations between the hours of 9am to 3pm, if the roost is occupied.
- Fidelity would commit to not accessing either well during inclement weather (i.e. rain, snow, winds exceeding 10 mph, temperature below 0°F) between Nov 1- April 1.

Fidelity also agreed to relocate the access road to the 12-0871 well. The new route accesses the well from

an existing injection well located to the southwest. The roost is shielded from the new access road by a small ridge, and traffic accessing the well will not be in view of the roost until they reach the well site. With Fidelity's proactive, mitigating adjustment of submitted design features and their above proposed mitigation (that aligns with recommendations from the FWS), BFO has reasonable assurance that preclude a likely overt violation of the Bald and Golden Eagle Protection or Migratory Bird Treaty Acts.

4.2.3.2.1.4. Residual Effects

Even with timing limitations, habitat quality may be degraded to a point that the area no longer provides habitat requirements for wintering bald eagles. A 1.0 mile timing restriction on construction activities and commitment of the operator to reduce disturbance at federal mineral sites do nothing to mitigate impacts associated with fee development or land owner use, and habitat may be degraded over time to such an extent that productivity of bald eagles may be reduced, potentially resulting in a violation of the Bald and Golden Eagle Protection Act.

4.2.3.3. Big Game

4.2.3.3.1. Direct and Indirect Effects

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

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD indicates a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not 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 as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and, as the Pinedale Anticline study suggests, mule deer do not readily habituate. A study in North Dakota stated "Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic" (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. 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.

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

4.2.3.3.2. Cumulative Effects

The cumulative effects associated with Alternative B 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.

4.2.3.3.3. Mitigation Measures

No mitigation is proposed with Alternative B.

4.2.3.3.4. Residual Impacts

No residual effects are anticipated.

4.2.3.4. Migratory Birds

4.2.3.4.1. Direct and Indirect Effects

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

In addition to other migratory bird species, several species that are classified as sensitive by the BLM are expected and known to occur in the project area including: Baird's sparrow, Brewer's sparrow, loggerhead shrike, long-billed curlew, sage sparrow, and sage thrasher.

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.

4.2.3.4.2. Cumulative Effects

The cumulative effects associated with Alternative B 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.

4.2.3.4.3. Mitigation Measures

No timing limitations on surface disturbing activities are proposed specifically for migratory birds. However, raptor and sage-grouse timing limitations on surface disturbing activities will also serve to mitigate impacts to nesting migratory birds.

A Condition of Approval requiring all stock tanks to be equipped and maintained with effective wildlife escape devices will reduce potential bird mortality from drowning.

4.2.3.4.4. Residual Effects

Sage-grouse timing limitations will apply to the entire POD. Those migratory bird species and individuals that are still nesting when the sage-grouse timing limitations are over (June 30) may have nests destroyed, or be disturbed, by construction activities. Protections around active raptor nests (Feb 1- July 31) extend past most migratory bird nesting seasons. Only a percentage of known nests are active any given year, so the protections for migratory birds from June 30 - July 31 will depend on how many raptor nests area active.

4.2.3.5. Raptors

4.2.3.5.1. Direct and Indirect Effects

Direct and indirect effects to raptors are described in the PRB FEIS (pg. 4-216 to 4-220). The Hill Prong North project will result in disturbance in proximity of nesting raptors, including direct loss of foraging habitats and indirect losses associated with declines in habitat effectiveness. All raptors using nests in the vicinity of the Hill prong North project will likely be impacted to some extent by the human disturbance associated with operation and maintenance. Additional information and site-specific impacts are discussed here.

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, resulting in increased nest predation.

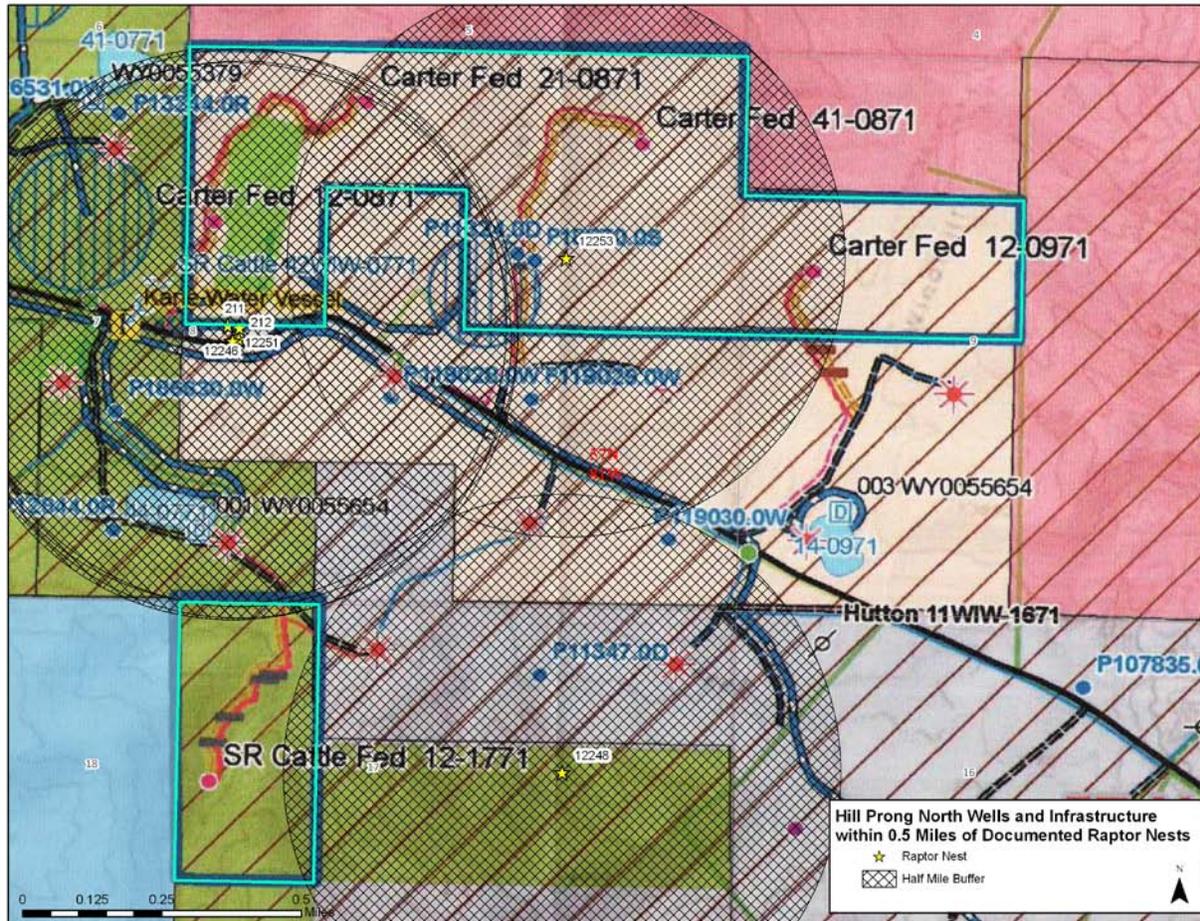
To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation be located in such a way as to provide adequate biologic buffer for 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. All proposed wells and associated infrastructure occurring within 0.5 miles of documented raptor nests are shown in Figure 4.3 below.

The access road to the Carter Fed 41-0871 well is proposed within 350 feet of nest 12253. The route is in full view (line of sight) of the nests as it occurs along a flat, grassy area along the drainage. The minimal distance from the road to the nest, combined with the lack of a topographical barrier between the two, do not provide an adequate biological buffer to reduce impacts to the nest. Only one year (2010) of surveys has been done for this nest, and the species use was not confirmed. The BLM biologist inspected the condition of the nest during the October onsite and found it to be in good condition, indicating that the

nest may have been used in recent years. Efforts were made by Fidelity to find an alternate access route to 41-0871, however, no other route was economically feasible. Routes approaching from the west or east of the proposed well location would require extensive engineering. Fidelity was then asked to provide operator committed measures to reduce impacts from human and traffic (light and heavy duty) disturbance that will occur along the road during the breeding season for maintenance activities throughout the life of the well. These operator committed measures will be incorporated into conditions of approval for the project. Even with the proposed operator committed measures, approval of the access road to Carter Fed 41-0871 may cause avoidance or abandonment, and potentially failure, of nest 12253.

The USFWS recommends a 0.5 mile disturbance free spatial buffer for golden eagle nests. Nests 211, 212, and 12251 occur within 600 feet of the access road to the Carter Fed 12-0871 and 21-0871 wells, and about 0.2 miles and 0.46 miles (respectively) from the well sites. The nests are also only 50 feet from the existing main access road (Badger Creek Road) through the area, and land owners regularly access a hay field using a road directly under the nests. Fidelity has agreed to relocate the access to the 12-0871 well so that the well is accessed from the southwest, and the nests are buffered from human disturbance associated with the road by a small ridge. The new access route is out of the line of sight of the nests until it reaches the proposed well site. Noise and increased traffic from surface disturbing and maintenance activities at the well sites will likely impact raptors using the nests. Stopped vehicles, particularly when occupants exit the vehicle, have been reported to provoke negative responses from nesting or perching raptors more often than moving vehicles (Romin and Muck 1999). Some tolerance of disturbance is expected, but avoidance or abandonment of the nest may occur from implementation of the proposed project. As discussed in the bald eagles section (Section 4.2.3.3.1), the USFWS recommended relocation of the 12-0871 well and associated access roads to it and the 21-0871 well. Please refer to this section for a discussion of why the well and the access road to the 21-0871 well were not relocated. Fidelity was asked to provide operator committed measures to mitigate impacts that may result from proximity of the well and access road placement to the nests.

Figure 4.3 Proposed and existing infrastructure within 0.5 mile of documented raptor nests within the Hill Prong North project area



4.2.3.5.2. Cumulative Effects

The cumulative effects associated with Alternatives B 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.

4.2.3.5.3. Mitigation Measures

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.

Fidelity has committed to limiting human presence in the area if nest 12253 becomes active. If the nest is active, seasonal stipulations will be observed during drilling, completion, and workover operations (to be applied as a condition of approval).

Fidelity has also committed to the following measure (to be applied as a condition of approval) to mitigate potential impacts to nests 211, 212, and 12251:

- Fidelity would attempt to postpone major maintenance or workovers on the wells between Feb 1 and July 31 (Raptor Nesting), when the nests are occupied. Any major work beyond routine maintenance

and inspection would require Fidelity to submit an exception request to BLM describing the level and timing of the work; BLM would mobilize to observe the nest for occupancy and if so, determine to grant Fidelity access or not based on site conditions.

4.2.3.5.4. Residual Impacts

Even with a timing limitation, raptors may abandon nests due to alteration in foraging habitats associated with development or because of sensitivity to well or infrastructure placement. Declines in breeding populations of some species that are more sensitive to human activities may occur.

4.2.3.6. Plains Sharp-tailed Grouse Effects

4.2.3.6.1. Direct and Indirect Effects

Direct and indirect effects to sharp-tailed grouse are described in the PRB FEIS (pg. 4-221 to 4-226) and expected are similar to those described in section 4.2.3.1.3(sage-grouse).

4.2.3.6.2. Cumulative Effects

The cumulative effects to sharp-tailed grouse are described in the PRB FEIS (pg. 4-221 to 4-226).

4.2.3.6.3. Mitigation Measures

No mitigation is proposed with alternative B.

4.2.3.6.4. Residual Impacts

No residual impacts are anticipated.

4.2.3.7. West Nile Virus

4.2.3.7.1. 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.

4.2.3.7.2. Cumulative Effects

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.

4.2.3.7.3. Mitigation Measures

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.

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.

4.2.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Tongue 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.

Fidelity E&P proposes to add the water produced from this project to existing water management infrastructure including off channel pits, land application disposal, subsurface drip irrigation and injection wells.

The maximum water production is predicted to be 20.0 gpm per well or 100 gpm (0.22 cubic feet per second (cfs) or 161.3 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 Tongue River drainage, the projected volume produced within the watershed area was 15,654 acre-feet in 2011 (maximum production is estimated in 2006 at 22,351 acre-feet). As such, the volume of water resulting from the production of these wells is 1.0% of the total volume projected for 2011. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.2.4.1. Groundwater

4.2.4.1.1. Direct and Indirect Effects

The PRB FEIS predicts an infiltration rate of 39% to groundwater aquifers and coal zones in the Upper Tongue River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 39 gpm will infiltrate at or near the discharge points and impoundments (62.8 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, “the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater.” (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. “The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers.” (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 50 to 820 feet compared to 246 feet to the Upper Roland to 1406 to the Carney coals. The operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

4.2.4.1.2. Cumulative Effects

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

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "...cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65).

4.2.4.1.3. Mitigation Measures

Adherence to the drilling COAs, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures should protect any 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 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 Impoundments Receiving Coalbed Methane Produced Water" (November, 2008). For all new WYPDES permits, the WDEQ requires that the proponent investigate the shallow groundwater at the proposed impoundment locations. Drilling at proposed impoundments began in the spring of 2004. Based on information received from the WDEQ, as of July, 2010, over 2013 impoundment sites have been investigated with more than 2297 borings. Of these impoundments, 264 met the criteria to require "compliance monitoring" if constructed and used for CBNG water containment. Only 135 impoundments requiring monitoring are presently being used. As of the second quarter of 2010, only 20 of those monitored impoundments (14.6%) caused a change in the "Class of Use" of any parameter in the underlying aquifer water.

4.2.4.1.4. Residual Effects

As described in Chapter 3.4.1, the production of CBNG in this project area has already removed some of the water saturation in the coal zones for the production of gas. The production from these wells may add to the drawdown locally.

4.2.4.2. Surface Water

4.2.4.2.1. Direct and Indirect Effects

Produced Water Quality

Table 4.3 shows the average values of EC and SAR as measured at selected USGS gauging stations at high and low monthly flows as well as the Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water (there is no current standard for EC). It also shows constituent limits for TDS, SAR and EC detailed in the project area WYPDES permit, and the concentrations found in the POD's representative water sample.

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

Sample location or Standard	TDS mg/l	SAR	EC µmhos/cm
Primary Watershed at Decker, MT Gauging station			
Historic Data Average at Maximum Flow		0.36	318
Historic Data Average at Minimum Flow		0.86	731
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000		
Livestock Use (Class III)	5,000	8	

Sample location or Standard	TDS mg/l	SAR	EC µmhos/cm
WDEQ Water Quality Requirement for WYPDES Permit # WY0055654 At discharge point	NA	NA	7,500
Predicted Produced Water Quality Commingled Coal Zones (Smith, Dietz 1 &3, Monarch and Carney)	1,660	71.4	2,180

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 1660 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS). The operator is currently providing produced water from surrounding fee wells to the local landowners for irrigation use.

The quality for the water produced from the commingled target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 20.0 gallons per minute (gpm) is projected to be produced from these 5 wells, for a total of 100 gpm for the POD. The quality for the water produced from the target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD.

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 Permit # WY0055654 and WY0055379 Part 2 page 2):

pH	6.5 to 9.0
Specific Conductance	7500 mg/l max
Dissolved iron	1000 µg/l max
Total Arsenic	150 µg/l max
Chlorides (WY0055654)	230 mg/l
Chlorides (WY0055379)	2000 mg/l

The WYPDES permits prohibit discharge from impoundments except in the event of a 50 year/24-hour storm event.

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

Produced Water Control

There are 5 existing discharge points associated with this project. They have been appropriately sited and

utilize appropriate water energy dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 5 existing impoundments would be utilized outside of the project area. These impoundments disturb approximately 31.6 acres including the dam structures. Of these water impoundments, all 5 are off-channel pits which facilitate evaporation and infiltration of CBNG water. Criteria identified in “Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming” (WDEQ, 2002) was used to locate these impoundments.

Produced Water Quantity

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 0.03 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Tongue River of 5 cfs (PRB FEIS pg 4-94). The predicted maximum discharge rate from these 5 wells is anticipated to be a total of 100 gpm or 0.22 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in Badger Creek from this action (0.03cfs) may add a maximum 0.024 cfs to the Upper Tongue River flows, or 0.5% of the predicted total CBNG produced water contribution. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP Appendix B-6). Based on the area of the watershed above the impoundments in the POD area (total 6.67 sq mi) and an assumed density of 1 well per location every 80 acres, the potential exists for the development of 54 wells which could produce a maximum flow rate of 1080 gpm (2.4 cfs) of water. The BLM agrees with the operator that this is not expected to occur because:

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

The potential maximum flow rate of produced water within the watershed upstream of the project area, 2.4 cfs, is much less than the volume of runoff estimated from the 2-year storm event for combined drainages (128 cfs).

In-channel downstream impacts are not anticipated based on the requirement for full containment. The WMP for the Hill Prong North POD was prepared by Fidelity Exploration and Production.

4.2.4.2.2. Cumulative Effects

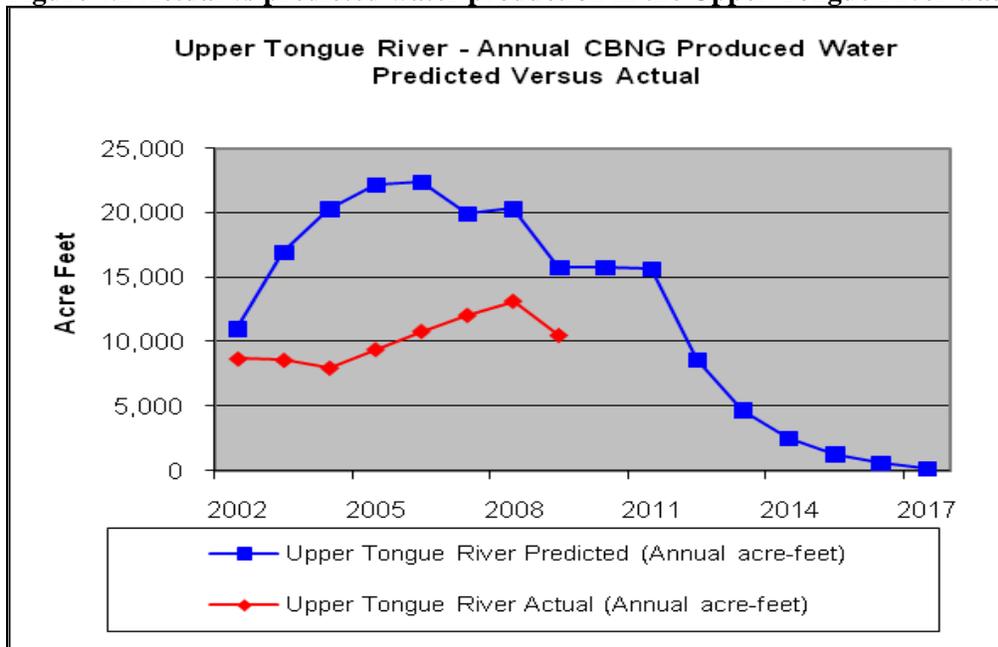
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Tongue River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2009, all producing CBNG wells in the Upper Tongue River watershed have discharged a cumulative volume of 81,044 acre-ft of water compared to the predicted 148,734 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in below. This volume is 54.5% of the total predicted produced water analyzed in the PRB FEIS for the Upper Tongue River watershed.

Table 4.5 Actual vs predicted water production in the Upper Tongue River watershed *2009 Data Update 04-06-10*

Year	Upper Tongue River Predicted (Annual acre-feet)	Upper Tongue River Predicted (Cum acre-feet from 2002)	Upper Tongue River Actual (Annual acre-feet)		Upper Tongue River Actual (Cumulative acre-feet beginning 2002)	
			Ac-ft	% of Predicted	Ac-ft	% of Predicted
2002	11,019	11,019	8,675	78.7	8,675	78.7
2003	16,950	27,969	8,574	50.6	17,248	61.7
2004	20,272	48,241	7,971	39.3	25,220	52.3
2005	22,133	70,374	9,397	42.5	34,617	49.2
2006	22,351	92,725	10,795	48.3	45,412	49.0
2007	19,945	112,670	11,984	60.1	57,396	50.9
2008	20,282	132,952	13,114	64.7	70,558	53.1
2009	15,782	148,734	10,487	66.4	81,044	54.5
2010	15,782	164,516				
2011	15,654	180,170				
2012	8,646	188,816				
2013	4,721	193,537				
2014	2,522	196,059				
2015	1,290	197,349				
2016	601	197,950				
2017	214	198,164				
Total	198,164		81,044			

Figure 4.2 Actual vs predicted water production in the Upper Tongue 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.

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Tongue River drainage, which is approximately 54.5% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to fully contain the volume of water discharged.

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.

4.2.4.2.3. Mitigation Measures

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. Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

The operator has committed to monitor the water discharge points and the channels downstream for stability. If erosion is noted, the operator will be required to repair and stabilize the area using selected mitigation techniques.

The operator has also committed to expediently stabilize and revegetate disturbance within channel and floodplain associated with this project.

4.2.4.2.4. Residual Effects

“Streams enhanced by large volumes of CBM produced water may begin to establish meander patterns on longer wavelengths in response to increased flows. Stream drainages would readjust to their existing natural flows at the end of the project’s life. Downcutting (stream erosion) and sediment deposition (aggradation) are natural processes that occur as stream drainages age through time. Downcutting occurs within the upper reaches of a drainage system as the stream channel becomes incised through erosion, until the slope of the stream and its velocity are reduced and further erosion is limited. Sediment is deposited within the lower, slower reaches of a stream.

Surface drainages could be degraded from erosion caused by increased surface flow, unless rates of CBM discharge and outfall locations are carefully controlled. Increased flows could cause downcutting in fluvial environments, resulting in increased channel capacity over time within the upper and middle reaches of surface drainages.” (PRB FEIS pg 4-118).

4.2.5. Cultural Resources

4.2.5.1. Direct and Indirect Effects

No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 1/14/2011 that no historic properties exist within the APE.

4.2.5.2. Cumulative Effects

Construction and development of oil and gas resources impacts cultural resources through ground disturbance, unauthorized collection, and visual intrusion of the setting of historic properties. This results in fewer archaeological resources available for study of past human life-ways, changes in human behavior through time, and interpreting the past to the public. Additionally, these impacts may compromise the aspects of integrity that make a historic property eligible for the National Register of Historic Places. Recording and archiving basic information about archaeological sites in the proposed project areas serve to partially mitigate potential cumulative effects to cultural resources.

Fee actions constructed in support of federal actions can result in impacts to historic properties. Construction of large plans of coalbed natural gas development on split estate often include associated infrastructure that is not permitted through BLM. Project applicants may connect wells draining fee minerals, or previously constructed pipelines on fee surface with a federal plan of development. BLM has no authority over such development which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. The cumulative effect of numerous federal approvals can result in impacts to historic properties. Archeological inventories reveal the location of sites and although the BLM goes to great lengths to protect site location data, that information can potentially get into the wrong hands. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

4.2.5.3. Mitigation Measures

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).

4.2.5.4. Residual Effects

During the construction phase, there will be numerous crews working across the project area using heavy construction equipment without the presence of archaeological monitors. Due to the extent of work and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

4.3. Summary of Effects

Table 4.6 provides a comparison of the cumulative effects associated with the alternatives.

Table 4.6 Summary of Environmental Consequences for Hill Prong North POD by Alternative

Resource/Species	Alternative A	Alternative B
Wetlands/Riparian Areas	No existing wetlands/riparian areas would be disturbed.	No existing wetland/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.
		Greatest habitat fragmentation.
Raptors	No habitat loss.	Greatest foraging habitat fragmentation.
	No wells authorized near nests.	Two wells and associated infrastructure authorized within 0.5 miles of golden eagle nest 12251. Resource road authorized within 350 feet of nest 12253.
Migratory Birds	No habitat loss.	Greatest habitat loss.
	No habitat fragmentation.	Greatest habitat fragmentation.
	Overhead electric poses predation & collision risk.	No additional overhead power proposed in POD.
Threatened and Endangered Species		
Bald eagle	No habitat loss.	Greatest foraging habitat fragmentation.
	No wells authorized near winter roost.	Two wells and associated infrastructure authorized within 0.5 miles of winter roost site.
	Overhead electricity poses mortality risk from electrocution.	No additional overhead power proposed in POD..

Resource/Species	Alternative A	Alternative B
Sensitive Species		
Greater Sage Grouse	No habitat loss. Predation and collision risk associated with overhead power lines. Grouse may avoid overhead power lines.	Greatest habitat loss. No additional overhead power proposed with POD.
West Nile Virus	No Impact	No additional increase in existing surface water.

5. CONSULTATION & COORDINATION

Agencies summarized in Table 5.1 were consulted on the proposed project to confirm compliance with applicable laws and regulations.

Table 5.1 Consultations

Contact	Title	Organization	Present at Onsite
Danny Powell	Production Manager	Fidelity Exploration and Production	No
Mike Keller	Sr. Environmental Engineer	Fidelity Exploration and Production	No
Renee Kendrick		Fidelity Exploration and Production	No
Scott Johnson	Field Foreman	Fidelity Exploration and Production	Yes
Nolan Olson	Landman	Fidelity Exploration and Production	Yes
Butch Pearson	Drilling Manager	Fidelity Exploration and Production	Yes
Val Snyder		Landowner	Yes
Christine Carter		Landowner	No
Charles Kane		Landowner	Yes
Pauline Schutte	Wildlife Biologist	US Fish and Wildlife Service	Yes
Mary Hopkins	Wyoming SHPO	Wyoming State Historic Preservation Office	No

6. OTHER PERMITS REQUIRED

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

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Appendix B: Resource and Species Worksheets

Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
Air quality	Yes	Yes	Yes	PRB FEIS: 3-291-298, 4-404-406, 4-377-386
Noise	No			
Cultural	No			PRB FEIS: 3-206-228, 4-273-288, 4-394
Native American religious concerns	No			PRB FEIS: 3-218-219, 3-228, 4-277-278
Traditional Cultural Properties	No			PRB FEIS: 3-218-219, 4-277-278
Mineral Potential				PRB FEIS: 3-66-70, 3-230, 4-127-129
Coal	No			PRB FEIS: 3-66
Fluid Minerals	No			PRB FEIS: 3-68-69
Locatable Minerals	No			Add in EA
Other leasables	No			
Salable minerals	No			
Paleontology	No			PRB FEIS: 3-65-66, 4-125-127
PFYC 3	No			PRB FEIS: 3-65-66, 4-125-127
PFYC 5	No			PRB FEIS: 3-65-66, 4-125-127
Rangeland management				Not in PRB FEIS
Existing range improvements	No			
Proposed range improvements	No			
Recreation				PRB FEIS: 3-263-273, 4-319-328
Developed site	No			PRB FEIS: 3-266, 4-326
Walk-in-Area	No			
Social & Economic				PRB FEIS: 3-275-289, 4-336-370
Environmental Justice	No			
Transportation	No			
Soils & Vegetation	Yes	Yes		PRB FEIS: 3-78-107, 4-134-152, 4-153-164, 4-393-394, 4-406
Erosion Hazard	Yes	No		PRB FEIS: 3-82, 4-135
Poor Reclamation Potential	Yes	No		PRB FEIS: 3-86, 4-149-152
Slope hazard	Yes	No		PRB FEIS: 3-81, 4-135
Forest products	No			
Prime and Unique Farmland	Yes	No		
Invasive Species	Yes	Yes		PRB FEIS: 3-103-108, 4-153-172
Wetlands/Riparian	No			PRB FEIS: 4-117-124, 3-108-113, 4-172-178, 4-406
Special Designations				
Proposed ACEC	No			
Wild & Scenic River	No			PRB FEIS: 3-273

Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
Wilderness Characteristics/Citizen Proposed	No		No	USDI Order 3310
WSA	No			
Visual Resources				PRB FEIS: 3-252-263, 4-302-314, 4-403
Class II	No			
Class III	No			
Water				PRB FEIS: 3-1-56, 4-1-122, 4-135, 4-33, 4-405
Floodplains	No			
Ground water	Yes	Yes		PRB FEIS: 3-1-30, 4-1-69, 4-392, 4-405
Surface water	Yes	Yes		PRB FEIS: 4-85-86, 4-117-124, 3-36-56, 4-69-122, 4-393, 4-405
Drinking water	No			PRB FEIS: 3-52, 4-50-52
Wildland Urban Interface	No			
Waste Management	No			
Wildlife				PRB FEIS: 3-113-153, 4-179, 4-247, 4-397
ESA listed, proposed, or candidate species	Yes	Yes		
BLM sensitive species	Yes	Yes		
General wildlife	Yes	Yes		
West Nile virus potential	Yes	Yes		