

**FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR**

**Pennaco Energy, Inc.
Hollcroft/Stotts Draw POD**

ENVIRONMENTAL ASSESSMENT –WY-070-07-021

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Pennaco Energy, Inc.’s Hollcroft/Stotts Draw Coal Bed Natural Gas (CBNG) POD comprised of the following 6 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	HOLLCROFT STOTTS SDU	16-10AW	SESE	10	52N	77W	WYW143158
2	HOLLCROFT STOTTS SDU	12-11AW	NWSW	11	52N	77W	WYW143158
3	HOLLCROFT STOTTS SDU	14-11AW	SESW	11	52N	77W	WYW143158
4	HOLLCROFT STOTTS HOLLCROFT	4-14AW	NWNW	14	52N	77W	WYW159007
5	HOLLCROFT STOTTS HOLLCROFT	6-14AW	SESW	14	52N	77W	WYW159007
6	HOLLCROFT STOTTS (water injection well)	13-11SR	NWSW	11	52N	77W	WYW143158

The following impoundments are approved for the containment of CBNG produced water:

	IMPOUNDMENT	BLM Identifier	Qtr/Qtr	Sec	TWP	RNG	Lease #
	Name / Number						
1	Hollcroft	2-52-77-SESW	SESW	2	52N	77W	FEE
2	Sage	11-52-77-NWNW	NWNW	11	52N	77W	FEE
3	Lindsay#1	10-52-77-NESE	NESE	10	52N	77W	WYW143158
4	Two Fingers	12-52-77-NWNW	NWNW	12	52N	77W	FEE
5	Landslide	11-52-77-SWSE	SWSE	11	52N	77W	WYW143158

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

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

1. The Operator, in their POD, has committed to:
 - Comply with all applicable Federal, State and Local laws and regulations.
 - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
 - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
 - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.

5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.
8. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.
9. Alternative C will not significantly impact the Proposed Area of Critical Environmental Concern, Wilderness Study Area, Visual Class III, sensitive watersheds and soils, or designated elk ranges identified in the Fortification Creek Area (FCA).
10. It best meets the purpose and need for this action.
11. Alternative C is an acceptable plan of development and meets the conditions of the Controlled Surface use lease stipulation that applies to many of the leases within the FCA. (See Section 3.1 of the EA for the CSU stipulation).

SUMMARY OF THE ALTERNATIVES:

Two alternatives were considered in detail: Alternative A-No Action, and Alternative C, Environmentally Preferred.

Alternative A - This alternative would consist of no new federal wells.

Alternative B – Hollcroft/Stotts Draw Plan of Development (POD) for 8 coal bed natural gas well APD's, 2 water injection wells APD and associated infrastructure as proposed by the operator. The wells were proposed at 9 locations with one well to be completed at each location. Under this alternative, 2 of the 9 wells would be drilled within the yearlong elk range identified by the Wyoming Game and Fish Department and BLM. This alternative was not considered because the effects analysis for elk in the Fortification Creek area has not been completed and the cumulative effects analysis in the PRB FEIS did not adequately assess the cumulative effects to the Fortification Creek elk herd.

Alternative C - Consists of 5 CBNG wells, one water injection well and associated infrastructure which fall outside of the elk ranges (16-10AW, 12-11AW, 14-11AW, 4-14AW, 6-14AW & 13-11SR) and incorporates the changes agreed to by BLM and the operator at the onsite inspection. Alternative C incorporates the use of existing roads and new well locations reducing total surface disturbance from Alternative B. The wells are proposed at the same locations as in Alternative B.

The water management plan for the POD proposes to utilize 5 existing impoundments for the storage of CBNG produced water from the federal wells. No additional surface disturbance will be required to utilize the impoundments as proposed by Pennaco Energy Inc. Of the impoundments, 2 are within the elk yearlong range including approximately 1.26 miles of existing roads and infrastructure.

Pennaco Energy Inc. proposes to incorporate 2 existing CBNG gathering facilities into the POD. One of these facilities including 0.63 miles of existing road and infrastructure is within the elk yearlong range however no additional surface disturbance will be required for this facility to be utilized.

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

Impacts that may be both Beneficial and Adverse

Implementation of Alternative C would result in both beneficial and adverse effects. Effects to socioeconomic resources, particularly employment, royalties, and taxes, would benefit the communities in the analysis area. Natural resources would experience adverse direct and indirect effects from the disturbances that would occur once development of CBNG begins. However, Alternative C best meets the

purpose of and need for the project while maintaining appropriate protection for the resources of the PRB through mitigation in the form of stipulations and COAs.

The Degree the Proposed Action Affects Public Health and Safety

Alternative C would have minimal effects on the health and safety of the public in the analysis area. Moreover, implementation of the selected alternative would not increase any risks to the public's health and safety. Activities associated with the development of CBNG are well developed, well known, standardized, and distributed throughout the PRB. Thousands of wells, compressors, pipelines, power lines and other facilities have been constructed in the PRB with little risk to the public's health and safety.

Unique Characteristics of the Geographic Area

The Fortification Creek Area (FCA) has a proposed Area of Critical Environmental Concern (ACEC), wetlands, riparian areas, visual resources, and cultural resources. Mitigation measures and COAs were developed during past analyses, especially the PRB O&G Final EIS, to ensure development of CBNG would occur in a manner that minimizes any effects to the unique characteristics of the PRB. The mitigation measures and COAs selected in the ROD for the PRB O&G Final EIS also would apply to the development of CBNG in the FCA. Therefore, development in the FCA would occur in a manner that would minimize effects to unique characteristics of the analysis area.

Effects on the Quality of the Human Environment with Potential to be Controversial

Overall, implementation of the selected alternative would result in positive short- and long-term socioeconomic effects. Selection of Alternative C would allow for CBNG development which would contribute to the Nation's supply of natural gas and would contribute to the economic development of the PRB overall. Protection measures have been developed and implemented for development activities on other leases in the PRB EIS project area which would also be applied minimizing adverse effects to the human environment, including cultural resources, visual resources, transportation, and recreation.

Effects on the Human Environment that could be Uncertain or Involve Unknown Risks

No uncertain or unknown risks are expected to occur. CBNG wells have been developed on in the analysis area and the PRB. The direct, indirect, and cumulative effects of this development have been extensively evaluated and are documented in various EISs, including the PRB O&G Final EIS, and numerous EAs prepared for APDs. The development that would follow implementation of the selected alternative would involve the same methods and techniques presently in use in the PRB. Thus, no uncertain or unknown risks are expected.

The Degree to which the Action Establishes a Precedent for Future Actions

The actions considered in this decision would not establish a precedent for future actions. Development of CBNG already has occurred in the area. Additionally, development of CBNG has been occurring in the PRB for more than 10 years and the actions in this EA comprise a very small portion of actions already occurring in the PRB. Thus, the actions contemplated in this decision would not establish a precedent for future actions.

Whether the Action is Related to Other Actions with Individually Insignificant but Cumulatively Significant Impacts

The cumulative effects of actions of the development of CBNG in the PRB were fully evaluated in the PRB O&G Final EIS. That cumulative analysis included development that was considered in the present analysis. The alternative selected in this decision incorporates the mitigation measures and COAs identified in the ROD for the PRB O&G Final EIS. Thus, the cumulative effects of the development of CBNG have already been addressed in an EIS.

Adverse Effects on Highways or other Structures, Scientific, Cultural, or Historical Resources

Implementation of the selected alternative is unlikely to result in adverse effects to historic properties or cultural resources. Mitigation measures and COAs developed during past analyses, such as the PRB O&G Final EIS, would ensure development of CBNG would occur in a manner that minimizes any effects to historic properties or cultural resources.

Degree of Adverse Effect on Threatened or Endangered Species

Implementation of the selected alternative is unlikely to result in unacceptable effects to species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). Mitigation measures and COAs developed during past analyses, especially the PRB O&G Final EIS, would ensure development of CBNG would occur in a manner that minimizes any effects to these species. The Biological Opinion issued by the USFWS for the PRB O&G Final EIS was based on the direct, indirect, and cumulative effects of the CBNG development. The terms and conditions identified in the BO become required conditions for the project as approved by the ROD.

Whether the Action Threatens Violation of Federal, State, or Local Law or Requirements for Protection of the Environment

The selected alternative would not violate federal, state, or local laws or other requirements for protection of the environment.

CONCLUSION:

Based on a review of the EA, supporting record, context, and the elements of intensity discussed above, the determination was made that this decision does not constitute a major Federal action that would significantly affect the quality of the human environment, as defined in the Code of Federal Regulations Title 40, Part 1508, Section 27 (40 CFR 1508.27). Therefore, an EIS is not necessary and will not be prepared.

PUBLIC INVOLVEMENT:

The public was provided an opportunity for involvement in the process. Scoping began on May 23, 2006 with issuance of a news release to prepare an EA. The notice solicited comments to assist BLM in identifying specific issues and concerns that it should address in the analysis. The comment period closed on June 23, 2006.

BLM reviewed and analyzed the comments that were received in response to scoping. BLM received 50 letters and e-mails and identified issues. These letters are available for review at the BLM, Buffalo.

The primary issue identified was wildlife and in particular elk.

Issues specific to elk included:

- Loss of security habitat
- Loss of habitat effectiveness, road density and amount of traffic (in particular crucial and partition range)
- Herd viability
- Habitat fragmentation
- Effect upon quality of hunting experience
- Increased potential of the herd being affected by West Nile virus
- Increased potential for poaching
- Current seasonal restrictions may not be adequate

Additional issues identified from the scoping comments, include:

- Loss of wilderness character in the Wilderness study area
- Affects to the integrity of the proposed Area of Critical Environmental Concern.
- Affects upon visual qualities of the area primarily from roads and powerlines.

- Water quality from discharged produced waters.
- Infestation of noxious weeds

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

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

Field Manager: _____ Date: _____

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Pennaco Energy, Inc.
Hollcroft/Stotts Draw POD
PLAN OF DEVELOPMENT
WY-070-07-021**

INTRODUCTION

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

1. PURPOSE AND NEED

The purpose for the proposal is to quantify reserves and produce coal bed natural gas (CBNG) on three valid federal oil and gas mineral leases issued to the applicant by the BLM. The three federal leases include WYW143158, WYW159007, and WYW141579.

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

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

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

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Scoping

The BLM solicited public comments on Hollcroft/Stotts Draw and 6 other PODs in the FCA. The scoping period closed on June 23, 2006. Fifty comment letters were received. These letters are available for review at the BLM, Buffalo. The following issues identified during scoping are pertinent to the Hollcroft/Stotts Draw POD:

The primary issue identified was wildlife and in particular elk.

Issues specific to elk included:

- Loss of security habitat
- Loss of habitat effectiveness, road density and amount of traffic (in particular crucial and partrition range)
- Herd viability

- Habitat fragmentation
- Effect upon quality of hunting experience
- Increased potential of the herd being affected by West Nile virus
- Increased potential for poaching
- Current seasonal restrictions may not be adequate

Additional issues identified from the scoping comments, include:

- Loss of wilderness character in the Wilderness study area
- Affects to the integrity of the proposed Area of Critical Environmental Concern.
- Affects upon visual qualities of the area primarily from roads and power lines.
- Water quality from discharged produced waters.
- Infestation of noxious weeds

Based upon the issues identified by BLM and through the scoping process, the following alternatives were developed for analysis.

2.2. Alternative A - No Action

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

2.3. Alternative B Proposed Action

The project area is located approximately 8.7 miles south of Arvada, WY in northeastern Johnson County, Township 52 North, Range 77 West, Sections 2, 10, 11, 13, and 14, Sixth Principal Meridian. The project area involves private surface overlying federal minerals. The project area is bounded by Petro-Canada’s Mitchell Draw Phase 2 POD to the south-southwest and Pennaco’s Cates Draw approximately 0.5 north-northwest. There is currently no CBNG development adjacent to the project area in any other direction.

Proposed Action Title/Type: Pennaco Energy, Inc.’s Hollcroft/Stotts Draw Plan of Development (POD) for 8 coal bed natural gas well APD’s, 2 water injection wells APD and associated infrastructure(access, electric, gas collection, and water disposal). At each CBNG well location the well targets both the Anderson (A) and the Wall (W) coal seams with the Wall being the deeper seam.

Completion of the construction phase should take approximately two months; one month for well drilling and completion, and one month for construction of the road and utility network. Well life is estimated to be approximately ten years (production phase), and would be immediately followed by the reclamation phase. The entire project from inception through reclamation should take no more than 15-20 years.

A description of the design features, construction practices and water management strategies associated with the proposed action, are included in the Master Surface Use Plan (MSUP), Drilling Plan and Water Management Plan (WMP) for the Hollcroft/Stotts Draw POD. The POD maps illustrate the proposed well location and associated facilities described above.

Proposed Well Information: There were originally 8 CBNG wells proposed within this POD, as follows:

Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
HOLLCROFT STOTTS HOLLCROFT	15-2AW	SWSE	2	52N	77W	WYW141579
HOLLCROFT STOTTS HOLLCROFT	*8-3A	SENE	3	52N	77W	WYW141579
HOLLCROFT STOTTS HOLLCROFT	16-10AW	SESE	10	52N	77W	WYW143158
HOLLCROFT STOTTS HOLLCROFT	14-11A	SESW	11	52N	77W	WYW143158
HOLLCROFT STOTTS HOLLCROFT	12-11A	NWSW	11	52N	77W	WYW143158
HOLLCROFT STOTTS HOLLCROFT	6-13AW	NWSW	13	52N	77W	WYW143158
HOLLCROFT STOTTS HOLLCROFT	4-14A	NWNW	14	52N	77W	WYW159007
HOLLCROFT STOTTS HOLLCROFT	6-14A	SENE	14	52N	77W	WYW159007
HOLLCROFT STOTTS (water injection well)	13-11SR	NWSW	11	52N	77W	WYW143158

*Note: This one CBNG well was withdrawn from the proposed action by the operator at the onsite inspection. See changes made during the onsite inspections for further information.

2.3.1. Changes as a result of the onsite inspection.

Below are the changes to the operator's proposed action agreed to by the operator and BLM during the onsite inspection, for those wells that fall outside the elk ranges. These wells and infrastructure were analyzed in detail by this analysis. It is important to demonstrate that efforts to reduce effects have been pursued.

Table 2.3. Changes agreed to at the onsite

	Well #	TWP	RNG	Sec	QTR	Changes and Comments
WYW141579	8-3A	52N	77W	3	SENE	The well is within the 1/4 mile buffer Zone of a Raptor nest. Moving the well outside the 1/4 mile puts it outside of the quarter section and off of Federal Minerals. The operator withdrew the APD.
WYW143158	16-10AW	52N	77W	10	SESE	The well was moved about 300' west to the edge of the heavy sagebrush, reducing sagebrush loss.
WYW143158	12-11A	52N	77W	11	NWSW	The access was changed by Hollcrofts to come in from the NE following an existing fee corridor.

	Well #	TWP	RNG	Sec	QTR	Changes and Comments
WYW143158	6-13AW	52N	77W	13	SEnw	Proposed 2-track access will be upgraded to a template road with culverts & spot upgrades. There are 3 headcuts that the access will run above that require a 30' vegetated buffer. A gate will be added at the fence crossing near the Landslide Reservoir. A cosway will be built at the upper end of the Landslide Res. to accommodate a channel crossing with a 48" culvert and 14' of fill. The fill will be taken from the kettle of the Landslide Reservoir. BLM requires designs for the cosway and the pad as well as a road diagram for the entire access route. The operator agreed to move the well about 500 feet down hill and withdraw the constructed pad for this well as per BLM recommendation.
WYW151170	4-14A	52N	77W	14	NWNw	Two 18 inch culverts and a low water crossing will be added at 3 small drainage crossings along the proposed 2-track access to the well site.
WYW151170	6-14-A	52N	77W	14	SEnw	The well was moved down hill to a 6% slope to avoid the 13% slope at the staked location.
Water Injection Wells						
WYW143158	13-11SR	52N	77W	11	NWSw	This well was added to the proposed Water Management Plan. The injection well is located outside the elk yearlong range. The access is an existing improved, power will come from overhead that runs next to the site, water will be draw from the Hollcroft Reservoir, that is 300' below the site. The location is flat, grass land. The facility will be built on skid structures and includes a small building approximately 10'X 16' with two 10' diameter water tanks setting on end.
FEE	6-2 SR	52N	77W	2	SWNE	This well was added to the proposed Water Management Plan. The injection well was staked inside the elk yearlong range but over fee minerals. This well was withdrawn by the operator from the POD when identified as inside elk ranges.

Note: The operator was made aware of the following at the onsite inspection.

*Kathleen Hollcroft stated that they prefer that the seed mix used for reclamation be the BLM's recommended seed mix.

*All the wells fall under Bald Eagle timing limitation stipulations.

2.4. Alternative C Environmentally Preferred Alternative

Alternative C consists only of those 5 CBNG wells, one water injection well and associated infrastructure which fall outside of the elk ranges (16-10AW, 12-11AW, 14-11AW, 4-14AW, 6-14AW & 13-11SR) and incorporates the changes agreed to by BLM and the operator at the onsite inspection included in table 2.5. Alternative C incorporates the use of existing roads and new well locations reducing total surface disturbance from Alternative B. The wells are proposed at the same locations as in Alternative B

In addition to the one water injection well, the water management plan for the POD proposes to utilize 5 existing impoundments for the storage of CBNG produced water from the federal wells. No additional surface disturbance will be required to utilize the impoundments as proposed by Pennaco Energy Inc. Of the impoundments, 2 are within the elk yearlong range including approximately 1.26 miles of existing roads and infrastructure.

Pennaco Energy Inc. proposes to incorporate 2 existing CBNG gathering facilities into the POD. One of these facilities including 0.63 miles of existing road and infrastructure is within the elk yearlong range however no additional surface disturbance will be required for this facility to be utilized. According to Pennaco, implantation of this federal project will increase oil and gas related activity related to these existing facilities.

County: Johnson

Applicant: Pennaco Energy, Inc.

Surface Owners: Kathleen Hollcroft

The proposed action was modified following onsite inspections and involves the development of the project, which includes the following:

- Drilling of 5 total federal CBM wells in Anderson and Wall coal zones ranging in depths from 995 to 1,650 feet.
- An unimproved and improved network of existing and proposed roads.
- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 5 existing water discharge points at 5 existing stock water reservoirs within the Upper Powder River primary watershed; 1 proposed stock water tank and drilling of 1 water injection well into shallow sand zones to depths ranging from 350 to 850 feet and installing a pump building and 2 water storage tanks at the location.
- A buried gas, water and power line network.
- An existing overhead power network.

The water management plan for the POD proposes to utilize 5 existing impoundments for the storage of CBNG produced water from the federal wells. No additional surface disturbance will be required to utilize the impoundments as proposed by Pennaco Energy Inc. Of the impoundments, 2 are within the elk yearlong range.

Pennaco Energy Inc. proposes to incorporate 2 existing CBNG gathering facilities into the POD. One of these facilities is within the elk yearlong range however no additional surface disturbance will be required for this facility to be utilized.

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(WMP) in the POD and individual APDs. Also see the subject POD for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003). Table 2.4 below illustrates the disturbance associated with the operator’s proposal with respect to the elk ranges identified by the Wyoming Game and Fish Department as well as distinguishing between those facilities that are existing verses proposed for this project area.

Table 2.4 Proposed Wells and Associated Infrastructure Outside/Inside the Elk Ranges

Outside Elk Ranges		Inside Elk Ranges	
2-Track/Corridor	2.75	2-Track/Corridor	3.98
Utility Corridor	3.06	Utility Corridor	0
Injection well site	0.17	Injection well site	0
Disturbance Total	5.98	Disturbance Total	3.98

2.5. Alternative C – The Environmentally Preferred Alternative

Proposed Well Information:

Table 2.5.

Well Name	Well Number	Qtr/Qtr	Section	TWP	RNG	Lease Number
HOLLCROFT STOTTS SDU	16-10AW	SESE	10	52N	77W	WYW143158
HOLLCROFT STOTTS SDU	12-11AW	NWSW	11	52N	77W	WYW143158
HOLLCROFT STOTTS SDU	14-11AW	SESW	11	52N	77W	WYW143158
HOLLCROFT STOTTS HOLLCROFT	4-14AW	NWNW	14	52N	77W	WYW159007
HOLLCROFT STOTTS HOLLCROFT	6-14-AW	SENW	14	52N	77W	WYW159007
Well Name	Water Injection Well	Qtr/Qtr	Section	TWP	RNG	Lease Number
HOLLCROFT STOTTS	13-11SR	NWSW	11	52N	77W	WYW143158

This alternative analyzes five CBNG and one water injection well(s) proposed with associated infrastructure that is outside of the elk ranges. Two well(s) (15-2AW & 6-13AW) at two separate locations with associated roads and infrastructure lie within the WY Game and Fish Department designated yearlong elk range and are not considered with this alternative. Implementation of committed mitigation measures contained in the MSRP, Drilling Program and WMP, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

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

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

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

2.5.1. Programmatic mitigation measures identified in the PRB FEIS ROD

Programmatic mitigation measures are those, determined through analysis, which may be appropriate to apply at the time of APD approval if site specific conditions warrant. These mitigation measures are applied as COA's and will be adhered to in addition to stipulations applied at the time of lease issuance and any standard COA.

2.5.1.1. Groundwater

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

2.5.1.2. Surface Water

1. Channel Crossings:
 - a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
 - b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
 - c) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
 - d) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
2. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.
3. Concerns regarding the quality of the discharged CBM water on downstream irrigation use may require operators to increase the amount of storage of CBM water during the irrigation months and allow more surface discharge during the non-irrigation months.
4. The operator will be required to provide a reclamation bond for impoundments over federal minerals in the amount specified by a qualified Professional Engineer for the impoundments to be used for the management of CBNG water.
5. The operator will supply a copy of the complete approved SW-4, SW-3, or SW-CBNG permits to

BLM as they are issued by WSEO for impoundments.

2.5.1.3. Soils

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

2.5.1.4. Vegetation

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

2.5.1.5. Wetland/Riparian

1. Wetland areas will be disturbed only during dry conditions (that is, during late summer or fall), or when the ground is frozen during the winter.
2. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.
3. The lower edge of soil or other material stockpiles will be located outside the active floodplain.
4. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphologic configuration and properly stabilized.
5. Reclamation of disturbed wetland/riparian areas will begin immediately after project activities are complete.

2.5.1.6. Wildlife

1. All conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY6633) shall be complied with.
2. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
3. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.5.1.7. Threatened, Endangered, or Sensitive Species

2.5.1.7.1. Bald Eagle

1. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a BLM approved biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.
2. A minimum disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimum disturbance-free buffer zone of one mile will be established for all bald eagle nest sites (February 15 – August 15).

3. A seasonal minimum disturbance-free buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.
4. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).
5. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.5.1.7.2. Ute Ladies'-tresses Orchid

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

2.5.1.8. Air Quality

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

2.5.2. Site specific mitigation measures

1. All changes made at the onsite will be followed. They have all been incorporated into the operator's plan of development.
2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected for the Hollerto/Stotts Draw POD is Covert Green, (18-0617 TPX).
3. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following:

Seed Mix - 10-14" Precipitation Zone for a Shallow Loamy Ecological Site

Species	% in Mix	Lbs PLS*
<i>Western Wheatgrass</i> (Pascopyrum smithii)	50	4.2
<i>Bluebunch wheatgrass</i> (Pseudoroegneria spicata ssp. Spicata)	35	6
<i>Prairie coneflower</i> (Ratibida columnifera)	5	0.6
<i>White or purple prairie clover</i> (Dalea candidum, purpureum)	5	0.6
<i>Rocky Mountain beeplant</i> (Cleome serrulata) /or <i>American vetch</i> (Vicia americana)	5	0.6
Totals	100%	12 lbs/acre

This is a recommended seed mix based on the native plant species listed in the NRCS Ecological Site descriptions, U.W. College of Ag. and seed market availability.

4. The operator will maintain drilling operations within a 150 foot by 150 foot work area for those locations where a constructed pad is not approved as designed including the following well locations: 16-10 AW, 12-11 AW, 14-11 AW, 4-14 AW and 6-14 AW.
5. Top soil will be clearly segregated for all excavation including the entire disturbance area for excavated areas for minor rig leveling, reserve pits, spot upgrades and utility trenches. Segregation will not be required while trenching with wheel trenchers.
6. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:

Reclamation Standards:

 - C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:
 - a. Large rills or gullies.
 - b. Perceptible soil movement or head cutting in drainages.
 - c. Slope instability on, or adjacent to, the reclaimed area in question.
 - C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.
 - C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
 - C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major

landscape features and meet the needs of the planned post disturbance land use.

7. Provide 4" of aggregate where grades exceed 8%.
8. The operator is responsible for having the licensed professional engineer(s) certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.
9. All Pennaco Energy representatives and contractors will have a copy of the approved POD map and conditions of approval with them at all times while conducting activities within the Hollcroft/Stotts Draw project area.
10. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or waterbars shall be placed according to the following spacing:

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

11. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time" (M32). The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Pennaco will coordinate with the BLM to determine if additional resurvey will be required.
12. The contract biologist shall contact the BLM prior to initiating any wildlife surveys.
13. No surface disturbing activity shall occur within one mile of bald eagle habitat (Powder River) annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1 through August 15 (CM8) prior to a nesting survey. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
52/77	10	Well: 16-10-52-77AW ALL project related activities within this ENTIRE section.
52/77	11	Wells: 12-11-52-77AW and 14-11-52-77AW ALL project related activities within this ENTIRE section.
52/77	14	Wells: 4-14-52-77AW and 6-14-52-77AW ALL project related activities within this ENTIRE section.

- a. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
- b. If a nest is identified and construction has not been completed, a minimum disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance-free buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).

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

14. The following conditions will minimize the impacts to raptors:

- a. No surface disturbing activity shall occur within ½ mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following:

Township/Range	Sec.	Affected Wells and Infrastructure
52/77	10	Well:16-10-52-77AW
52/77	10	ALL project related activities within this ENTIRE section.

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

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2005/2006
3053	Red-tailed hawk	411868E 4928976N	NWSE Sec. 3 T52N, R77W	Cottonwood, live	Good	Active/Inactive
3054	Golden eagle	411480E 4928219N	NENW Sec. 10 T52N, R77W	Cottonwood, live	Good	Active/Active
3055	Red-tailed hawk	411497E 4926622N	NENW Sec. 15 T52N, R77W	Cottonwood, live	Good	Active/Inactive
3763	Red-tailed hawk	412536E 4929619N	SENE Sec. 3 T52N, R77W	Cottonwood, live	Excellent	Active/Active
3764	Northern harrier	414112E 4929179N	NESE Sec. 2 T52N, R77W	Ground	Good	Inactive/Active
3765	Great-horned owl	411976E 4929036N	NWSE Sec. 3 T52N, R77W	Cottonwood, live	Good	Inactive/Active
3766	Unknown	411560E 4927457N	NESW Sec. 10 T52N, R77W	Cottonwood, live	Poor	Inactive/Inactive
3767	Red-tailed hawk	411816E 4927139N	SWSE Sec. 10 T52N, R77W	Cottonwood, live	Good	Active/Active
3768	Red-tailed hawk	415512E 4926871N	SWSE Sec. 12 T52N, R77W	Juniper, live	Good	Unknown/Active
3769	Northern harrier	413722E 4925268N	SWSE Sec. 4 T52N, R77W	Ground	Good	Unknown/Active

- d. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
- e. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.

15. The following conditions will minimize the impacts to sage-grouse:

- a. A survey is required for sage-grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist. The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
- b. If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1).
- c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
- d. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours.

16. Please contact Jim Verplancke Natural Resource Specialist, @ (307) 684-1057, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

2.6. Alternatives considered but not analyzed in detail

- Land application disposal of CBNG produced water because an acceptable location was not identified or agreed to by the private surface owner.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on March 21, 2005. Field inspections of the proposed **Hollcroft/Stotts Draw POD** CBM project were conducted on **7/6/2006** by the following personnel:

- Representing BLM:
 - Jim Verplancke, NRS
 - Jennifer Morton, Wildlife Biologist
 - Mike McKinley, Hydrologist
 - Al Sprague, Civil Engineer
- Representing Pennaco Energy:
 - Jeb Beacham, Regulator Compliance Rep.
 - Jay Carlson, Construction
 - Carol Chadwick, Civil Engineer
 - Peter Angelos, Surveyor with Land Survey, Inc
 - Jim Sullivan, Engineer with ATC Associates, Inc
 - Susan Peterson, Project Manager with ATC Associates, Inc
- Landowners:
 - Kathleen Hollcroft

This section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major issues. Coal bed natural gas wells and associated infrastructure including overhead power lines have been constructed on private surface in the vicinity of this proposed action. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table

3.1.

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Jennifer Morton
Floodplains		X		Jim Verplancke, Mike McKinley
Wilderness Values		X		Jim Verplancke
ACECs	X			Jim Verplancke
Water Resources	X			Jim Verplancke, Mike McKinley
Air Quality		X		Jim Verplancke
Cultural or Historical Values			X	Robert C. Wilson
Prime or Unique Farmlands			X	Jim Verplancke
Wild & Scenic Rivers			X	Jim Verplancke
Wetland/Riparian	X			Jim Verplancke, Mike McKinley
Native American Religious Concerns			X	Robert C. Wilson
Hazardous Wastes or Solids		X		Jim Verplancke
Invasive, Nonnative Species	X			Jim Verplancke
Environmental Justice		X		Jim Verplancke

3.1. Critical Elements contained in the Evaluation Area

- 1,700 feet of the existing access within the POD lies inside the elk yearlong range.
- 590 acres of the POD lies within the ACEC with no new disturbance proposed within the 590 acres.
- Of the total 4,300 acres within the POD, 4,100 lies inside the FCA; 200 acres lies outside the FCA. 100% of the new disturbance is proposed within the FCA.

3.2. Fortification Creek Area

The 5 proposed CBNG wells within the FCA are on fee surface. The area has been recognized to contain important resource values since the late 1970's when the BLM Buffalo Field Office established a Management Framework Plan for the entire Field Office area. The area was recognized again in the 1980 Buffalo Resource Area Oil and Gas EA and the Fortification Creek Oil and Gas Surface Protection Plan completed in 1982. The 1985 Resource Management Plan incorporated decisions from both of those documents. Important resources in the FCA include elk crucial winter and calving habitat, high visual quality, a wilderness study area, steep slopes with erosive soils, and significant cultural, historic, and or paleontological values. The Resource Management Plan decisions relevant to the FCA include:

- No overhead power
- The following lease stipulations will apply:
 - Controlled Surface Use – Surface occupancy or use within the Fortification Creek area will be restricted or prohibited unless the operator and surface managing agency arrive at an

acceptable plan for mitigation of anticipated impacts. This may include development, operations and maintenance of facilities.

In particular for elk:

- Protecting elk critical winter and parturition range.
- Protecting Fortification Creek Wilderness Study Area..
- All other lease stipulations that may apply.
- Class III visual resource management objectives

The Hollcroft-Stotts Draw POD borders the Fortification Creek Area (FCA) on the west. The 1985 Buffalo Field Office Resource Management Plan (RMP) identified the (FCA) because it contains a combination of important resources such as wildlife habitat including an isolated elk herd, high visual quality, a wilderness study area, steep slopes and erosive soils, and significant cultural, historic or paleontological values. The Hollcroft/Stotts Draw project’s original proposal contained designated critical winter and yearlong range for this elk herd. The FCA has considerable interest for many uses as evidenced by the Sierra Club’s nomination as an Area of Critical Environmental Concern (ACEC) and the Wyoming Wilderness Association’s request to expand the Wilderness Study Area (WSA).

Table 3.2. FCA Mineral and Surface Ownership in acres

	Surface	Mineral
BLM	44,416	83,000
Private and State	48,138	14,834

The Hollcroft/Stotts Draw POD boundary encompasses approximately 4,300 acres of private surface with 3,222 acres lying over 3 federal mineral leases (WYW143158, WYW141579 & WYW159007). There are no federally owned lands within the project area.

3.3. Topographic Characteristics of Project Area

The Hollcroft/Stotts Draw POD is within the Powder River Basin (PRB) which lies within the Missouri Plateau of the northern Great Plains ecological region (Kuchler, 1964; Bailey, 1976). The dominant physiographic character of the uplands is one of a gently rolling prairie occasionally punctuated by prominent, non-eroded buttes and ridges. The entire project area is within the Fortification Creek Watershed tributary of the Upper Powder River. The Fortification Creek watershed lies on both sides of the main stem Upper Powder River with tributaries Bull Creek and Stotts Draw on the East side of the river. These tributaries are immediately adjoined by steeply eroded "draws" and "breaks" (i.e., ridges and canyons) surrounding subordinate ephemeral or intermittent streams in the drainage bottoms for several miles distant from the main stem river. Typical of the Powder River Breaks, many slopes are steep ranging from 15% to more than 25%. Hillside appear terraced, and hilltops are generally at uniform elevations. The Upper Powder River valley within this area has relatively wide (i.e., 1-2 miles), flat floors with terraced floodplains. Elevations within the project area range from 3,500 to 4,200 feet above sea level.

The regional climate is mid-latitude, interior continental, with relatively long, cold winters and relatively short, warm-hot summers and distinct spring and fall shoulder seasons. The summer growing season (frost free) typically ranges from 95-130 days (ave. = 120 days) between late May and mid-September, with considerable daily variation and occasional cool periods. On the plains, average daily temperatures typically range from 5-10 (low) and 30-35 (high) degrees Fahrenheit in mid-winter, and between 55-60 (low) and 80-85 (high) degrees Fahrenheit in mid-summer. The regional climate is considered semi-arid, and typically, total annual precipitation ranges from 10-14 inches, with most of that coming as rain between May and September. Snowfall varies from year-to-year, but it is common to have continuous

snow cover for a period of 60 days or more in a "normal" winter. Annual prevailing winds are from the southwest, but local conditions vary. Arctic air masses with strong winds commonly occur during the winter months, and air masses from the Gulf of Mexico sometimes influence summer weather conditions.

3.4. Vegetation & Soils

Vegetation within the Hollcroft/Stotts Draw POD is predominately sagebrush-steppe and juniper woodlands. However, a variety of plant communities are present on the landscape. The Upper Powder River bottoms and valley floor are characterized by the presence of riparian gallery forests featuring an overstory of cottonwoods (*Populus* spp.), willows (*Salix* spp.), elms (*Ulmus* spp.), and green ash (*Fraxinus* spp.) (Burgess et al, 1973; Johnson and Burgess; Jones and Walford, 1995). Moving out of the river bottoms up into the larger tributaries, the larger trees drop out of the vegetation leaving mostly boxelder (*Acer* spp.), and several large shrub species such as buffaloberry (*Shepherdia* spp.), hawthorn (*Crataegus* spp.), serviceberry (*Amelanchier* spp.), and chokecherry and wild plum (*Prunus* spp.) in predominance. At the very heads of drainages, shorter shrubs such as skunkbrush (*Rhus* spp.), snowberry (*Symphoricarpos* spp.), basin big sagebrush (*Artemisia tridentata tridentata*) and sometimes silver sagebrush (*Artemisia cana*) are visually dominant here and in mesic swales (Boldt and Severson, 1977; USDA-NRCS). The steep sloped (often 45E-60E) ridges and benches in the "breaks" of the project area are typically a shallow clay loam clay with a high sand component, sometimes capped with sandstone outcrops and are usually only sparsely vegetated. Typical shrubby vegetation of these clay/shale ridges include: Wyoming big sage-brush (*Artemisia tridentata wyomingensis*), skunkbush, rabbitbrush (*Chrysothamnus* spp.), saltbush (*Atriplex* spp.), greasewood (*Sarcobatus* spp.), and sometimes various species of juniper (*Juniperus* spp.) (Judd, 1939; Whitman and Hanson, 1939; and Brown, 1971). On the upland "benches" and more gently sloping "bowls" the vegetation is characteristically prairie grassland and shrub-steppe. The dominant vegetation present is Wyoming big sagebrush with both warm and cool season grasses intermixed to various degrees (Shiflet, 1994). Rocky Mountain juniper (*Juniperus scopulorum*) is common along Bull Creek and Stotts Draw.

Wyoming big sagebrush occurs throughout the project area in a patchy mosaic of sparse to moderately dense stands and plant height is typically 12-24 inches. Small scattered stands of silver sage were documented within many of the main and smaller drainages throughout the project area. Moderately dense stands of greasewood are present along the Powder River, especially in NWSE Section 10.

Stands of cottonwood are located along the Powder River and extend into the lower reaches of Fortification Creek. These stands range from smaller dead, dying, or healthy cottonwoods ranging from 7 to 13 feet in height, to large, dense stands of mature (15-25 feet) trees. Cottonwood saplings were also observed at the edges of some of the larger stands. Lone individuals of small stands of juniper are present along many draws and slopes in the eastern portion of the project area. Current land uses within the project area include livestock grazing and CBM development.

Land cover within the POD consists of approximately 50% sagebrush grasslands, 45% grasslands, 2% woodlands, >2% other (bare rock or soil, water gas wells, roads, etc.) and <1% water. Common grasses within the project area include cheatgrass, Japanese brome, needle-and-thread, and blue gramma.

Fragile watersheds and soils were noted as resource values in the FCA. The soils vary from primarily loamy to very sandy throughout the Hollcroft/Stotts Draw POD project area. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0-4 inches on ridges to 20-60 inches in bottomland. Erosion potential varies from high to moderate depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. The soils in the areas proposed for disturbance were found to be both loamy and sandy with fair potential for reclamation.

3.4.1. Wetlands/Riparian

Gallery forests of cottonwoods, willow, elms and green ash dominate the overstory of the riparian areas within the Hollcroft/Stotts Draw POD with those large shrubs and grasses associated with sandy soil types prevalent in the understory. Many of the riparian vegetation communities, and some of the upland landscape (particularly where machinery could be used), has been, and continues to be, disturbed for agriculture and Oil and Gas industrial purposes. The vegetation of these disturbed locations varies, and invasion by noxious weeds is of particular concern at these sites.

3.4.2. Invasive Species

Within the Hollcroft/Stotts Draw POD, Russian knapweed, leafy spurge and salt cedar, state-listed noxious weeds infestations were discovered by a search of inventory maps and/or databases compiled by the NRCS and Johnson County Weed & Pest. Salt cedar was also identified within the project area during subsequent field investigation by proposed operating proponent and BLM. The operator has submitted an Integrated Pest Management Plan to the BLM with this POD that describes how noxious weeds will be controlled at disturbed areas within the project area.

3.5. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Thunderbird – Jones & Stokes (TJS). TJS performed surveys for Ute ladies'-tresses orchid, bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006.

A BLM Biologist conducted a field visit on July 6, 2006. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose. A Biological Assessment was prepared by a BLM biologist. The Biological Assessment was submitted to the U.S. Fish and Wildlife Service (USFWS) for consultation.

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

3.5.1. Big Game

Big game species expected to be within the Hollcroft-Stotts Draw project area include pronghorn antelope, mule deer, white-tailed deer and elk.

3.5.1.1. Elk

Elk occur throughout the state of Wyoming in a variety of habitats, including coniferous forests, mountain meadows, short and mixed grass prairies, sagebrush and other shrublands. Elk rely on a combination of grasses and forbs, depending on their availability throughout the seasons. Elk tend to be migratory, moving between summer and winter ranges. Typically, mortality is a result of predation on calves, hunting, and winter starvation. Predators include coyotes, mountain lions, bobcats, bears, and golden eagles.

Elk occurred in the Fortification Creek area historically. However, due to the lack of roads and difficult access, little information on numbers and distribution are known. The Fortification elk herd was re-

established in 1952 and 1953 by the release of transplanted elk from Montana. Another transplant of 19 yearling bulls from the Jackson area was released into the area in 1974. Over the years the herd has gradually increased to a 1990 post season population estimate of about 400 elk. Currently there are an estimated 230 elk in the Fortification herd, down from an average of 272 in 2002. The current Wyoming Game and Fish Department (WGFD) objective for the herd is 150.

In 1992 a 2.5 year study of the Fortification elk herd was initiated by the WGFD in cooperation with the BLM and area landowners, with the collaring of 17 cow elk. Data from this study allowed better delineation of the elk ranges. In 2005, a second study was initiated and 26 elk were collared. These studies indicate high use of ponderosa pine, juniper, and draw habitats by the elk.

The Hollcroft-Stotts Draw project contains suitable year round habitat for elk and documented use. The data collected from both studies document the following elk observations within and surrounding the project area from 1992-1995 and 2005-2006. In April, August and October of 2005, elk were recorded at three locations within one mile of the project area. One elk was recorded within one mile of the project area in each of May, June, July, September, and November of 2005. Two elk locations were recorded in March of 2006 within one mile of the project area. On May 13, 2004, T-J&S observed 11 elk along a slope in NENE Section 13, just south of Bull Creek.

3.5.1.2. Deer/Antelope

The project area is part of the Gillette and Ucross antelope herd units. The 2004 estimated herd population for the Gillette herd unit was 13,985 with a population objective of 11,000 and for the Ucross herd unit, the 2004 estimated herd population was 4145 with a population objective of 2500 (WGFD 2004).

Mule deer within the project area belong to the Powder River herd unit. Mule deer populations for this herd unit have been increasing since 1998 with a 2004 population estimate of 55,561 animals, and a herd objective of 52,000 (WGFD 2004).

White-tailed deer within the project area belong to the Powder River herd unit. The 2004 estimated herd population estimate of 12,716 animals, and a herd objective of 8,000 (WGFD 2004).

The WGFD has designated the northwest half of the project area as yearlong range for antelope. The west half of project area is designated as winter-yearlong range and the eastern half as yearlong range for mule deer. The western edge of the project area is designated as yearlong range for white-tailed deer. Populations of pronghorn antelope, mule deer and white-tailed deer within their respective hunt areas are well above WGFD objectives.

3.5.2. Aquatics

The project area is drained by Bull Creek and Stotts Draw, ephemeral tributaries of the Powder River, and the Powder River itself. No springs were documented within the project area.

The Powder River, adjacent to the western boundary of the POD, is one of the last free-flowing prairie stream ecosystems left in the United States; with existing flows, turbidity, and water quality within historic ranges. Due to this, the Powder River still supports an intact native fish community including several rare or declining species. These species have evolved life history strategies that allow them to survive in extreme conditions (Hubert, 1993). Native fish species include sauger, shovelnose sturgeon, goldeye, plains minnow, sand shiner, flathead chub, plains killifish, river carp sucker, sturgeon chub, western silvery minnow, channel catfish, fathead minnow, longnose dace, mountain sucker, shorthead redhorse, longnose sucker, stonecat, white sucker and others. Six of these are designated by the Wyoming Game and Fish Department as either Native Species Status (NSS) 1, 2, or 3 species. Species in

these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act.

NSS1 species (sturgeon chub and western silvery minnow) are those that are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions are declining or vulnerable. **NSS2 species** (goldeye, shovelnose sturgeon, and sauger) are physically isolated and/or exist at extremely low densities throughout their range, and habitat conditions appear to be stable. **NSS3 species** (plains minnow) are widely distributed throughout their native range and appear stable; however, habitats are declining or vulnerable. For these species, the WGFD has been directed by their Commission to recommend that no loss of habitat function occur. Some modification of the habitat may occur, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged).

The sturgeon chub was petitioned for listing under the Endangered Species Act in 2000. The Sturgeon Chub is a small minnow native to WY and is known to occur only in the Powder River and in one location on Crazy Woman Creek. The Sturgeon Chub requires large, free-flowing rivers characterized by swift flows, high variable flow regimes, braided channels, high turbidity and sand/gravel substrates. On April 18, 2001, the U.S. Fish and Wildlife Service determined that the listing was not warranted, due to the sturgeon chub population being more abundant and better distributed throughout their range than previously believed.

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available for them.

3.5.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.5.4. Raptors

Ten raptor nest sites were identified by TJS within 0.5 mile of the project area, seven of which were active in 2006 (Table 4.).

Table 4. Documented raptor nests within the Hollcroft-Stotts Draw project areas in 2006.

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2005/2006
3053	Red-tailed hawk	411868E 4928976N	NWSE Sec. 3 T52N, R77W	Cottonwood, live	Good	Active/Inactive
3054	Golden eagle	411480E 4928219N	NENW Sec. 10 T52N, R77W	Cottonwood, live	Good	Active/Active
3055	Red-tailed hawk	411497E 4926622N	NENW Sec. 15 T52N, R77W	Cottonwood, live	Good	Active/Inactive
3763	Red-tailed hawk	412536E 4929619N	SENE Sec. 3 T52N, R77W	Cottonwood, live	Excellent	Active/Active
3764	Northern harrier	414112E 4929179N	NESE Sec. 2 T52N, R77W	Ground	Good	Inactive/Active
3765	Great-horned owl	411976E 4929036N	NWSE Sec. 3 T52N, R77W	Cottonwood, live	Good	Inactive/Active
3766	Unknown	411560E	NESW Sec. 10	Cottonwood,	Poor	Inactive/Inactive

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2005/2006
		4927457N	T52N, R77W	live		
3767	Red-tailed hawk	411816E 4927139N	SWSE Sec. 10 T52N, R77W	Cottonwood, live	Good	Active/Active
3768	Red-tailed hawk	415512E 4926871N	SWSE Sec. 12 T52N, R77W	Juniper, live	Good	Unknown/Active
3769	Northern harrier	413722E 4925268N	SWSE Sec. 4 T52N, R77W	Ground	Good	Unknown/Active

3.5.5. Threatened and Endangered and Sensitive Species

3.5.5.1. Threatened and Endangered Species

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

3.5.5.1.1. Black-footed ferret

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

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

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

Four black-tailed prairie dog colonies were identified during site visits by TJS within the project area. One partially active colony is present in east-central Section 2. The colony encompasses 70.1 acres, but only the extreme northwestern portion of the colony was active in 2006. One large, inactive colony (overgrown, collapsed burrows) encompasses 184.9 acres and ranges from SE Section 2 to NW Section 12. Two more active colonies within the project area are located in central Section 11 (230.0 acres) and SWSW Section 11 / NWNW Section 14 (15.7 acres).

3.5.5.1.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000, but as yet no final decision has been made.

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

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

The Hollcroft-Stotts Draw project is located adjacent to the Powder River. Adequate bald eagle nesting and roosting habitat occurs within and adjacent to the project area in Sections 34, T53N, R77W, and 3, 10, and 16, T52N, R77W. Woodlands are relatively prevalent within the project area. Stands of cottonwoods are scattered along the Powder River and extend into the lower reaches of Fortification Creek. These stands range from copses of smaller dead, dying, or healthy cottonwoods ranging from 7 to 15 feet in height, to large stands of mature (15-25 feet) trees.

No potential nests were identified during consultants (Gregory 2006) or BLM biologist's site visits, within the immediate project area or extending one mile from proposed activities. TJS performed aerial winter roost surveys. During 2004-05 winter roost surveys, several bald eagles were documented approximately 1.2 miles north of the project area along the Powder River. Those sightings were either single individuals or pairs. No bald eagles or bald eagle nests were observed on or within one mile of the project area during spring 2004 surveys. During the 2005-06 winter roost surveys, three separate observations of adult bald eagles perched in cottonwood trees along the Powder River were documented. On December 16, 2005, one adult was observed in NWSW Section 16, approximately one mile west of the project area. On January 17, 2006, two separate individuals were documented: one within the project area in NENE Section 3, and one approximately 0.5 mile west of the project area in NWNE Section 16.

BLM records indicate that the nearest known "current" bald eagle roost is located approximately 15.2 miles northwest of the project area, along Clear Creek, and an "old" roost is located 4.5 miles north of the project area.

3.5.5.1.3. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

Produced water will be contained in five existing on-channel reservoirs. Due to rough terrain and the lack of a perennial or late season water source, the only potential Ute ladies'-tresses habitat identified within the project area is along the Powder River. Dense cottonwoods and steep banks render much of the riverbed unsuitable for the orchid, but flat, open sandbars are present in a few areas. The sandbars are partially vegetated with wetland species such as sedges and rushes. However, those areas are considered only marginal habitat, as alkaline conditions are present (apparent as a visible crust) along the exposed stretches of soil and rocks at the high water mark.

3.5.5.1.4. Sensitive Species

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

3.5.5.1.5. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Their decline is related to multiple factors including, habitat destruction, poisoning, and Sylvatic plague.

Four black-tailed prairie dog colonies were identified during site visits by TJS within the project area. One partially active colony is present in east-central Section 2. The colony encompasses 70.1 acres, but only the extreme northwestern portion of the colony was active in 2006. One large, inactive colony (overgrown, collapsed burrows) encompasses 184.9 acres and ranges from SE Section 2 to NW Section 12 (Brown 2006). Two more active colonies within the project area are located in central Section 11 (230.0 acres) and SWSW Section 11 / NWNW Section 14 (15.7 acres).

3.5.5.1.6. Greater sage grouse

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

Sagebrush habitats, primarily those in the eastern and northwestern portions of the project area, are adequate to support sage-grouse throughout the year. No documented sage-grouse leks are present within two miles of the project area. A single male sage-grouse was seen in grass beside the road in NWNE Section 2 on May 3, 2005. No other grouse, leks, or grouse sign was documented on or near the project area by TJS during aerial and ground surveys in 2005 or 2006.

3.5.5.1.7. Mountain plover

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

Suitable plover habitat is limited to the prairie dog colonies and sparse grasslands within the north and east central portions of Section 2, and the northwestern portions of Section 11. No mountain plovers were observed on or near the project area during surveys conducted in spring 2005 or 2006.

3.6. West Nile Virus

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

Since its discovery in 1999 in New York, WNV has been firmly established in the United States and has continued to spread west. Birds are the natural vector host and serve not only to amplify the virus, but spread it rapidly throughout the country since they are the only known animal to infect mosquitoes. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting

the virus to humans, horses, and wildlife. The *Culex* genus appears to be the most important mosquito group that vector, WNV.

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

Table 3.5 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5
2005	12	4	6	3

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

Although most of the attention has been focused on human health issues, WNV has had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNV had been detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations have incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNV. During 2003, 36 raptors were documented to have died from WNV in Wyoming including Golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, Cooper’s hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson’s hawk (Cornish et al. 2003). Actual mortality is likely to be greater. Population impacts of WNV on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNV in the PRB in 2003. While birds infected with WNV have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

Mosquitoes can potentially breed in any standing water that lasts more than 4 days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNV mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNV, such as some *Culex* species, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this

environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

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

3.7. Water Resources

The project area is within the Fortification Creek watershed, tributary to the Upper Powder River system. Bull Creek and Stotts Draw and the unnamed tributaries of the watershed are ephemeral streams that flow mostly in response to precipitation and snow melt. Mean annual flow and peak stream flow estimates for the WMP were determined using the basin-characteristics method for the plains region as described by Lowham (1998). Annual flow was estimated at 13.52 acre feet per year. Peak stream flow for a 2-year event was calculated to 7.73 cfs per square mile. The area of the Bull Creek and Stotts Draw watersheds is 21.7 square miles. The average annual precipitation for this area is approximately 11.55 inches, as derived from the studies presented by the USDA, 20-year average for the Arvada, WY rain gauge. More than half of the annual precipitation occurs during the growing season, with April, May and June being wettest months.

3.7.1. Groundwater

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

The ROD includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation 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 BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a

regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 27 registered stock and domestic water wells within the POD boundary ranging in depth from 3 to 1,040 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.7.2. Surface Water

The project area is within the Fortification Creek watershed which is tributary to the Upper Powder River primary 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 Hollcroft/Stotts Draw POD. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area” (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, Wyoming (PRB FEIS page 3-49).

No natural springs were identified within the Hollcroft/Stotts Draw POD boundary by the operator. A search of the Wyoming State Engineer Office (WSEO) Surface Water Rights Database for this area showed no natural springs.

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

3.8. Cultural Resources

A Class III cultural resource inventory was conducted for the **Hollcroft/Stotts Draw POD** project prior to on-the-ground project work (BFO project no. 70050146). No cultural properties were reported within the footprint of the federal undertaking.

3.9. Proposed Area of Critical Environmental Concern

In the late 1990’s Federal portions of the area were proposed (through petition) as an Area of Critical Environmental Concern (ACEC) designation. Relevance and importance criteria are centered on the

unique prairie elk herd. The BLM verified that the proposed ACEC met the relevance and importance criteria in the 2003 Powder River Basin EIS. A final decision on ACEC designation was deferred for future planning analysis. The ROD for that EIS states, “When APDs are received that encompass these areas, mitigation measures will be reevaluated and/or additional site-specific mitigation would be implemented to ensure protection of values for meeting relevance and importance criteria.” The closest proposed well in this POD is approximately 0.45 miles from the proposed ACEC.

3.10. Visual Resource Management

The FCA is designated as a visual Class III resource. The objective for Class III is to provide for management activities that may contrast with the basic landscape elements, but remain subordinate to the existing landscape character.

3.10.1. Description of Visual Elements of the Project Area

3.10.1.1. Form

The project area is part of a land type known as the Powder River Breaks located at the edge of the river valley. It varies from a float valley floor to predominately hilly with moderate elevation change. There is some visual variety in the landscape. The vegetation on the valley floor consists of irregular patches of sagebrush and fairly large expanses of grass with stands of mature cottonwood trees and willow under story adjacent to the Powder River. The back lying landscape overall is made up of distinct hills with steep slopes, fairly deep, eroded drainages, and long ridges. It is fairly rough, broken country as implied by the name. There are some rock outcrops as well as slopes that, because of a rapid rate of erosion, appear devoid of vegetation. Any typical view in the project area contains foreground – middle ground as well as background images. The country is rough and broken enough that well designed projects such as coal bed natural gas development may be concealed by the landforms.

3.10.1.2. Line

There is a fairly strong horizontal alignment to the landscape, mainly because the hills are of relatively uniform height and because of the long ridges in the area. At a smaller-than- landscape scale, the hills and drainages are outlined by diagonal lines, formed by the sides of individual steep hills. In places the element line is a jumble of criss-crossing diagonal lines, a result of the substantially eroded landscape.

The line of vegetation is much more subtle and is a result of changes in species composition and density of the vegetation. The line of vegetation is not a dominant feature in the landscape.

The existing structures (tanks) have a fairly strong vertical alignment.

3.10.1.3. Color

The color of the landforms is a light buff to tan with occasional red outcrops of scoria. The color of the soil and rock is mostly obscured by vegetation.

During the spring of the year the landscape has a strong green color due to the lush grass. The sagebrush provides greenish gray accents and where sagebrush predominates, greenish gray is the dominant color. Juniper appears as clumps and blotches of dark green. The vegetation that provides a constant color through the seasons is sagebrush and juniper. The grass varies from lush green in the spring and early summer to tan-to-beige from late summer through the winter and early spring. While no single color fits all seasons, colors from the BLM Standard Environmental Color Charts that come the closest to matching the natural colors in the landscape are Carlsbad Canyon, Covert Green, Slate Gray, and Dune.

The existing structures are a variety of colors, ranging from white to red to silver. Many are in various stages of repair and show effects of rusting and weathering.

3.10.1.4. Texture

The texture of the land is mostly medium due to the ruggedness of the hills. The vegetation is smooth to coarse. Grasses tend to exhibit a smooth texture, sagebrush a medium to coarse texture, and juniper a coarse texture. Structures have smooth surfaces but due to their nature add a degree of coarseness to the landscape.

It is a classic panoramic Wyoming landscape which creates a feeling of vastness and open space. There is no adjacent scenery that either adds or detracts from the visual quality of the area.

3.10.2. Visual Resources

Key Observation Point(s) (KOPs) for this project area are the ranch headquarters along the main access into the project area and Lower Powder River Road (County road). The Hollcroft's ranch house is on the east side the Upper Powder River and the Lower Powder River Road is on the west side of the river. The Powder River Road was a possible KOP but it is an average of 1½ miles from the project area, thus the project is not very visible from that road.

The project area is mostly sagebrush – grass area on the edge of the Powder River Breaks. The terrain is hilly. Some of the proposed well sites are obscured from view from the KOPs by topographic features. Most roads to the sites are existing. Views from the KOPs toward the project area include power lines, fences, roads, buildings. These are visible and noticeable but, with the exception of the large power line, not dominant. A couple of the structures are CBM facilities.

3.11. Recreation

There is no legal public access to any of the POD area. Land owners have allowed limited public access upon request. The Fortification Creek area has been popular with the hunting public because of the limited access and because it is one of the few large land blocks available within the Powder River Basin.

4. ENVIRONMENTAL CONSEQUENCES

Three alternatives are being considered a. No action, B. proposed action with modifications, C. Proposed wells outside elk ranges with modifications .

4.1. Vegetation & Soils Direct and Indirect Effects

Table 4.1 Comparison Summary of Effects by Alternative

Element	Alternative A – No Action	Alternative B – Proposed Action	Alternative C – Environmentally Preferred	Duration of Disturbance
CBNG Well(s) (Acres)	0	8 (0.8)	5 (0.5)	Long Term
Water Injection Well(s) (Acres)	0	1 (0.17)	1 (0.17)	Long Term
Constructed Pads	0	0	0	Long Term
Miles Improved Roads (Acres)				
Without Utility Corridor	0	Existing	Existing	Short Term
With Utility Corridor	0	Existing	Existing	Short Term
Miles of 2-Track Roads (Acres)				
Without Utility Corridor	0	0	0	Long Term
With Utility Corridor	0	1.1 (3.7)	0.3 (0.8)	Long Term
Channel Disturbance	0	0.1	0.1	Short Term
Miles of Buried Pipelines (Acres)				
Without Utility Corridor	0	0	0	Short Term
With Utility Corridor	0	1.6 (5.0)	1.6 (5.0)	Short Term
Miles of Buried Power Cable Without Corridor (Acres)	0	0.7 (1.2)	0.7 (1.2)	Short Term
Miles of Overhead Powerlines	0	Existing	Existing	Long Term
Acres Short-term Disturbance	0	5.12	5.12	Short Term
Acres Long-term Disturbance	0	4.94	1.57	Long Term

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

Alternative A

The proposed CBNG wells, water injection wells and associated infrastructure and utility network would not be constructed. No new vegetation and soil impacts would result.

Alternative B

The operator's original plan proposed drilling 8 CBNG wells. It was identified during the onsite inspection that 2 of the 8 wells locations would require 150' X 150' constructed pads and the other 6 wells would not require constructed pads for a minimum of 1.63 acres of disturbance. Pennaco added 2 water injection wells to the POD following the onsite adding 0.34 acres of disturbance for the project.

Approximately 3.5 miles of existing improved roads will be utilized as access to various well locations. Approximately 1.1 miles of newly constructed and 2.1 miles existing two-track roads would be utilized to access well sites. Utility corridors would account for 5.0 acres of disturbance. Long-term and short-term disturbance would be 4.94 acres and 5.12 acres respectively. The effects to vegetation and soils would be greater under Alternative B than under Alternative C.

Alternative C

Overall impacts to vegetation and soils from surface disturbance should be minor, based on the operator's plans and BLM applied mitigation. The 6 proposed well locations are all on relatively level locations and constructed pads will not be necessary. As such, minor surface disturbance would occur with the drilling of the 5 CBNG and 1 water injection wells. This disturbance would only involve minor digging-out of rig wheel wells (for leveling drill rig on minor slopes), 2 reserve pits excavated (estimated approximate size of 10 x 6 x 10 feet), and compaction (from vehicles driving/parking at the drill site). This would be a short-term, minor impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

The amount of existing access roads utilized under Alternative C would be the same as in Alternative B however the amount of new 2-track roads constructed would be reduced to 0.8 miles. Long-term disturbance is reduced by 3.2 acres under Alternative C. The amount of surface disturbance due to utility corridors under Alternative C would be the same as under Alternative B.

The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. None of pipeline will be constructed outside of corridors for this project. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

4.1.1. Vegetation & Soils Cumulative Direct and Indirect Effects

The PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of CBNG development. The cumulative effects on vegetation and soils relative to this project are anticipated to be minimal. The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. "Government soil experts state that SAR values of only 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult." (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

The PRB FEIS stated that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the Project Area. SAR in water in the sub-watersheds could be altered by saline soils

because disturbed soils with a conductivity of 16 mmhos/cm could release as much as 0.8 tons/acre/year of sodium (BLM 1999c). Soils in floodplains and streambeds may also be affected by produced water high in SAR and TDS. (PRB FEIS page 4-151).

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils relative to this project are anticipated to be minimal for the following reasons:

- They are proportional to the total amount of water predicted to be produced in the **Upper Powder River** watershed and that the amount of cumulatively produced water is only approximately 14.7% of the total predicted for this watershed in the PRB FEIS (see section 4.4.2.1).
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Upper Powder River and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the Hollcroft/Stotts Draw POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wetland/Riparian Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No wetland or riparian impacts would result.

Alternative B

The effects to wetlands and riparian areas would be the same under Alternative B as under Alternative C.

Alternative C

The WMP for the Hollcroft/Stotts Draw POD is for storage of CBNG produced water in 5 existing on-channel impoundments, and re-injection of treated water at the 13-11 SR well to shallow sand zones above the Anderson coal seam.

CBNG produced water may also be discharged from selected reservoirs directly into the Powder River or its tributaries as periodic and scheduled discharges in a manner consistent with WYDEQ Water Quality Division polices outlined in “Wyoming Powder River Assimilative Capacity allocation and control Process” dated May 4, 2006 and in compliance with all applicable WYPDES permit requirements.

No effects to wetlands/riparian areas are anticipated under Alternative C. The existing facilities were observed by BLM to be in sound operating condition. The proposed water re-injection plan was reviewed by BLM and follows WYDEQ Guildlines. The operator has committed to monitoring for impacts downstream of the discharge points as well as below the on-channel impoundments and reports made available to the BLM authorizing officer upon request.

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that “(they) may be lost by bank undercutting caused by the increased surface water flows in channels.” Included in the ROD is programmatic mitigation “which *may be* appropriate to apply at the time of APD approval if site specific conditions warrant.”(ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: “To reduce adverse effects on existing wetlands and riparian areas, water

discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods.”(ROD Page A-32).

“Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas.” (PRB FEIS Page 4-175).

4.3. Invasive Species Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. Without soil-disturbing construction activities no additional habitat for invasive plant species should be created. Invasive plants are present in the project area, without control efforts invasive plants are likely to increase.

Alternative B

Soil-disturbing activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of invasive plants. The types of effects would be similar to Alternative C..

Alternative C

Pennaco Energy Inc. will be responsible for weed control on disturbed areas within the exterior limits of the project area. Pennaco Energy Inc. has developed an Integrated Pest Management Plan, along with the Johnson County Weed and Pest Department to control weeds in the project area. Within the Hollcroft/Stotts Draw POD, state-listed noxious weeds including Russian knapweed, leafy spurge and salt cedar infestations were discovered by a search of inventory maps and/or databases. Salt cedar was also identified within the project area during subsequent field investigation by proposed operating proponent and BLM.

Infestations of invasive species and noxious weeds were not discovered within proposed disturbance areas of the project area. Pennaco Energy Inc. will contact the Johnson County Weed and Pest and/or the BLM and coordinate with the landowner, to work out a specific control program(s) for any noxious weed(s) discovered.

Tamarisk (salt cedar) and Russian olive are exotic plants that are abundant along some portions of the Powder River and its tributaries. Proliferation of these species alters the native riparian plant community, which could also impact the native fish community.

Utilization of existing facilities and surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and

perennial pepperweed. However, mitigation as required by BLM applied COAs will ensure that potential impacts from noxious weeds and invasive plants will be minimal.

4.4. Wildlife

Table 4.1 summarized direct habitat loss for the three alternatives; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

4.4.1. Big Game Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. Without additional CBNG development additional big game habitat will not be lost or further fragmented. Without CBNG associated human activities big game would not be displaced from the project area.

Alternative B

Under this alternative, 2 of the 8 CBNG wells would be drilled within the yearlong elk range identified by the Wyoming Game and Fish Department and BLM. The types of effects would be similar to Alternative C; however the magnitude of those effects would be greater than Alternative C. Alternative B would result in greater direct habitat loss. With additional disturbance associated with roads and pipelines, the overall displacement area within the project would likely be greater than with Alternatives A or C.

Alternative C

Big game in the Hollcroft/Stotts Draw project area includes elk, mule deer, white-tailed deer, and pronghorn antelope. The types of effects are similar for each species; however the degree of effect will vary with species size, behavior, and disturbance sensitivity. For example, deer and pronghorn do not move as easily as elk through deep snow, so winter disturbance could impact these smaller individuals more severely than elk. Pronghorn and white-tailed deer are more tolerant of human activities than elk and mule deer. The most important difference between the elk and the deer or antelope is that the elk are an isolated herd.

Under Alternative C, elk, pronghorn antelope and mule deer habitat will be directly disturbed with the construction of wells, pipelines, and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss. Short term disturbances may provide some habitat value as these areas are reclaimed and native vegetation becomes established. However, they may also increase vehicular collision when adjacent to roads. This alternative evaluates proposed wells and infrastructure located outside designated elk yearlong range and that existing infrastructure (2 impoundments, 1 metering facility) within elk yearlong range that will be utilized by the federal Hollcroft/Stotts POD. There will be no additional surface disturbance, no change in operations or human activity levels associated with these facilities. The use of these facilities should not have any additional effects to elk.

CBNG development fragments habitats through placement of linear facilities such as roads and pipelines. The impacts from fragmentation can vary depending on the use of the feature. For example activity associated with a road would displace big game by reducing habitat effectiveness as well as fragmenting habitat. The placement of linear elements can also act as vectors for invasive plant species that can reduce the forage value of the area by out competing native plants and increase the potential for wildfire.

Big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles

(Hiatt and Baker 1981). The WGFD feels a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not accepted the disturbance (Madison 2005).

Indirect disturbance from human activity is probably the largest potential impact from the proposed action. The FEIS used “habitat effectiveness” (the degree to which habitat features fulfill specific habitat functions; the degree to which a species or population is able to continue using a habitat for a specific function) in an attempt to assess the effect of human disturbance. The BFO modeled effective big-game habitat based on 80 acre well distribution (8 wells/section) and 0.5 mile or line-of-sight displacement. Development at this scale resulted in no effective big-game habitat. The development proposed in Alternative C will displace big game and may preclude their use of the project area. Anecdotal observations within Fortification Creek suggest elk displacement from human activities is greater than one half-mile, possibly three-quarters of a mile or greater (Roberts, pers comm.). A desert elk study researching elk response to oil and gas development in the Jack Morrow Hills area of southwestern Wyoming, indicated elk avoided areas within 2 kilometers (1 1/4 miles) of active roads (Powell 2003).

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. Elk and 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). Operation and maintenance activities within the POD will increase the traffic on road segments within the FCA and on existing roads within designated elk ranges.

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

4.4.1.1. Elk

The FEIS states that CBNG development in the Powder River Basin would cause a decrease in habitat effectiveness for elk, which may result in decreased population. This effect may be more severe where the population is near carrying capacity. The current Fortification elk herd is slightly over the WGFD objective of 150, by 80 elk. The Fortification elk herd has exhibited a downward trend since 2002 and drought conditions continue to persist within the Powder River Basin. Hunting, both legally and illegally, will also continue to decrease the Fortification Creek herd population.

Changes in population numbers could come as a result of the impacts described above, however when populations are reduced too a much smaller size additional adverse impacts to the population can occur. Small populations are subject to genetic inbreeding, and stochastic events such as fires, severe winter, disease, drought (Soule 1986) that make them intrinsically more vulnerable to extinction. Populations that are isolated, like the Fortification elk herd, are more sensitive to these internal (genetic) and external (stochastic) elements. In isolated populations, due to a closed gene pool with no gene immigration, deleterious genes can become more prevalent through time. Stochastic events such as fires or severe

winter storms can remove individuals from populations. In populations that are small in number and isolated, such events are magnified because there are proportionally fewer animals left with no potential for immigration into the population. There is genetic interchange between the Fortification Creek herd and other regional elk herds; therefore genetic impacts are unlikely. Stochastic effects are a concern, the Buffalo Field Office experienced three wildfires each greater than 12,000 acres in 2006. One of these fires was greater than 20,000 acres.

Two impoundments and one metering facility were previously constructed within elk ranges (one in yearlong range and one in crucial winter range) for fee CBNG development. These facilities will be utilized for the federal Hollcroft/Stotts Draw project. There will be no additional surface disturbance, no change in operations or human activity levels associated with these facilities. The use of these facilities should not have any additional effects to elk.

Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-211. No additional mitigation measures are required.

4.4.2. Aquatics Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. Without additional CBNG development additional produced water would not contribute to aquatic resources effects.

Alternative B

Same as Alternative C.

Alternative C

Produced water will be contained in five existing on-channel reservoirs. CBNG produced water may also be discharged from selected reservoirs directly into the Powder River or its tributaries as periodic and scheduled discharges.

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

Altering water temperatures, flow timing and magnitude, turbidity and chemical composition of the Powder River could harm native fish species which inhabit the Powder River. Alterations could also allow for non native species to become established. Any water development that alters discharge patterns, reduces turbidity, changes water quality, modifies sediment transport, or blocks migratory routes for fish is likely to result in changes in the fish community. Additionally, altering of tributaries may have adverse effects to aquatic species. Tributaries provide spawning and nursery habitat for riverine fishes and support unique fish assemblages. Seasonal movements of riverine fishes into tributaries may be essential to the continued maintenance of several species found in the Powder River (Hubert, 1993).

Change in Water Quality

Fish and amphibian species have evolved and adapted to existing conditions. Changes in water quality

may have detrimental impacts on the native aquatic fauna. Major information gaps for these species include feeding habits, reproduction, specific habitat preference (pools, riffles, runs, backwaters, side channels, or a combination), and seasonal habitat use.

The Wyoming Game and Fish Department has identified three primary threats to the Powder River ecosystem: 1) habitat alterations due to water produced during coalbed natural gas development, 2) water development in the headwaters of the watershed, and 3) introduction of exotic flora and fauna (WGFD 2006). Even relatively small amounts of CBNG water have the potential to alter the habitat in the Powder River, particularly during periods of low flow. It is not known at this time how these changes might impact native fishes.

Wyoming Game and Fish Department initiated a detailed fish and amphibian survey of the main-stem Powder River in 2004 to determine baseline species composition and distribution in the Basin. In accordance with the PRB FEIS, a monitoring plan was established by the Interagency Working Group. The plan calls for baseline data collection over a three year period which is intended to provide information relative to the effects upon the aquatic biota of CBNG water.

Changes in the conductivity and sodium absorption ratio may occur as increased flows move sediment from channel bottoms and potentially increase erosion of floodplains. Confluence Consulting reported high salinities and electrical conductivities, possibly due to CBNG water, for the Spotted Horse drainage in their recently released report on the Powder River. This report indicated that CBNG discharges could affect native species in the drainage.

The water quality projected to be discharged to the Powder River from this project is 2060 mg/l TDS. Pennaco expects to discharge water with an SAR of 31.4, and an EC less than 3240 μ mhos/cm.

Change in Water Quantity

Native fauna in the Powder River drainage have evolved and adapted to a very dynamic hydrograph with high sediment loads. Changes in this flow regime (i.e., perennial flows) may seriously impact native fauna by altering their use of historical habitats for spawning, rearing, and reproduction. Alterations that impact channel morphology is an issue, and will have impacts to the aquatic biota due to changes in sediment loads, loss of habitat, and possible disruption of migration movements due to barriers created by culverts and/or head cuts. This is a monitoring and adaptive management issue for CBNG development.

It is difficult to assess, due to limited information, what effects this discharge may have upon the aquatic biota in the Powder River system. The increase in flow resulting from the discharge of project CBNG treated water would be more noticeable during the late summer months or winter months when the mean monthly flow is smaller than during the remainder of the year. An addition of approximately (17.4 cfs per day) of project treated water to an average flow of 30 cfs into the Powder River is unlikely to affect its hydraulic regime or alter surface water quality. The flow attributable to project produced water is very small relative to storm flows. Peak flow estimates for the river range from 3,560 cfs for a two year storm event to 18,065 cfs for a 100-year storm event. Channel erosion, and/or channel sedimentation would be very unlikely to occur. Addition of the treated produced water would facilitate beneficial uses such as livestock and wildlife supply and irrigation supply during the late summer and winter months when the naturally occurring flow is diminished.

Cumulative effects

WDEQ is aware of the concerns about the effects of water quality and flows relative to discharge of treated water directly into the Powder River. They are taking a conservative approach to permitting until more information can be obtained and their watershed based permitting approach is implemented. Long

term water quality and flow monitoring, that would be required in the NPDES permit, would ensure that effluent limitations are met. Under permitted conditions, it is not anticipated that existing downstream water uses would be affected. The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.4.3. Migratory Birds Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No migratory bird impacts would result.

Alternative B

The types of effects would be similar to Alternative C; however the magnitude of those effects would be greater than Alternative C. Alternative B would result in greater sagebrush disturbance and therefore greater direct habitat loss. With additional disturbance associated with roads and pipelines, the overall displacement area within the project would likely be greater than with Alternatives A or C.

Alternative C

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

Density of breeding Brewer's sparrows declined by 36% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). Findings suggest that indirect habitat losses from energy development may be substantially larger than direct habitat losses (Ingelfinger 2004).

Density of breeding sage sparrows was reduced by 57% within a 100-m buffer of dirt roads regardless of traffic volume. The density of roads constructed in natural gas fields exacerbated the problem and the area of impact was substantial (Ingelfinger 2004).

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

Cumulative effects

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

4.4.4. Raptors Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to raptors would result.

Alternative B

The types of effects would be similar to Alternative C. Alternative B would result in greater surface disturbance and therefore greater direct habitat loss. With additional disturbance associated with roads

and pipelines, the overall displacement area (foraging habitat) within the project would likely be greater than with Alternatives A or C. **No nests are within 0.5 miles of the additional well sites.**

Alternative C

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to over heating or chilling of eggs or chicks. The prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

Table 5. Wells within close proximity to documented raptor nests within the Hollcroft-Stotts Draw project area (Timing limitations will apply to these wells).

BLM ID#	UTM (NAD 83)	SPECIES	STATUS (2006)	WELL / PIT NUMBER	DISTANCE (MILES)
3767	411816E 4927139N	Red-tailed hawk	Active	16-10-52-77AW	0.29

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

Cumulative effects

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

4.4.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment. Threatened and Endangered Species potentially affected by the proposed project area are discussed below.

4.4.5.1. Threatened and Endangered Species Direct and Indirect Effects

4.4.5.1.1. Black-footed ferret Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to black-footed ferrets would result.

Alternative B

Same as Alternative C.

Alternative C

Because it is highly unlikely ferrets are present and the suitable habitat shall not be disturbed, implementation of the proposed development should have no effect on the black-footed ferret.

4.4.5.1.2. Bald eagle Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to bald eagles would result.

Alternative B

The types of effects would be similar to Alternative C; however the magnitude of those effects would be greater than Alternative C. The additional wells are not located within or adjacent to bald eagle nesting or roosting habitat. Alternative B would result in greater surface disturbance and therefore greater direct foraging habitat loss. With additional disturbance associated with roads and pipelines, the overall displacement area (foraging habitat) within the project would likely be greater than with Alternatives A or C. With an increased amount of roads and overhead power there would be an increased likelihood of road and power line mortalities.

Alternative C

Based on the raptor nesting and bald eagle winter roost surveys, it is highly likely bald eagles will nest and/or roost within the Hollcroft-Stotts Draw project area. Steps have been taken to minimize loss if eagles do use the area such as road design for minimal speeds and timing restrictions placed on operations during timeframes and within areas suitable to bald eagle roosting and nesting. The proposed project should not affect bald eagle nesting or winter roosting provided Pennaco complies with all mitigation.

There are 4 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Pennaco is proposing no additional overhead three-phase distribution lines. There are currently 3 miles of two-track roads and 3.5 miles of improved roads within the project area, with 0.8 miles of two-tracks only proposed.

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

Produced water will be stored in five existing on-channel 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 be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.4.5.1.3. Ute's Ladies Tresses Orchid Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to Ute's ladies tresses orchids would result.

Alternative B

Same as Alternative C.

Alternative C

According to current (May 2006) project information, the Powder River is not expected to be disturbed by construction of the Hollcroft-Stotts Draw project. No crossings (roads or pipelines) of the Powder River are proposed, and all reservoir locations are proposed within upland habitats. Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. As the limited areas identified as marginal habitat within the project area will not be disturbed by construction activities, implementation of the proposed coal bed natural gas project should not affect the Ute ladies'- tresses orchid.

4.4.5.2. Sensitive Species Direct and Indirect Effects

Effects to all BFO sensitive species have been analyzed, results are included in the Hollcroft/Stotts Draw Biological Assessment. Only those sensitive species of high public interest are discussed below.

4.4.5.2.1. Black-tailed prairie dog Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to black-tailed prairie dog would result.

Alternative B

One proposed well site (Hollcroft 15-2-52-77) is located within the inactive colony in Section 2, but no active prairie dog colonies are expected to be disturbed by the proposed activities. The well house and nearby power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent road may result in prairie dog road mortalities.

Alternative C

No impacts to prairie dogs should result from implementation of Alternative C. None of the wells or proposed infrastructure are within prairie dog colonies.

4.4.5.2.2. Greater sage-grouse Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to greater sage-grouse would result.

Alternative B

The types of effects would be similar to Alternative C; however the magnitude of those effects would be greater than Alternative C. Alternative B would result in greater sagebrush disturbance and therefore greater direct habitat loss. With additional disturbance associated with roads and pipelines, the overall displacement area within the project would likely be greater than with Alternatives A or C.

Alternative C

No documented sage-grouse leks are present within two miles of the project area. Sagebrush habitats, primarily those in the eastern and northwestern portions of the project area, are adequate to support sage-grouse throughout the year.

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

Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al.

2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003).

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

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

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

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

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

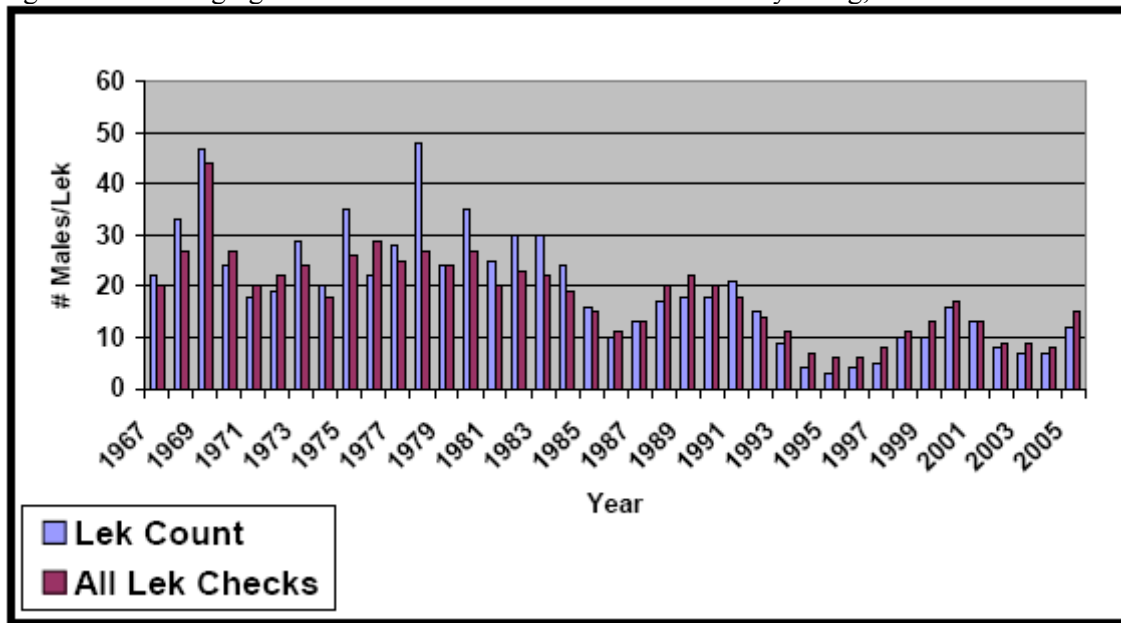
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan's north-central Montana study area.

Vegetation communities within the Powder River Basin are naturally fragmented as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse it is likely a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al In press, Holloran and Anderson 2005). A recent sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Holloran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres; meanwhile Powder River Basin sagebrush coverage was estimated to be 35% with an average

patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding WAFWA revised their sage grouse management guidelines (Connelly et al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where habitats are not distributed uniformly such as the Powder River Basin.

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

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



Sage-grouse populations within the PRB are declining independent of coalbed natural gas development. CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (Oedekoven 2004). The Powder River Basin Oil and Gas Project Final Environmental Impact Statement estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003). Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

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

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

4.4.5.2.3. Mountain plover Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to mountain plover would result.

Alternative B

Impacts to mountain plovers may be greater with Alternative B than Alternative C, as there is more suitable habitat associated with Alternative B. Suitable habitat is present within the portion of Section 2 (well site 15-2) not included in Alternative C.

Alternative C

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines adjacent to the project area provide perch sites for raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

Suitable plover habitat is limited to the prairie dog colonies and sparse grasslands within the north and east central portions of Section 2, and the northwestern portions of Section 11. The project should not affect mountain plovers.

4.4.5.3. Cumulative effects

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

4.5. West Nile Virus Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No West Nile virus habitat would be created therefore no environmental effects would result.

Alternative B

Effects due to West Nile virus would be the same as Alternative C.

Alternative C

The PRB FEIS and ROD included a programmatic mitigation measure that states, “The BLM will consult with appropriate state agencies regarding WNV. If determined to be necessary, a COA will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant.” This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat.

BLM has also consulted with the researchers that are studying the dynamics of WNV species and its effects in Wyoming.

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

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

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

4.6. Water Resources Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No impacts to water resources would result.

Alternative B

The maximum water production under Alternative B would be 360 gpm, 135 gpm greater than the maximum water production under Alternative C. The types of effects would be similar to Alternative C; however effects related to water resources under Alternative B may be slightly greater due to the additional produced water.

Alternative C

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the **Upper Powder River** primary watershed and the secondary 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), should minimize project area and downstream potential impacts from proposed water management strategies.

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

The maximum water production is predicted to be **45.0** gpm per well or 225 gpm (0.5 cfs or 362.9 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the **Upper Powder River** drainage, the projected volume produced within the watershed area was 167,608 acre-feet in 2005 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 0.22% of the total volume projected for 2005, which will result in an insignificant increase to the present volume of water produced from coal bed natural gas in the Powder River Basin. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.6.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the **Upper Powder River** drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 90 gpm will infiltrate at or near the discharge points and impoundments (145 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 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 3 to 1,040 feet compared to 950 feet to the **Anderson and 1,600 feet to the Wall**. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence of the proposed wells.

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

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

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

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004). This guidance document is currently being revised as the “Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments” which was approved September, 2006. Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an “Impoundment Monitoring Plan” to investigate the potential for existing

impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

Cumulative Effects:

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

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

4.6.2. Surface Water

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

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

Predicted Values	TDS, mg/l	SAR	EC, µmhos/cm
Most Restrictive Proposed Limit –		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Primary Watershed at Arvada, Wyoming Gauging station			
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8)			
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000	8	
Livestock Use (Class III)	5,000		
WDEQ Water Quality Requirement for WYPDES Permit #WY0051543			
At discharge point 001, 002, 003, 004 & 005	5,000		7,500
At Irrigation Compliance – within reservoirs			
Predicted Produced Water Quality Commingled Wall and Anderson Coal Zones	2,060	31.4	3,240

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 2060.0 mg/l TDS which is in excess of the WDEQ criteria for agricultural use (2000 mg/l TDS),

however direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the **Anderson & Wall** 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 **45** gallons per minute (gpm) is projected is to be produced from these **5 CBNG** wells, for a total of 225 gpm for the POD. See Table 4.4 .

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

In addition to full containment impoundments, the operator has submitted as part of the WMP to re-inject CBNG produced water from these federal wells into the Wasatch and Fort Union sand zones that lie above the shallowest coal seam (Anderson coal seam) within the project area. The Hollcroft Federal 13-11SR injection well facility is being permitted through the SEO and WYDEQ Underground Injection Control program under General Permit 5C5-3, Chapter 16 water quality rules and regulations. The WYDEQ has assigned UIC Facility Number WYS-019-169 to this injection well. Pennaco has submitted an APD to the WOGCC and BLM because the well is proposed to be drilled through federal minerals. The injection site will inject approximately 210,000 gallons per day from Lindsay #1 impoundment. In the event that the injection well pump is shut down, flow from the well will be directed back to the impoundment preventing a spill. Water will be treated with chlorine prior to injection to prevent bacterial contamination of the shallow groundwater aquifers as required by WYDEQ. See the WMP for facility diagrams and water treatment and injection processes.

As part of the water management strategies analyzed, CBNG produced water may also be discharged from selected reservoirs directly into the Upper Powder River mainstem or its tributaries and pulse released in a manner that will not reach surface waters. These periodic and scheduled discharges would be performed in a manner consistent with WYDEQ Water Quality Division policies and in compliance with all applicable WYPDES permit requirements. The operator is pursuing a modification to the existing WYPDES permit WY0051543 to accommodate such discharge events.

To manage the produced water, 5 existing impoundments would be utilized within the project area. There will be no additional surface disturbance associated with these structures. Of these water impoundments, **all 5 are** on-channel reservoirs. The impoundments would result in evaporation and infiltration of CBNG water. Monitoring may be required based upon WYDEQ findings relative to “Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments” (June 14, 2004). The existing impoundments will be monitored to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

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 0.08 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 Powder River of 171,423 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 5 wells is anticipated to be a total of 225 gpm or 0.5 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment the produced water re-surfacing in Upper Powder River from this action (0.08 cfs) may add a maximum 0.064 cfs to the Upper Powder River flows, or 0.00003% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). The addition of the water produced from these wells will not significantly impact the water quantity in the mainstem of the Upper Powder River. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP page 5). Based on the area of the Bull Creek and Stotts Draw watersheds above the POD (21.72 sq mi) and an assumed density of one well per location every 80 acres, the potential exists for the development of 174 wells which could produce a maximum flow rate of 7,830 gpm (17.4 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, 17.4 cfs, is much less than the volume of runoff estimated from the 2-year storm event for Bull Creek and Stotts Draw watersheds. Therefore, the estimated flow rate of water produced from the full development in the watershed above the project area is significantly less than the natural runoff from the area.

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 page 5):

Total Petroleum Hydrocarbons	10 mg/l max
pH	6.5 to 8.5
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Sulfates	3000 mg/l max
Radium 226	60 pCi/l max
Dissolved iron	1000 µg/l max
Dissolved manganese	1755 µg/l max
Total Barium	1800 µg/l max
Total Arsenic	150 µg/l max
Chlorides	230 mg/l

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA

for the permit. The designated point of compliance identified for this permit is at all the outfalls (001-005).

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

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

In-channel downstream impacts are addressed in the WMP for the Hollcroft/Stotts Draw POD prepared by ATC Associates INC. for Pennaco Energy, Inc.

4.6.2.1. Surface Water Cumulative Effects

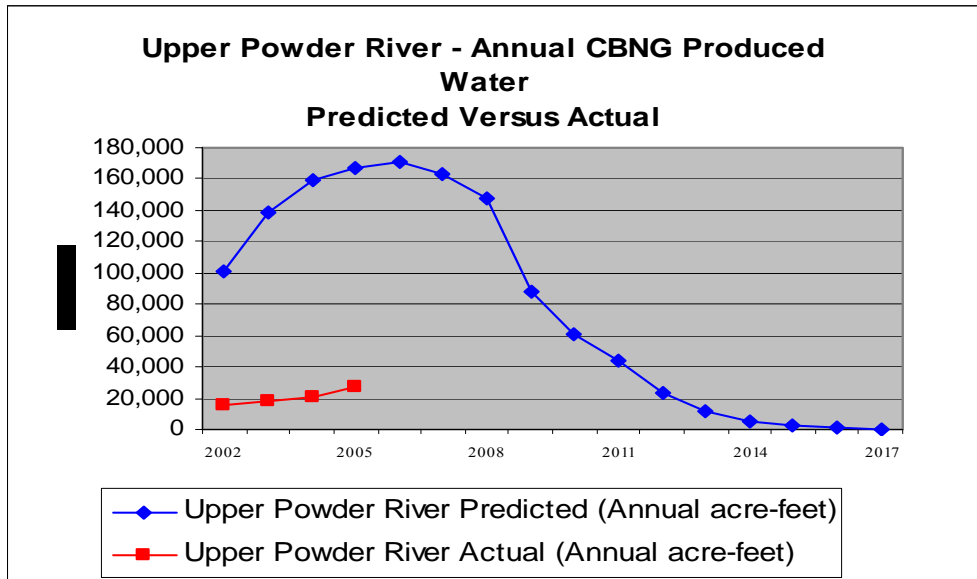
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2005, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 83,072 acre-ft of water compared to the predicted 565,096 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 14.7 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.5 Actual vs predicted water production in the Upper Powder River watershed *2005 Data Updated 4-5-06*

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,658	16.5	83,072	14.7
2006	171,423	736,519				
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233					

Figure 2: Actual vs predicted water production in the Upper Powder River watershed



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where

available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, “Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ’s (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met.” (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are anticipated to be minimal for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the **Upper Powder River** drainage, which is approximately 85.3% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.7. Cultural Resources Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed.

Alternative B

Effects to cultural resources would be the same as Alternative C.

Alternative C

The project as proposed will have a determination of no historic properties affected. 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).

4.8. Recreation Direct and Indirect Effects

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No recreation impacts would result.

Alternative B

Under Alternative B, 1.1 miles of additional 2-track road with utility corridor would be constructed versus that which was analyzed under Alternative C. The types of effects would be similar to Alternative C; however effects related to recreation under Alternative B would be slightly greater because of the

increased disturbance.

Alternative C

The effect of the development of roads and well facilities would be improved vehicular access to the area. However, a majority of this access would not be available to the public because all of the surface is privately owned and there are no recreational facilities. Private surface owners have reported an increase in the incidence of trespass throughout the Powder River Basin due to increased availability of access and vehicle traffic resulting from oil and gas related activities.

Drilling and construction activities are the most disruptive to big game and hunters. Construction noise and activity displaces big game and competes with the solitude and primitive experience many hunters seek. Elk, mule deer, and pronghorn are expected to return to the project area following drilling and construction, however in lower numbers than before; metering and maintenance activities will likely continue to displace big game, particularly elk and mule deer. The hunting experience is expected to improve somewhat following construction, but the solitude and primitive experiences prior to development would not. The end result is likely to be long term decreased hunting activity in the area.

As more individuals gain access and become familiar with remote areas with big game populations the demand for hunting licenses may increase to the point that a lower success in drawing specific licenses would occur; hunting and fishing may become less enjoyable as a result of the more limited success and overcrowding; poaching may increase; the increase in people and traffic has and may continue to result in shooting of nongame species and road kills; and increased off-road activities have and would continue to result in disturbance of wildlife during sensitive wintering or reproductive periods.

There is no legal public access to any of the POD area. Land owners have allowed limited public access upon request. The Fortification Creek area has been popular with the hunting public because of the limited access and because it is one of the few large land blocks available within the Powder River Basin. CBNG development is changing the rural undeveloped nature of the Basin to a rural industrial setting, decreasing the satisfaction levels of many hunters and other recreationists. One permitted outfitter with the BLM Buffalo Field Office returned his 2005 permit due to client dissatisfaction with hunting in natural gas fields. Other outfitters have also made similar comments and discussed returning their permits.

Conflicts between different recreation users and CBNG activities may increase. With the increased roads and access, illegal off road vehicle use and trespass are likely to increase. The CBNG activity may also pose as a danger to recreation users due to heavy machinery on the roads.

Alternative C would result in less impact to recreation as were disclosed in Alternative B with the operator following BLM recommendation(s) to reduce the amount of new road(s) to be constructed for CBNG well access.

4.9. Visuals Resource Management

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. No visual resource impacts would result.

Alternative B

Under Alternative B, 1.1 miles of 2-track road with utility corridor would be constructed to an additional 2 well locations versus that which was analyzed under Alternative C. The effects to visual resources under Alternative B would be greater than those under Alternative C.

Alternative C

The project, as proposed, meets the Class III objective. Additional mitigation measures include using color to camouflage the installations and blend the structures into the landscape background. The color, Covert Green, has been chosen for all above-ground facilities.

Most of the above-ground facilities will be at least partially obscured by topographic features, the angle of observation is low so surface disturbance will not be very visible, access roads are mostly existing roads, pipelines not using existing roads would re-vegetate in a maximum of 2 – 3 years. The project is a far enough distance from the KOPs to appear small. The scale of the project features, compared to the backdrop of the Powder River Breaks, is small, recovery time is short (as long as an acceptable mix of appropriate vegetation species is included in the seed mix).

Visual Resource Management (VRM) classes along with the corresponding VRM objectives, were established by the Buffalo Field Office in 1986 with the approval of the Buffalo Resource Management Plan (RMP). Visual values were identified through an inventory conducted by (then) Resource Area personnel. Visual Resource Management objectives corresponding to the various management classes provide standards for analyzing and evaluating proposed projects like the one considered here. Projects are evaluated using the Contrast Rating System described by Bureau Manual Section 8431. A contrast rating is a systematic way to evaluate a proposed project to determine if it meets Visual Resource Management objectives established by the RMP. It also identifies mitigating measures that serve to minimize visual impacts.

In summary, the VRM system: identifies visual values; establishes objectives in the RMP for managing those values; and provides a means to evaluate proposed projects to ensure that visual resource management objectives are met.

The Visual Resource Management Class established for the project area is Class III. The objective for Class III areas is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities (developments, etc) may attract attention but should not dominate the view of the casual observer. Changes should repeat the landscape character elements (form, line, color, and texture) found in the predominate natural features of the characteristic landscape.

The project area currently has some natural gas development activity dating back to the 1980s. In spite of this it retains an overall natural appearance. The existing facilities consist of access roads, wells, and production facilities. They are noticeable and attract attention but are not a dominant visual element in the area in spite of the fact that most are painted an entirely inappropriate color.

4.9.1. Cumulative Impacts

This project has the potential to cause cumulative impacts to the visual character of the area. The main reason is because natural gas exploration and development has the potential over time to change the area from one that is largely free of man-made features to one dominated by roads, drill pads, and production facilities. At the present time it is possible to look across the landscape and see very few man-made features. Under the proposed development scenario this would no longer be possible.

Development would introduce new forms, superimpose new lines, and texture throughout the area. The process would be cumulative because while any one well would not cause substantial impacts, a whole series of wells would cause impact that at some point would reach a threshold where substantial changes would be noted.

Cumulative impacts are exponential in nature. The first couple of wells are not noticeable on a landscape basis but as the number of wells increases the impact affects a broad area.

It is not possible to mitigate all the visual impacts from natural gas exploration and production in the area but the severity of the impacts could be minimized.

The Hollcroft/Stotts Draw POD would not appreciably add cumulative impacts to the area. This is because most of the infrastructure for the project takes advantage of existing roads and disturbances and because the existing developments overshadow the proposed development in terms of size and scale.

4.9.2. Mitigation

Several mitigation measures were identified during the 2006 field trips. They are as follows:

1. Minimize the number of roads. Plan roads to reduce mileage and build only the roads necessary for development. Locate well sites as close to existing roads as possible. Roads should meander. Straight roads seem to go on forever, and they don't fit the landscape. Meandering roads make a slight turn and seem to disappear.
2. Fit the roads to the landscape. Locate roads to minimize road cuts and fills. Where road cuts are required, don't cast the cut material down-slope. Build roads around obstacles, not over them.
3. Don't locate drill sites on hill tops. Locate them so the permanent structures are in lower areas hidden or screened by hills. Locate drill pads so that they are screened from the view from the main access roads.
4. Paint the permanent facilities such as well heads, tanks, separators, etc, a color known as Covert Green, depending on the exact conditions encountered at each well location. The concept is to paint structures a color that is equal to or slightly darker than the surroundings.
5. Locate pipelines and utility lines in or adjacent to roads.
6. When and where reclamation is done, include sagebrush seed in the seed mixture. Sagebrush is a dominant vegetative species in the area. A key objective of reclamation should be to re-establish vegetation that is currently there. Sagebrush seed collected in the project area should be used.

Reclamation should be done on a project-wide basis, rather than well-by-well.

4.10. Wilderness

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. Wilderness values would not be impacted.

Alternative B

Under Alternative B, the nearest well to the WSA would be 0.63 miles; the next nearest well would be 1.02 miles from the WSA. The types of effects would be similar to Alternative C; however effects related to visual resources under Alternative B would be slightly greater.

Alternative C

Approximately 207 acres of the Fortification Creek Wilderness Study Area falls inside the POD boundary. One of the existing impoundments (Two Finger Reservoir) that will be utilized for storage of CBNG produced water from this project lies downstream and just outside the western boundary of the Wilderness Study Area. No additional improvements will be made to the Two Finger reservoir and no pipelines, power lines roads, vehicular traffic, etc. will be authorized within the WSA. Wilderness values

will not be affected by the proposed development as there is a 1.2 mile distance between the nearest proposed well and the Wilderness Study Area. The infrastructure and access to the impoundments is existing requiring no additional disturbance.

4.11. Area of Critical Environmental Concern

Alternative A

The 8 proposed CBNG wells, 2 water injection wells and associated road and utility network would not be constructed. Areas of critical environmental concern would not be impacted.

Alternative B

Under Alternative B, the nearest well to the Fortification Creek nominated Area of Critical Environmental Concern (ACEC) would be 0.05 miles; the next nearest well would be 0.63 miles from the ACEC. The types of effects would be similar to Alternative C; however effects related to the ACEC under Alternative B would be slightly greater because of the additional wells close to the proposed ACEC.

Alternative C

The Fortification Creek nominated Area of Critical Environmental Concern (ACEC) includes the Fortification Creek Wilderness Study Area and lies within the Fortification Creek Area. The area meets relevance criteria for scenic value and wildlife. It also meets the importance criteria for local significant qualities (only area in Campbell County with wilderness characteristics); has circumstances that make it fragile, and unique (plains elk herd, and minimal impacts from man); and has been recognized as warranting protection to satisfy national priority concerns.

The proposed wells are located on private surface. There will be no direct impact from these wells on the proposed ACEC which is approximately 0.45 miles from the nearest well. Approximately 510 acres of the proposed ACEC falls inside the POD boundary. One of the existing impoundments (Two Finger Reservoir) that will be utilized for storage of CBNG produced water from this project lies downstream and just outside the western boundary of the proposed ACEC. No additional improvements will be made to the Two Finger reservoir and no pipelines, power lines roads, vehicular traffic, etc. will be authorized within the ACEC. Although the project will be visible from the proposed ACEC, the distance between this proposed development and the proposed ACEC and other mitigation agreed to during the onsite inspection should mitigate potential visual impacts. The other characteristics that met the relevance and importance criteria that may be affected are the elk herd and wilderness quality. The 5 CBNG and one water injection wells and associated infrastructure lie outside the elk winter range(s).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brad Rogers	Wildlife Biologist	U.S. Fish & Wildlife Service	No
Kathleen Hollcroft	Landowner	Hollcroft Ranch	Yes

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at

<http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html>.

- Avian Power Line Interaction Committee. 1996. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute. Washington, D.C. 125pp.
- Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.
- Brown, Kimberly. 2004. Pennaco Energy, Inc. Hollcroft / Stotts Draw Plan-of-Development Wildlife Survey and Habitat Assessment. Thunderbird – Jones & Stokes. Gillette, WY. 9pp.
- Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.
- CBM Associates, Inc. 2005. Hollcroft-Stotts Draw Federal Coal Bed Methane Project Water Management Plan. Laramie, WY. 10pp.
- Code of Federal Regulations (CFR)
1. 40 CFR All Parts and Sections inclusive Protection of Environment Revised as of July 1, 2001.
 2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.
- Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17pp.
- Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.
- Gregory, Jessica M. 2006. Hollcroft / Stotts Draw Plan-of-Development Wildlife Surveys Addendum A. Thunderbird – Jones & Stokes. Gillette, WY. 10pp.
- Gregory, Jessica M. 2006. Pennaco Energy's Hollcroft / Stotts Draw POD, Ute ladies'-tresses orchid habitat assessment. Thunderbird – Jones & Stokes. Gillette, WY. 2pp.
- Grenier, Martin. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp
- Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.
- Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.
- Litzel, R. 2004. Personal communication [January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.
- Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988

- Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.
- Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: <http://www.cdc.gov/ncidod/vol9no7/03-0277.htm>.
- Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003
- Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.
- Morton, Jennifer and Tom Bills. 2006. Pennaco's Hollcroft-Stotts Draw Coalbed Natural Gas Plan of Development Biological Assessment. USDI Bureau of Land Management, Buffalo Field Office. Buffalo, WY. 21pp.
- Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.
- Patterson, Craig T. and Stanley H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (*Haliaeetus leucocephalus*) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.
- Pennaco Energy, Inc. 2006. Master Surface Use Plan: Hollcroft / Stotts Draw POD. Gillette, WY. 6pp.
- Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of Land Management Wildlife Biologist/Sage Grouse Coordinator.
- Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.
- Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah
- Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.
- The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.
- U.S. Department of the Interior, Bureau of Land Management, Buffalo Field Office, Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.

- U.S. Department of the Interior, Bureau of Land Management, Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.
- U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.
- U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.
- Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.
- WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments
- Bailey, R.G. 1976. Ecoregions of the United States. U.S. Forest Service. Ogden, Utah.
- Boldt, C.E. and K. E. Severson. 1977. Management Review of Hardwood Draws in the Northern Great Plains. Rocky Mountain Forest and Range Experiment Station - South Dakota School of Mines and Technology. Rapid City, South Dakota.
- Brown, R.W. 1971. Distribution of Plant Communities in Southeastern Montana Badlands. The American Midland Naturalist No. 85 (2).
- Buffalo Field Office. 2003. Record of Decision and Resource Management Plan Amendments for the Powder River Oil and Gas Project. USDI Bureau of Land Management, Buffalo Field Office. Buffalo, WY.
- Buffalo Field Office. 1999. Wyodak Coal Bed Methane Project: Final Environmental Impact Statement. USDI Bureau of Land Management, Buffalo Field Office. Buffalo, WY.
- Burgess, R.L., W.D. Johnson, and W.R. Keammerer. 1973. Vegetation of the Missouri River Floodplain in North Dakota. North Dakota State University. Fargo, North Dakota.
- Cornish, Todd. Personal Communication. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.
- Johnson, W.C. and R.L. Burgess. Smith Grove Story - Part II. North Dakota Outdoors Magazine. Bismarck, North Dakota.
- Jones, G.P. and G.M. Walford. 1995. Major Riparian Vegetation Types of Eastern Wyoming. Wyoming Natural Diversity Database. Laramie, Wyoming.
- Judd, B.I. 1939. Plant Succession on Scoria Buttes of Western North Dakota. Ecology, Vol. 20 (2).
- Judd, B.I. 1939. Plant Succession on Scoria Buttes of Western North Dakota. Ecology, Vol. 20 (2).

Murkin, James W. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Naugle, David E.; Cameron L. Aldridge; Brett L. Walker; Todd E. Cornish; Brendan J. Moynahan; Matt J. Holloran; Kimberly Brown; Gregory D. Johnson; Edward T. Schmidtman; Richard T. Mayer; Cecilia Y. Kato; Marc R. Matchett; Thomas J. Christiansen; Walter E. Cook; Terry Creekmore; Roxanne D. Falise; E. Thomas Rinkes; and Mark S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. *Ecology Letters*. 7:704-713.

Shiflet, T.N. Ed. 1994. Rangeland Cover Types of the United States. Society for Range Management. Denver, Colorado.

Whitman, W. and H.C. Hanson. 1939. Vegetation on Scoria and Clay Buttes in Western North Dakota. *Ecology*, Vol. 20 (3).

Wyoming Game and Fish Department (WGFD). 2006. "Inventory of Fishes and Aquatic Habitat within the Powder River Basin, Wyoming." (<http://gf.state.wy.us/fish/AAC/CurrentProjects/Powder>). Cheyenne, WY.

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