DECISION RECORD
for Lance Oil and Gas, Incorporated
CAMP JOHN UNIT EPSILON POD, WY-070-EA10-239
Bureau of Land Management, Buffalo Field Office

This Decision Record approves 21 applications for permit to drill (APDs), a right-of-way, water management plan (WMP), and associated infrastructure with the Camp John Unit Epsilon (CJU) plan of development (POD) to drill for coalbed natural gas (CBNG). The development is subject to conditions of approval (COAs).

Compliance. This decision complies with:

- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701).
- Mineral Leasing Act of 1920 (30 U.S.C. 181) and as prescribed in 43 CFR Part 3160 to include On Shore Order No. 1.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- Migratory Bird Treaty Act (16 USC 703).
- DOI Order 3310, Protecting Wilderness Characteristics on Lands Managed by the Bureau of Land Management, Dec 2010; BLM Manuals 6300-1 and 6300-2 (drafts).
- Powder River Basin Final Environmental Impact Statement (FEIS), and RMP Amendment.
- Buffalo Resource Management Plan 1985, Amendments 2001, 2003.

The Selected Alternative.
Features. This Decision Record approves the 21 APDs, through the analysis yielded from EA 070-EA10-239, the FEIS, and RMPs. These 21 APDs, the right of way, WMP, and associated infrastructure were evaluated under Alternative B in WY-070-EA10-239.

The APDs listed below were previously onsited in the Lance Oil and Gas Company's CJU Epsilon CBNG POD in 2010.

The BFO approves these APDs:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	Camp John Epsilon Hayden	14-31WA	SWSW	31	51N	75W	WYW40809
2	Camp John Epsilon Hayden	14-31BG	SWSW	31	51N	75W	WYW40809
3	Camp John Epsilon Hayden	12-31BG	SWNW	31	51N	75W	WYW40809
4	Camp John Epsilon Hayden	12-31WA	SWNW	31	51N	75W	WYW40809
5	Camp John Epsilon Federal	23-31BG	NESW	31	51N	75W	WYW40809
6	Camp John Epsilon Federal	23-31WA	NESW	31	51N	75W	WYW40809
7	Camp John Epsilon Federal	24-31BG	SESW	31	51N	75W	WYW40809
8	Camp John Epsilon Federal	24-31WA	SESW	31	51N	75W	WYW40809
9	Camp John Epsilon	31-35WA	NWNE	35	51N	76W	WYW143698
10	Camp John Epsilon	31-35BG	NWNE	35	51N	76W	WYW143698
11	Camp John Epsilon	14-35BG	SWSW	35	51N	76W	WYW143698
12	Camp John Epsilon	14-35WA	SWSW	35	51N	76W	WYW143698
13	Camp John Epsilon	22-35BG	SENW	35	51N	76W	WYW51882
14	Camp John Epsilon	22-35WA	SENW	35	51N	76W	WYW51882

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
15	Camp John Epsilon	24-35BG	SESW	35	51N	76W	WYW143698
16	Camp John Epsilon	24-35WA	SESW	35	51N	76W	WYW143698
17	Camp John Epsilon	33-35WA	NWSE	35	51N	76W	WYW51882
18	Camp John Epsilon	32-35BG	SWNE	35	51N	76W	WYW143698
19	Camp John Epsilon	32-35WA	SWNE	35	51N	76W	WYW143699
20	Camp John Epsilon	42-35WA	SENE	35	51N	76W	WYW143698
21	Camp John Epsilon	43-35WA	NESE	35	51N	76W	WYW51882

The BFO approves the following right-of-way:
Grant Number WYW-170077, granted under the FLPMA of 1976, is for an access road to the well, Camp John Fed 14-31-5175. Construction of the following access road is prohibited until the authorized right-of-way is issued.

Located: 6th PM, Campbell County, Wyoming, T51N, R75W, Section 31: lot 14

Water Management:
The following water treatment facilities and associated existing infrastructure were inspected and approved for use in association with the water management strategy for the POD.

Facility Name	NEPA Document	WYPDES	Qtr/Qtr	Sec	T	R	Lease	Water Discharge Point	QtrQtr	Sec	T	R
Barber Creek	Williams Draw Unit Alpha POD WY-070-05-134	WY0052175	SENW	11	50	77	Fee	014	SWNE	9	50	77
Barber Creek	Powder Valley Unit POD WY-070-04-072	WY0056081	NENW	9	50	77	WYW149359	012 013 014	NESE SWSW SWSW	8 4 4	50	77

Limitations.
There are no deferrals or denials. There was no application for and no approval of the use of federal water in surface impoundments. The CJU Epsilon WMP's primary and secondary disposal method for produced water is through pipelines.

THE FINDING OF NO SIGNIFICANT IMPACTS (FONSI).
The FONSI supporting EA WY-070-EA10-239, considered the project design, analysis, and rationale and found no significant impact on the human environment aside from those revealed in the Powder River Basin FEIS and RMP Amendment. The FONSI found no significant impacts, thus there is no requirement for an EIS.

COMMENT OR NEW INFORMATION SUMMARY.
After receipt of the proposed development the BFO received a written determination that the Wyoming Game and Fish Department guidelines for Fortification Creek elk habitat are recommendations and are not regulatory, (SDR-WY-2011-005, p. 10). The BFO also received new DOI Order 3310.

DECISION RATIONALE.
The decision authorizing the 21 APDs, the right-of-way, WMP, and associated POD infrastructure as described in Alternative B, and analyzed in EA WY-070-EA10-239, is also based on the following:

1. The additional wells, right-of-way, WMP, and infrastructure will not result in significant environmental degradation, and any minor environmental degradation that will result is revealed in the PRB FEIS.

2. This federal action is clearly lacking wilderness characteristics because it has surface areas with extensive coal bed natural gas development.

3. The selected alternative will help meet the nation's energy needs, and may stimulate local economies by maintaining workforce stability.

4. The Operator, in their POD, committed to:
   - Comply with all applicable federal, state and local laws and regulations.
   - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
   - Offer water well agreements to the owners of record for permitted water wells within 0.5 miles of a federal CBNG producing well in the POD.
   - Has a surface use agreement with affected landowners.

5. Lance diligently improved the design of Alternative B to minimize environmental effects. The BFO applied further mitigation measures where required.

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

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

Field Manager: _____ Date: 3/30/11

FINDING OF NO SIGNIFICANT IMPACT
for
Lance Oil and Gas, Incorporated
CAMP JOHN UNIT EPSILON POD
WY-070-EA10-239
Bureau of Land Management, Buffalo Field Office

FINDING OF NO SIGNIFICANT IMPACT:
On the basis of the information contained in the environmental assessment (EA), and all other information available to me, it is my determination that:

(1) the decision to approve 21 applications to drill (APDs), a right of way, water management plan (WMP), and associated plan of development (POD) infrastructure previously onsited in the Lance Oil and Gas (Lance) Camp John Unit Epsilon (CJU) coalbed natural gas (CBNG) POD will not have significant environmental impacts beyond those already addressed in the Powder River Basin (PRB) Final Environmental Impact Statement (FEIS) (2003), to which the EA is tiered; and

(2) the decision to approve the 21 APDs will have minor adverse impact to the Fortification Creek elk[1] security and parturition habitat. By extension the adverse impact will likely contribute to reduced numbers of elk and increased stress to elk, in addition to the cumulative impacts from the rest of this development and other developments within this elk range; and

(3) the decision to authorize the 21 APDs is in conformance with the Buffalo Field Office (BFO) Resource Management Plan (RMP) (1985, 2001, 2003), or other legislative or regulatory processes including DOI Order 3310, BLM Manuals 6300-1 and 6300-2; and

(4) the decision to authorize the APDs and POD does not constitute a major federal action having a significant effect on the human environment. Therefore, an environmental impact statement is not necessary and will not be prepared.

This finding is based on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), both with regard to the context and to the intensity of the impacts described in the EA, WY-070-EA10-239, which is incorporated here by reference.

CONTEXT:
Mineral development (coal, oil and gas, bentonite, and uranium) is a long-standing and common land use within the Powder River Basin. The PRB FEIS reasonably foreseeable development predicted and analyzed the development of 51,000 CBNG wells and 3,200 oil wells (PRB FEIS ROD pg. 2). The additional CBNG development described in Alternative B is insignificant within the national, regional, and local context.

INTENSITY:
The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment. Design features and mitigation measures were included within the proposal, Alternative B, to prevent significant adverse environmental

[1] The term Fortification Creek elk describes the same elk herd which inhabits both the Fortification Creek Planning Area (FCPA) and adjacent habitats that include those in the Camp John Unit Epsilon POD and other PODs. Camp John Unit Epsilon POD is outside, yet adjacent to, the FCPA. Decisions on Camp John Unit Epsilon affect the elk. The BFO initiated an RMP plan amendment for the FCPA in 2009, which continues.

effects. The BLM also added site specific and programmatic mitigation measures to reduce adverse environmental effects of this development.

The preferred alternative does not pose a significant risk to public health and safety. The geographic area of the POD does not contain unique characteristics identified within the 1985 RMP, 2003 PRB FEIS, or other legislative or regulatory processes, including DIO Order 3310 and supporting manuals.

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

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

There are no cultural or historical resources present that will be adversely affected by the selected alternative (EA sec 4.2.7). This federal action is clearly lacking wilderness characteristics because it has surface areas with extensive coal bed natural gas development; see the EA's Table 2.4. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected (EA, sec 4). The selected alternative will not have any anticipated effects that would threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Field Manager: _____ Date: 3/30/11

ENVIRONMENTAL ASSESSMENT (EA)
for LANCE OIL AND GAS, INCORPORATED
CAMP JOHN UNIT EPSILON POD, WY-070-EA10-239
BUREAU OF LAND MANAGEMENT, BUFFALO FIELD OFFICE

ACRONYMS AND ABBREVIATIONS

µg/l	Microgram per Liter
µmhos/cm[1]	Micromhos per Centimeter
µS/cm[1]	MicroSiemens per Centimeter
AFMSS	Automated Fluid Minerals Support System
AO	Authorized Officer
APD	Application for a Permit to Drill
AUZ	Augusta Unit Zeta
BCC	Bird of Conservation Concern
BFO	Buffalo Field Office
BGEPA	Bald and Golden Eagle Protection Act (1940)
bgs	Below Ground Surface
BHEC	Big Horn Environmental Consultants
BLM	Bureau of Land Management
BMP	Best Management Practices
CBM	Coalbed Natural Gas
CBNG	Coalbed Natural Gas
CCIX	Continuous Countercurrent Ion Exchange
CD3W	Carr Draw III West
CDIV	Carr Draw IV
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CIAA	Cumulative Impacts Analysis Area
CJU	Camp John Unit
COA	Conditions of Approval
CRUP	Cultural Resource Use Permitee
dB	Decibels
dBA	Decibels on the A-weighted scale
EA	Environmental Assessment
EC	Electrical Conductivity
ESA	Endangered Species Act (1973)
FCPA	Fortification Creek Planning Area
FEMA	Federal Emergency Management
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act (1976)
FCPA	Fortification Creek Planning Area
gpm	Gallons per Minute
GIS	Global Information System
GPS	Global Positioning System
KDS	Kinney Divide Unit Gamma
ID team	Interdisciplinary team
Lance	Lance Oil and Gas, Incorporated

[1] Micromhos per centimeter and microSiemens per centimeter are equivalent terms. Both terms are utilized based on specific agency usage.

L_{dn}	Average Day/Night Noise Level
L_{eq}	Equivalent Sound Level
MBTA	Migratory Bird Treaty Act (1918)
mg/l	Milligrams Per Liter
MLRA	Major Land Resource Area
MMBtu	Million Metric British Thermal Units
MMRP	Monitoring, Mitigation, and Reporting Plan
MOU	Memorandum of Understanding
MSUP	Multi-Point Surface Use and Operations Plan
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSS	Native Species Status
PA	Programmatic Agreement
PLS	Pure Live Seed
POD	Plan of Development
PRB	Powder River Basin
R	Range
RFFD	Reasonable Foreseeable Future Development
RMP	Resource Management Plan
ROD	Record of Decision
SAR	Sodium Adsorption Ratio
SCS	Soil Conservation Service
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Officer
SSURGO	Soil Survey Geographic Database
T	Township
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TLS	Timing Limitation Stipulations
U.S.	United States
UIC	Underground Injection Control
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDEQ	Wyoming Department of Environmental Quality
WDU	Williams Draw Unit Gamma and Delta
WGFD	Wyoming Game and Fish Department
WMP	Water Management Plan
WOGCC	Wyoming Oil and Gas Conservation Commission
WSA	Wilderness Study Area
WSEO	Wyoming State Engineer’s Office
WYNDD	Wyoming Natural Diversity Database
WYPDES	Wyoming Pollutant Discharge Elimination System

CONTENTS

1. INTRODUCTION 1
1.1. Background 1
1.2. Purpose and Need for the Proposed Action 1
1.3. Decision to be Made 2
1.4. Conformance with Land Use Plan and Other Applicable Laws, Regulations, and Policies 2
1.5. Scoping and Issues 2
2. PROPOSED ACTION AND ALTERNATIVE 2
2.1. Alternative A - No Action 3
2.2. Alternative B - Operator Proposed Action 3
2.3. Alternatives Considered but Not Analyzed in Detail 6
2.4. Summary of Alternatives 7
3. AFFECTED ENVIRONMENT 9
3.1. Project Area Description 9
3.1.1. Geologic Features and Mineral Resources 9
3.1.1. Land Ownership 9
3.1.2. Land Use 10
3.2. Soils, Vegetation, and Ecological Sites 10
3.2.1. Soils 10
3.2.1.1. Soils Susceptible to Erosion 12
3.2.1.2. Slope Hazard 12
3.2.1.3. Miscellaneous Areas 15
3.2.1.4. Source of Reclamation Materials 15
3.2.2. Vegetation 16
3.2.2.1. General Description 16
3.2.2.2. Wetlands/Riparian 17
3.2.2.3. Invasive Species 17
3.2.3. Ecological Sites 18
3.3. Wildlife and Protected Species 19
3.3.1. Habitat Types 20
3.3.2. Federally Threatened, Endangered, Proposed, and Candidate Species 20
3.3.2.1. Threatened and Endangered Species, including Blowout Penstemon and Ute Ladies'-tresses Orchid 20
3.3.2.2. Proposed Species, including Mountain Plover 21
3.3.2.3. Candidate Species, including Greater Sage-grouse 21
3.3.3. BLM Sensitive Species 22
3.3.3.1. Northern Leopard Frog 22
3.3.3.2. Bald Eagle 22
3.3.3.3. Brewer's Sparrow 23
3.3.3.4. Ferruginous Hawk 23
3.3.3.5. Loggerhead Shrike 23
3.3.3.6. Long-billed Curlew 23
3.3.3.7. Northern Goshawk 24
3.3.3.8. Peregrine Falcon 24
3.3.3.9. Sage Sparrow 24
3.3.3.10. Sage Thrasher 24
3.3.3.11. Western Burrowing Owl 25
3.3.3.12. Black-tailed Prairie Dog 25
3.3.3.13. Fringed Myotis 26
3.3.3.14. Long-eared Myotis 26
3.3.4. Big Game 26

3.3.4.1. General 26
3.3.4.2. Elk Habitat and Availability 26
3.3.5. Upland Game Birds, Including Plains Sharp-tailed Grouse 32
3.3.6. Aquatic Species 33
3.3.7. Migratory Birds 34
3.3.8. Raptors 35
3.4. Water Resources 38
3.4.1. Groundwater 38
3.4.2. Surface Water 40
3.5. Economics and Recovery of CBNG Resources 41
3.6. Cultural Resources 41
3.7 Wilderness 42
4. ENVIRONMENTAL EFFECTS 42
4.1. Alternative A 42
4.2. Alternative B 43
4.2.1. Project Area Description 43
4.2.1.1. Geologic Features and Mineral Resources 43
4.2.1.2. Land Ownership 43
4.2.1.3. Land Use 43
4.2.2. Soils, Vegetation, and Ecological Sites 44
4.2.2.1. Soils 44
4.2.2.2. Vegetation 48
4.2.2.3. Ecological Sites 54
4.2.3. Wildlife and Protected Species 55
4.2.3.1. Habitat Types 55
4.2.3.2. Federally Threatened and Endangered Species, including Blowout Penstemon and Ute Ladies'-Tresses Orchid 56
4.2.3.3. Proposed Species, including Mountain Plover 56
4.2.3.4. Candidate Species, including Greater Sage-grouse 58
4.2.3.5. BLM-Sensitive Species 61
4.2.3.6. Big Game 67
4.2.3.7. Upland Game Birds, including Plains Sharp-tailed Grouse 83
4.2.3.8. Aquatic Species 84
4.2.3.9. Migratory Birds 84
4.2.3.10. Raptors 85
4.2.4. Water Resources 87
4.2.4.1. Produced Water Quality, Control, and Quantity 87
4.2.4.1. Groundwater 90
4.2.4.2. Surface Water 91
4.2.5. Economics and Recovery of CBNG Resources 94
4.2.6. Cultural Resources 95
4.2.6.1. Direct and Indirect Effects 95
4.2.6.2. Cumulative Effects 95
4.2.6.3. Mitigation Measures 95
4.2.6.4. Residual Effects 95
4.2.7 Wilderness 96
4.3. Summary of Effects 96
5. CONSULTATION & COORDINATION 97
6. OTHER PERMITS REQUIRED 98
7. REFERENCES AND AUTHORITIES 98
8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS 107

LIST OF TABLES

Table 2.1 Proposed Wells – Alternative B
Table 2.2 Summary of the Alternatives
Table 3.1 Adjacent or Overlapping CBNG POD Development
Table 3.2 Dominant Soils within the Camp John Unit Epsilon CBNG POD
Table 3.3 Water Erosion Potential within the Camp John Unit Epsilon CBNG POD
Table 3.4 Percent Slope within the Camp John Unit Epsilon CBNG POD
Table 3.5 Reclamation Potential within the Camp John Unit Epsilon CBNG POD
Table 3.6 Wetlands and Riparian Areas within the Camp John Unit Epsilon CBNG POD
Table 3.7 Campbell County Weeds of Concern
Table 3.8 Dominant Ecological Sites and Dominant Soils Map Units within the Camp John Unit Epsilon CBNG POD
Table 3.9 Summary of all Ecological Sites within the Camp John Unit Epsilon CBNG POD
Table 3.10 Sage-grouse Leks within 4 miles of the Camp John Unit Epsilon CBNG POD
Table 3.11 Camp John Unit Epsilon Black-tailed Prairie Dog Colonies within 0.25 mile of the POD
Table 3.12 Fortification Creek Elk Ranges
Table 3.13 2009 Elk Security Habitat within the Fortification Creek Elk Herd Range
Table 3.14 Fortification Creek Elk Ranges
Table 3.15 Fortification Creek Elk with GPS Collars
Table 3.16 GPS/VHF Collared Elk Re-located within the CJU Epsilon CBNG POD Project Area
Table 3.17 Sharp-tailed Grouse Lek Located within the Camp John Unit Epsilon CBNG POD
Table 3.18 Fish Occurring in the Upper Powder River Sub-basin
Table 3.19 Herpetile Species Expected to Occur in the Powder River Basin
Table 3.20 Documented Raptor Nests within 0.5 mile of the Camp John Unit Epsilon CBNG POD
Table 3.21 Existing Groundwater Monitoring Wells Nearest the Camp John Unit Epsilon CBNG POD
Table 3.22 Historical Average of Natural Gas Prices at the Henry Hub
Table 3.23 Cultural Resource Sites In or Near the Camp John Unit Epsilon CBNG POD
Table 4.1 Location of Discussion of the No Action Alternative in the PRB FEIS
Table 4.2 Percent of Documented Elk Collar Locations in each of the Defined Ranges within the CIAA
Table 4.3 Loss of Elk Security Habitat Calculated within Identified Elk Ranges over Time
Table 4.4 Proposed Project Infrastructure within 0.5 mile of Documented Raptor Nests
Table 4.5 Proposed Discharge Site Information for the Camp John Unit Epsilon CBNG POD
Table 4.6 Comparison of Regulated Water Quality Parameters to Predicted Water Quality
Table 4.7 Applicable WYPDES Permit Effluent Limits
Table 4.8 CBNG Produced Water Comparisons
Table 4.9 Summary of Environmental Consequences for Camp John Unit Epsilon CBNG POD by Alternative
Table 5.1 Consultations

LIST OF FIGURES

Figure 3.1 Erosion Potential Within the Project Area
Figure 3.2 Areas of Slopes Exceeding 25 Percent Within the Project Area
Figure 3.3 Affected Environment - Fortification Elk Herd Ranges
Figure 3.4 Depth to Water from Surface
Figure 4.1 Male Sage-grouse Lek Attendance within Northeastern Wyoming, 1967-2007
Figure 4.2 Elk Security Habitat Remaining in the CIAA as of March 2010
Figure 4.3 Camp John Unit Epsilon Elk Security Habitat Remaining under Alternative B

Figure 4.4 Existing Wells within the CIAA as of September 14, 2010
Figure 4.5 Fortification Creek Elk Ranges
Figure 4.6 Elk Security Habitat Remaining Post RFFD
Figure 4.7 Fortification Creek Elk Yearlong Use
Figure 4.8 Fortification Creek Elk Winter Range Use
Figure 4.9 Fortification Creek Elk Parturition Range Use
Figure 4.10 Annual CBNG Water Production Comparisons

LIST OF APPENDICES

Appendix A – Resource and Species Worksheets……A-1
Appendix B – All Wells Considered During Development of the CJU Epsilon CBNG POD ……..….B-1
Appendix C – Diagram of Compaction Reduction Tool …….C-1
Appendix D – Summary of Oil and Gas Related Motor-Vehicle Fatalities ……..…..D-1

ENVIRONMENTAL ASSESSMENT (EA)
for LANCE OIL AND GAS, INCORPORATED
CAMP JOHN UNIT EPSILON POD, WY-070-EA10-239
BUREAU OF LAND MANAGEMENT, BUFFALO FIELD OFFICE

1. INTRODUCTION

This EA analyzes the environmental impacts of the 21 applications to drill (APDs) in the Camp John Unit (CJU) Epsilon plan of development (POD). This analysis tiers into and incorporates by reference the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS), WY-070-02-065 (issued January 2003) and the Record of Decision and Resource Management Plan (RMP) Amendments for the Powder River Basin Oil and Gas Project (PRB ROD), WY-070-02-065 (approved April 30, 2003), pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21 (Bureau of Land Management [BLM] 2003a, BLM 2003b). This document is available at the Buffalo, Wyoming, Field Office (BFO), and on the BFO's website. This EA addresses site-specific resources and impacts that were not disclosed in the PRB FEIS or PRB ROD.

1.1. Background

Lance Oil and Gas, Incorporated (Lance) submitted the CJU Epsilon Coalbed Natural Gas (CBNG or CBM) POD on April 4, 2008, to the BFO for 18 Applications for a Permit to Drill (APDs) to develop and produce natural gas within coal formations of the Powder River Basin (PRB). Subsequent to this submittal, Lance filed revisions to its original plan. On April 1, 2009 Lance requested to transfer 4 APDs (22-35-5176WA/BG and 33-35-5176WA/BG) from the Camp John Unit Beta POD to the CJU Epsilon CBNG POD for a total of 22 APDs. On May 1, 2010 Lance requested to transfer 2 APDs (12-31-5175WA/BG) from the Camp John Unit SMA Phase 1 POD to the CJU Epsilon CBNG POD for a total of 24 APDs. The final project revision, in October, reduced the number of APDs to 21 by the removal of 3 wells (33-35-5176BG, 42-35-5176BG, and 43-35-5176BG). Lance submitted revised well list, drilling prognosis, well plats, well pad designs, and project maps with each revision.

An initial onsite visit on June 9, 2010 evaluated the proposal and suggested modifications to mitigate environmental impacts. BLM sent a post-onsite deficiency letter on June 21, 2010. An initial response to the post-onsite deficiencies was received on July 23, 2010. Proposed Conditions of Approval (COAs) were shared with Lance at the post-onsite notes review meeting on June 21, 2010. A second deficiency letter was sent to Lance by BLM on August 19, 2010. BLM received Lance's responses to the second deficiency letter on August 11 and 31, 2010. A field visit evaluated potential construction in areas suspected to have low reclamation potential on September 28, 2010. Results of the visit and requested information were summarized and provided to Lance by e-mail on October 4, 2010. The BFO received revised project information on September 14 and 19, on October 25 and 27, and on December 20, 2010.

1.2. Purpose and Need for the Proposed Action

The purpose of the proposed POD is to develop and produce natural gas in a manner providing environmental protection and natural resource conservation while executing a federal oil and gas lease, per 43 CFR 3160, all Onshore Orders, the Mineral Leasing Act (MLA), the Federal Land Policy and Management Act (FLPMA), and other laws, statutes, and regulations.

The need for the action is the requirement to obtain approval for the development of an oil and gas lease through APDs on public lands and minerals managed by the BLM in a manner minimizing adverse environmental impacts and promoting conservation, per Onshore Order No. 1, pursuant the MLA, the FLPMA, and other laws, statutes, and regulations.

1.3. Decision to be Made

BLM will decide whether to approve the proposed development of natural gas resources on the federal leasehold; and if so, under what terms and conditions.

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

The proposed project conforms to the terms and the conditions of the 1985 BFO Resource Management Plan (RMP) (BLM 1985), the 2001 BFO RMP Update (BLM 2001), Amendment (BLM 2003), and the PRB FEIS (including the PRB ROD) (BLM 2003a, b). The Proposed Action complies with all federal laws, regulations, and policies, including USDI Order 3310. This includes, but is not limited to, the following Acts and Orders, as amended: USDI Order 3310, Federal Land Policy and Management Act (FLPMA) (1976), Mineral Leasing Act (MLA) (1920), National Historic Preservation Act (1966), Endangered Species Act (ESA) (1973), Migratory Bird Treaty Act (MBTA) (1918), Bald and Golden Eagle Protection Act (BGEPA) (1940), Clean Water Act (1972), Clean Air Act (1970), and National Environmental Policy Act (NEPA) (1969).

1.5. Scoping and Issues

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

The BLM interdisciplinary team (ID team) conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resource and land uses. Appendix A identifies those resources and land uses present and affected by the proposed project. Resources and land uses that are either not present, not affected, or were adequately covered by the PRB FEIS will not be discussed in this EA. The ID team identified important issues for the affected resources to further focus the analysis. This EA addresses the site-specific impacts that were not analyzed within the PRB FEIS and identifies potentially significant effects of the proposed project to help the decision maker come to a reasoned decision. Project issues include:

- **Soils and Vegetation**: erosion hazard, slope hazard, reclamation potential, riparian and wetland communities, and weed species;
- **Wildlife**: raptor nesting productivity, mountain plover habitat , sharp-tailed grouse occupancy and persistency, greater sage-grouse nesting and brood rearing habitat, and elk habitat;
- **Water**: groundwater depletion, quality and quantity of produced water;
- **Cultural Resources**: potential for buried cultural material; and
- **Social and Economic**: potential for the proposed project to impact gas prices and potential for gas prices to impact the proposed project.

2. PROPOSED ACTION AND ALTERNATIVE

BFO analyzed two alternatives: the No Action Alternative (Alternative A) and the Action Alternative (Alternative B). The following sections include a brief description of each alternative. Programmatic mitigation measures from the PRB FEIS apply to both alternatives. Site-specific conditions of approval (COAs), programmatic COAs, drilling and production COAs, and standard COAs would apply only to Alternative B and are included in the COAs.

2.1. Alternative A - No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1, pp. 2-54 to 2-62. This alternative consists of no new federal wells. Under this alternative, the operator's proposal would be denied.

2.2. Alternative B - Operator Proposed Action

Alternative B contains complete APDs and is based on Lance and the BLM working to reduce and mitigate environmental impacts. This alternative summarizes the POD as it was submitted to BLM, after site visits by Lance, on July 21, 2010, along with supplemental clarifying filings received August 30, 2010, October 25, 27, and December 20, 2010. A summary of project changes leading to the development of Alternative B is included in Section 2.3 of this document, and a summary table of wells considered since initial POD submittal is included as Appendix B.

Proposed Action Title/Type: Lance Oil and Gas, Incorporated's Camp John Unit Epsilon CBNG POD

Proposed Well and Compressor Station Information: There are 21 proposed wells in this POD (Table 2.1). The wells would be vertical bores proposed on an 80-acre spacing pattern with either 1 or 2 wells per location. Eighteen wells would be situated on 9 locations (twin wells); 3 wells would be situated on 3 locations (single wells). Wells would produce from Big George and Wall coal seams. Proposed well house dimensions are 6 feet in width, 6 feet in length, and 5 feet in height. Well house color would be Covert Green, selected to blend with the surrounding vegetation.

Table 2.1 Proposed Wells – Alternative B

No.	Well Name	Well No.	Qtr/Qtr	Sec	TWN	RNG	Federal Lease No.
1	Camp John Epsilon Hayden	12-31-5175BG	SWNW	31	51N	75W	WYW40809
2	Camp John Epsilon Hayden	12-31-5175WA	SWNW	31	51N	75W	WYW40809
3	Camp John Epsilon Hayden	14-31-5175BG	SWSW	31	51N	75W	WYW40809
4	Camp John Epsilon Hayden	14-31-5175WA	SWSW	31	51N	75W	WYW40809
5	Camp John Epsilon Federal	23-31-5175BG	NESW	31	51N	75W	WYW40809
6	Camp John Epsilon Federal	23-31-5175WA	NESW	31	51N	75W	WYW40809
7	Camp John Epsilon Federal	24-31-5175BG	SESW	31	51N	75W	WYW40809
8	Camp John Epsilon Federal	24-31-5175WA	SESW	31	51N	75W	WYW40809
9	Camp John Epsilon	14-35-5176BG	SWSW	35	51N	76W	WYW143698
10	Camp John Epsilon	14-35-5176WA	SWSW	35	51N	76W	WYW143698
11	Camp John Epsilon	22-35-5176BG	SENW	35	51N	76W	WYW51882
12	Camp John Epsilon	22-35-5176WA	SENW	35	51N	76W	WYW51882
13	Camp John Epsilon	24-35-5176BG	SESW	35	51N	76W	WYW143698
14	Camp John Epsilon	24-35-5176WA	SESW	35	51N	76W	WYW143698
15	Camp John Epsilon	31-35-5176BG	NWNE	35	51N	76W	WYW51882
16	Camp John Epsilon	31-35-5176WA	NWNE	35	51N	76W	WYW51882
17	Camp John Epsilon	32-35-5176BG	SWNE	35	51N	76W	WYW143698
18	Camp John Epsilon	32-35-5176WA	SWNE	35	51N	76W	WYW143698
19	Camp John Epsilon	33-35-5176WA	NWSE	35	51N	76W	WYW51882
20	Camp John Epsilon	42-35-5176WA	SENE	35	51N	76W	WYW143698
21	Camp John Epsilon	43-35-5176WA	NESE	35	51N	76W	WYW51882

In addition to well development, the project uses an existing compressor station located in the SW quarter of the NW quarter (SWNW Qtr/Qtr) of Section 25, T51N, R76W. Because impacts from this existing

compressor station were not disclosed in past assessments, the station is discussed in the cumulative analysis sections of this document.

Water Management Proposal: The Water Management Plan (WMP) for this POD describes the primary method for disposal of CBNG produced water as conveyance via an existing pipeline to an existing water treatment facility prior to discharge to Powder River and Barber Creek, using existing Wyoming Department of Environmental Quality (WDEQ) permitted outfalls. For this conveyance, pressure would be supplied by an existing pump station located in the NWNE Qtr/Qtr of Section 22, T51N, R76W. The following water treatment facilities and associated existing infrastructure were analyzed for use in association with the preferred water management strategy for the POD.

Facility Name	NEPA Document	WYPDES	QTR	Sec	TWN	RNG	Lease	Outfall	QTR	Sec	TWN	RNG
Barber Creek	Williams Draw Unit Alpha POD WY-070-05-134	WY 0052175	SENW	11	50	77	Fee	014	SWNE	9	50	77
Barber Creek	Powder Valley Unit POD WY-070-04-072	WY 0056081	NENW	9	50	77	WYW 149359	012 013 014	NESE SWSW SWSW	8 4 4	50	77

The secondary method of managing produced water would be to transport the water for eventual injection into the Madison Formation near Midwest in Natrona County, Wyoming, as authorized by an existing WDEQ permit(s). This disposal method would require construction of approximately 23 miles of pipeline and associated infrastructure under a separate permit to interconnect with the County Line water pump station located at the SESE Qtr/Qtr of Section 7, T47N, R77W, and associated pipeline currently used for the injection wells. The County Line pump station is on private lands, therefore permitting and construction of this water pump station was not directly regulated by any federal process.

County: Campbell

Operator: Lance Oil and Gas Company, Incorporated

Surface Owners: Most land in the project area is privately owned by Kerry and Stephanie Hayden. The State of Wyoming owns all of Section 36, T50N, R76W. The BLM manages fragmented smaller parcels located at the SENE and SWNE Qtr/Qtr of Section 6, T50N, R75W, and NWNW, SENW, NESW, SESW, SESE, NWSE and NESE Qtr/Qtr of Section 31, T51N, R75W.

Drilling and Construction:

- Well development would include the drilling of 9 wells into the Big George coal zone and 12 wells into the Wall coal zone, to depths of approximately 1,800 feet and 2,400 feet, respectively. Most wells would be collocated (multiple wells at a single location each targeting a single, separate, formation). Three wells would be drilled for comingled production (a single well per location capable of producing from multiple coal seams), to depths of approximately 2,400 feet.

- Drilling and construction activities are anticipated to be completed within 2 years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering will be accomplished by individual well telemetry. No central metering facility is proposed. In addition to telemetry, Lance anticipates 2 to 3 visits to each well per week during the summer and 4 visits per week during the winter to ensure the wells are operating correctly and there are no leaks undetected by telemetry.

- The project WMP discusses 2 potential discharge options, described previously in this document under the Water Management Proposal. No stock water reservoirs or containment structures would be constructed associated with this POD.

- A road network consisting of approximately 14 miles of existing and approximately 3.7 miles of proposed new or improved crown and ditched (i.e., template or engineered) roads, including use of appropriately sized culverts for management of stormwater runoff would be used. No primitive roads are anticipated for this POD due to rough terrain and erosive soil.

- An aboveground power line network is in place that would supply power to the wells via transformers and underground power installation in proposed or existing roads/utility corridors. If the power line network is not completed before the wells are in production, then temporary diesel generators would be placed at 7 power drops.

- A storage tank of 500-gallon capacity would be located with the 7 temporary diesel generators. Generators would be projected to be in operation for approximately 24 months. Fuel deliveries would be an anticipated 3 times per week. Generator noise level is expected to be approximately 100.9 decibels (dB) at a distance of 3 feet.

- Utility corridors include buried gas, water, and power line networks both proposed and existing; a majority of the utility corridors are within or immediately adjacent to roadways.

- One existing compressor station, the Winter Park Compressor Station, located in the SWNW Qtr/Qtr of Section 25, T51N, R76W, would be used for gas transportation.

For a detailed description of design features, construction practices, and water management strategies associated with the proposed action, refer to Lance's Master Multi-Point Surface Use and Operations Plan (MSUP), Master Drilling Prognosis (Drilling Plan), Integrated Weed and Pest Management Plan, site-specific reclamation plans, and WMP in the POD and individual APDs. Also refer to the subject POD for maps showing the proposed well locations and associated facilities described above (Lance 2010). These documents are included in the project administrative record, available for review at the BFO. More information on CBNG well drilling, production, and standard practices also is available in the PRB FEIS, Volume 1, pages 2-9 to 2-40 (BLM 2003a).

Implementation of committed mitigation measures contained in the MSUP, Drilling Plan, and WMP, in addition to the Standard COAs from the PRB ROD, are incorporated and analyzed in this alternative.

Right-of-Way Grants:

Lance requested one right-of-way grant. Grant Number WYW-170077, is for an access road to a well location, Camp John Fed 14-31-5175BG/WA. Construction of the following access road is prohibited until the authorized right-of-way is approved and issued.

6th PM, Campbell County, Wyoming
T51N, R75W
Section 31: lot 14

An agreed upon COA for the right-of-way grant:
To minimize surface disturbance and vegetation loss the following applies for right-of-way WYW-170077 for a well access road to the location:

a. The access route would extend approximately 803 feet in length.
b. Proposed access not to exceed a total 50 foot width

2.3. Alternatives Considered but Not Analyzed in Detail

The original POD for the CJU Epsilon POD was submitted on April 4, 2008 with 18 federal APDs, and then subsequently revised to include 24 APDs. The original POD submittal is not analyzed in detail in this EA. Discussions and onsite visits occurred between the BFO and Lance between May 2009 and September 2010 based on the initial project description. As a result of these discussions, adjustments were made to the initially proposed project as summarized in a table in Appendix B of this document and in the following text.

- A total of 7 wells (6 twinned wells on 3 sites and 1 commingled well on 1 site) were added to the project: 12-31-5175BG, 12-31-5175WA, 31-35-5176BG, 31-35-5176WA, 32-35-5176BG, 32-35-5176WA, and 33-35-5176WA.
- One well, 33-35-5176BG, was considered (added then withdrawn) during project refinement, but is not included in the final project.
- A total of 2 twinned wells at 2 separate locations from the initially proposed project were reduced to a single well at each location to reduce overall and/or sensitive resource disturbance due to pad size (42-35-5176 and 43-35-5176).
- 4 wells and 1 well pad (21-35-5176BG, 21-35-5176WA, 42-35-5176BG, and 43-35-5176BG) were withdrawn to:
  - Reduce disturbance;
  - Avoid steep slopes;
  - Limit soil erosion; and
  - Avoid soils with low reclamation potential.
- 2 wells and 1 well pad (31-35-5176BG and 31-35-5176WA) were added to replace withdrawn wells (21-35-5176BG and 21-35-5176WA).
- Excluding wells later withdrawn, 12 wells (23-31-5175BG, 23-31-5175WA, 24-31-5175BG, 24-31-5175WA, 14-35-5176BG, 14-35-5176WA, 22-35-5176BG, 22-35-5176WA, 24-35-5176BG, 24-35-5176WA, 42-35-5176WA, and 43-35-5176WA) at 7 locations were relocated to:
  - Reduce overall and/or sensitive resource surface disturbance;
  - Increase safety and reliability (e.g., avoid existing underground utilities or pipelines); and

- Improve operational reliability (e.g., maintain a 20-foot vegetation buffer between the proposed well site and drainages).

- A total of 7 well pads (twelve wells: 14-31-5175BG, 14-31-5175WA, 23-31-5175BG, 23-31-5175WA, 24-31-5775BG, 24-31-5175WA, 22-35-5176BG, 22-35-5176WA, 32-35-5176WA, 33-35-5176WA, 42-35-5176WA, and 43-35-5176WA) were adjusted (e.g., from constructed pads to slots or to a reduced pad size) to limit surface disturbance.
- Design of all well pads was adjusted to include a 1 to 2 percent slope for drainage.
- Water management strategies considered but eliminated from the final project include:
  - Containment in impoundments (considered but eliminated); and
  - Land Application (considered but eliminated).

- A total of 8 roads were relocated, upgraded, and/or engineered to:
  - Provide surfacing and drainage relief;
  - Limit soil erosion; and
  - Avoid existing infrastructure (e.g., pipelines).

The above changes are documented in revised project descriptions that were provided as Lance's responses to the BFO's deficiency letters. These modifications resulted in a refined proposed project, which is analyzed here as Alternative B. The initial POD, the post-onsite deficiency letters, and Lance's responses to the deficiency letters are in the project administrative record.

2.4. Summary of Alternatives

A summary of the infrastructure existing within the POD area (Alternative A) and the infrastructure proposed by Lance (Alternative B) are presented in Table 2.2.

Table 2.2 Summary of the Alternatives

Facility	Alternative A[1] (No Action) Existing Number or Miles (Acres)	Alternative B[1] (Operator Proposal) Proposed Number or Miles (Acres)
Total CBNG Wells Well Locations [2] *Constructed Pads* [3] *Slotted Pads* *Nonconstructed Pads*	56 (29.0 acres)	21 (6.7 acres) 7 (12 wells) 4 (7 wells) 1 (2 wells)
Conventional Wells	0	0
Gather/Metering Facilities	0	0
Compressor Station Facilities	1 (7.0 acres)	0
Ancillary Facilities (Staging/Storage Areas)	1 (4.0 acres)	0 [4]
Water Impoundments [5]	8 (<5.0 acres) [5]	0

Table 2.2 Summary of the Alternatives

Facility	Alternative A[1] (No Action) Existing Number or Miles (Acres)	Alternative B[1] (Operator Proposal) Proposed Number or Miles (Acres)
Roads-Engineered *Without Utility Corridor* *With Utility Corridor*	 14.0 miles (81.8 acres) [6]	 0 0
Roads-Template/Spot Upgrade *Without Utility Corridor* *With Utility Corridor*	 Included with above (roads-engineered)	 2.2 miles (11.9 acres) 1.5 miles (8.8 acres)
Roads-Primitive *Without Utility Corridor* *With Utility Corridor*	 3.9 miles (19.2 acres) [7]	 0 miles 0 miles
Utility Corridors (water, gas, and buried power) [8]	Not available	2.5 miles (11.4 acres)
Power lines-Overhead	9.0 miles (32.7 acres)	0
Water Pump/Treatment Facilities [9]	1 (4.0 acres)	0
Water Discharge Points	4[210]	0
TOTAL ACRES DISTURBANCE	**178.7**	**38.8**

[1] Acres or mileage in the action alternatives represent additional facilities and do not include existing facilities.

[2] Data not available for well site type for existing wells; assume 0.5 acre of disturbance per CBNG well.

[3] Represents the number of proposed well locations. Twenty-one wells would be built at 12 locations.

[4] Data limited to Lance's proposal only, which includes use of 1 existing staging area.

[5] One on-channel reservoir approximately 1 acre in size is located in the SESE Qtr/Qtr of Section 31, T51N, R76W. Five additional stock reservoirs, each less than 1 acre, are located in: SENE Qtr/Qtr of Section 1, T50N, R76W (permitted by SEO); NENW Qtr/Qtr of Section 2, T50N, R76W; SESW Qtr/Qtr of Section 35, T50N, R76W; and SWSE Qtr/Qtr of Section 25, T51N, R76W. Three CBNG water impoundments are permitted in the POD boundary in Section 1 of T50N, R76W (including the 42-1 [P13406R], 22-1[P17788S] and 12-1[P13406R]) but are not built. Because no disturbance is currently associated with these impoundments, no acreage associated with them is included in the total disturbance shown in this table.

[6] Data provided for existing improved roads does not differentiate between with and without utility corridor; existing width assumed to be 45 or 50 feet wide.

[7] Data provided for existing primitive roads does not differentiate between with and without utility corridor; existing width assumed to be 40 or 45 feet wide.

[8] Includes utility corridors proposed along existing primitive roads, along existing improved roads, and independent of roads.

[9] Two treatment facilities proposed for use are located outside of the POD boundary and are not included in this table. Size estimate for the pump facility interpreted from aerial photography.

[10] Outfalls are not within the CJU Epsilon project boundary.

3. AFFECTED ENVIRONMENT

This section describes the environment 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. A screening of all resources and land uses potentially affected by the proposed project is included in Appendix A of this document. Resources that would be unaffected, or not affected beyond the level analyzed within the PRB FEIS, are not discussed in this EA.

3.1. Project Area Description

The POD would be developed within an area of approximately 4,144 acres in Campbell County. The topography in the project area is relatively rugged terrain, with more moderate to level topography located along the far eastern boundary. Elevations are about 4,200 to 4,726 feet above sea level.

Topography ranges from moderately to extremely rugged with steep ridgelines and deeply incised draws. Much of the project area consists of dissected uplands with steep down-cut channels, created predominately by summer thunderstorms and spring runoff in ephemeral drainages with steep gradients and fine sediment substrate, which lead to Powder River. The project area is drained by unnamed tributaries of the Fortification Creek. Fortification Creek lies on the northeast edge of the project area. The riparian areas are dominated by tree and shrub species which consist mainly of sparse cottonwood trees with scattered salt cedar shrubs with areas of greasewood and dense sage brush. Some areas of the lowland were cleared for livestock grazing and hay operations. This area is managed as rangeland with livestock grazing and recreational hunting as the main uses. The area experienced some historic conventional oil and gas exploration and production, and more recently CBNG development.

Alluvial and colluvial deposits consist of gradational and dissected alluvial fans (BLM 2009). The underlying bedrock within the project area consists entirely of the main body of the Wasatch Formation of the Eocene Epoch. Within the vicinity of the project area, the Wasatch Formation is primarily variegated-mudstone with sandstone and conglomeratic lenses (Love and Christiansen 1985).

The Wasatch Formation is underlain by the Fort Union Formation, which is further subdivided into 3 different members. The upper member of the Fort Union Formation, the Tongue River Member, is known to contain thick, continuous coal beds, including the Anderson-Wyodak coal zone (Bartos and Ogle 2002). The Big George coal seam is considered a deeper equivalent to the Anderson-Wyodak coal zone within the Fort Union Formation (Bartos and Ogle 2002).

3.1.1. Geologic Features and Mineral Resources

Fortification Creek is within the far northeast corner of the project area, passing through less than approximately 1 mile of the POD boundary. Two intermittent streams, including Antelope Draw and Carr Draw, run through the central portion of the project area. With the exception of coal, potential development of locatable and leasable minerals does not exist within the POD boundary. However, development potential exists for salable minerals, including sand and gravel deposits and clinker (BLM 2009). Sand and gravel deposits are in the far northeast portion of the project area as erosion-remnants of Fortification Creek, and a minor area of state-owned land is considered to have potential for clinker development, (BLM 2009). Salable minerals are mined from surface deposits and outcrops. Coal deposits also occur throughout the project area. In addition to possible mineral development, the land also is used for grazing and recreational hunting.

3.1.2. Land Ownership

The majority of the land within the project area is privately owned, with some parcels interspersed that are state owned and under BLM management. Precise parcels are described in Section 2.2.

3.1.3. Land Use

The project and surrounding area is rangeland with existing oil and gas development. In addition to possible mineral development, the land also is used for grazing and recreational hunting.

The CJU Epsilon project area is adjacent to the boundaries of 7 approved CBNG PODs that include 379 wells, 56 of which are within the CJU Epsilon POD boundary, see generally, Table 3.1. There are 3,617 wells within the 4 mile-consideration of cumulative effects area for this proposal (WOGCC).

Table 3.1 Adjacent or Overlapping CBNG POD Development

POD Name	Environmental Assessment #	Decision Date
Camp John & Augusta	WY-070-05-373	8/25/2005
Carr Draw IV	WY-070-09-128	10/7/2005
Carr Draw POD V Add 1	WY-070-06-306	9/29/2006
Carr Draw POD I Add I	WY-070-07-071	3/23/2007
Augusta Unit Zeta	WY-070-08-154	7/22/2009
Carr Draw III West	WY-070-09-066	9/4/2009
Carr Draw V Add II	WY-070-09-123	9/25/2009

An existing main access road and utility corridor travels north south through Sections 26 and 35 of Township 51 North (T51N), Range 76 West (R76W), and Section 2 of T50N, R76W and was analyzed in part under the Camp John and Augusta POD and Augusta Unit Zeta POD EAs. Therefore, careful delineation of the respective project components was completed to avoid duplication of disturbance acres.

3.2. Soils, Vegetation, and Ecological Sites

3.2.1. Soils

Information on major land resource areas and soil types was obtained from NRCS information, including the Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, U.S. Department of Agriculture Handbook 296 (NRCS 2006) and the Soil Survey Geographic Database (SSURGO). Soil baseline characterization for the project area is based on Soil Survey Geographic (SSURGO) database review and analyses. SSURGO is the most detailed level of soil mapping done by the USDA NRCS. Soils in the POD boundary were identified from the North Campbell County Survey Area, Wyoming (WY705), and South Campbell County Survey Area, Wyoming (WY605). The NRCS performed the survey using National Cooperative Soil Survey standards.

The BLM uses county soil survey information to predict soil behavior, limitations, and suitability for a given activity or action. The Bureau's long term goal for soil resource management is to maintain, improve, or restore soil health and productivity, and to prevent or minimize soil erosion and compaction. Soil management objectives are to ensure that adequate soil protection is consistent with the resource capabilities.

The POD boundary is primarily located within the Southern Part of the Northern Rolling High Plains Major Land Resource Area (MLRA). This area is in the Missouri Plateau, Unglaciated, Section of the Great Plains Province of the Interior Plains. It is an area of old plateaus and terraces that are deeply eroded. Typically, local relief is about 150 to 250 feet. Slopes generally are gently rolling to steep, with wide belts of steeply sloping badlands bordering a few of the larger river valleys. Terraces are common along most of the major river systems in the area. In places, flat-topped, steep-sided buttes rise sharply above the plains.

The dominant soil orders in this MLRA are Aridisols and Entisols. Aridisols are well developed soils that have a very low concentration of organic matter and form in an arid or semi-arid climate. In contrast,

Entisols are considered recent soils that lack soil development because erosion or deposition rates occur faster than the rate of soil development. Soils in the project area have developed in alluvium and residuum derived mainly from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams.

Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 inches on miscellaneous areas (such as badlands) to 4 inches on ridges and side slopes to 8+ inches in bottomlands. Slopes vary with steep slopes occurring primarily in the western portion of the project area. Soils differ with topographic location, slope, and elevation. The primary soil limitations in the project area are depth to bedrock, low organic matter content, low water holding capacity, and high water erosion potential.

Dominant soil map units found within the POD boundary are listed in Table 3.2. Soil map units representing 2 percent or greater in extent within the POD boundary are discussed. Additional soil information is included in the ecological site descriptions. Ecological site descriptions are soil and vegetation community descriptions compiled by the NRCS for the purpose of resource identification providing management and reclamation recommendations. See Section 3.2.2 of this document for further discussion.

Table 3.2 Dominant Soils within the Camp John Unit Epsilon POD

Map Unit	Map Unit Name	Approximate Acres[1]	Project Area (%)
217	Theedle-Shingle loams, 3 to 30 percent slopes	1,199	29
204	Samday-Samday, very shallow-Shingle clay loams, 6 to 40 percent slopes	924	22
216	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	714	17
147	Forkwood-Cushman loams, 6 to 15 percent slopes	422	10
233	Ustic Torriorthents, gullied	212	5
285	Haverdad-Boruff complex, 0 to 3 percent slopes, occasionally flooded	137	3
215	Theedle-Kishona loams, 6 to 20 percent slopes	120	3
327	Ulm-Bidman complex, 0 to 6 percent slopes	112	3
334	Vonalf-Xema- Mittenbutte fine sandy loams, 3 to 30 percent slopes	79	2

[1] Approximately 4 percent of the soils are soil types that cover less than 2 percent of the project area each.

Source: NRCS 2010.

The project area contains 17 soil map units, each of which contains 1 or 2 major soil components and additional soil or miscellaneous components of minor extent. The soil series is the most specific category of the national soil classification system, commonly used to designate soil map units. Soil series describe soils that have similar chemistry, physical properties, and perform similarly for land use purposes.

As an example, the Theedle-Shingle complex has a severe erosion hazard rating and covers approximately 1,199 acres (29 percent) of the project area with a topsoil depth 4 inches or less. This complex consists of components which occur at a proportion of 50 percent, 30 percent, and numerous minor inclusions consisting of 5 percent of the map unit. The Theedle and Shingle soils are loamy, and moderately deep (20 to 40 inches) to shallow (less than 20 inches) to bedrock. The minor inclusions consist of badlands, 2 very deep (60 inches or more) soil components and one shallow soil component. On the surface, vegetation is good on level to gentle slopes and sparse on more steeply sloping areas. The dominant components of the complex Theedle and Shingle soils have a poor rating as a source of topsoil or reclamation material. Bedrock occurs 12 to 28 inches from the soil surface. The badland miscellaneous

area inclusion is of greatest concern due to the lack of soil, vegetation, and a predominance of steep slopes and high erosion potential. Often badlands are comprised of slightly weathered bedrock. Typically, miscellaneous areas are difficult, if not impossible, to reclaim.

The Ustic Torriorthents, gullied, map unit would also present reclamation challenges due to the highly dissected nature and high erodibility of the soil. Riverwash is a minor component of this map unit which is frequently flooded and unstable. The Riverwash soils are an area of strict avoidance due to these variables.

3.2.1.1. Soils Susceptible to Erosion

Loss in productivity is likely to occur on most disturbed soils if erosion is not monitored and mitigated. Because soil formation is a very slow process, most soils cannot renew their eroded surface while erosion continues. The development of a favorable rooting zone by the weathering of parent rock is much slower than development of the surface horizon. One estimate of this renewal rate is 0.5 ton per acre per year for unconsolidated parent materials and much less for consolidated materials. These very slow renewal rates support the philosophy that any soil erosion is too much. Loss of organic matter, resulting from erosion and tillage, is one of the primary causes for reduction in production yields. As organic matter decreases, soil aggregate stability, soil moisture holding capacity, and cation exchange capacity decline (U.S. Department of Agriculture [USDA] 1998). Table 3.3 and Figure 3.1 shows the relative erosion potential, based on the site-specific information discussed above.

Table 3.3 Water Erosion Potential within the Camp John Unit Epsilon POD

Erosion Potential	Approximate Acres	Percent of Project Area
High	212	5
Moderate	3,038	73
Low	894	22

Source: NRCS 2010.

Soils susceptible to wind erosion include soils that have surface-soil properties that affect their resistance to soil blowing, including texture, organic matter content, and aggregate stability. Fine sandy-textured and silty soils with poor aggregation are particularly susceptible to wind erosion. The soils in the project area generally have a low to moderate wind erosion potential.

3.2.1.2. Slope Hazard

A soil’s stability is greatly affected by the slope on which it occurs. In general a greater slope, yields a greater potential for slumping, landslides, and water erosion. Approximately 791 acres (19 percent) in the project area have slopes of 25 percent or more; see Figure3.2.

Figure 3.1 Erosion Potential within the Project Area

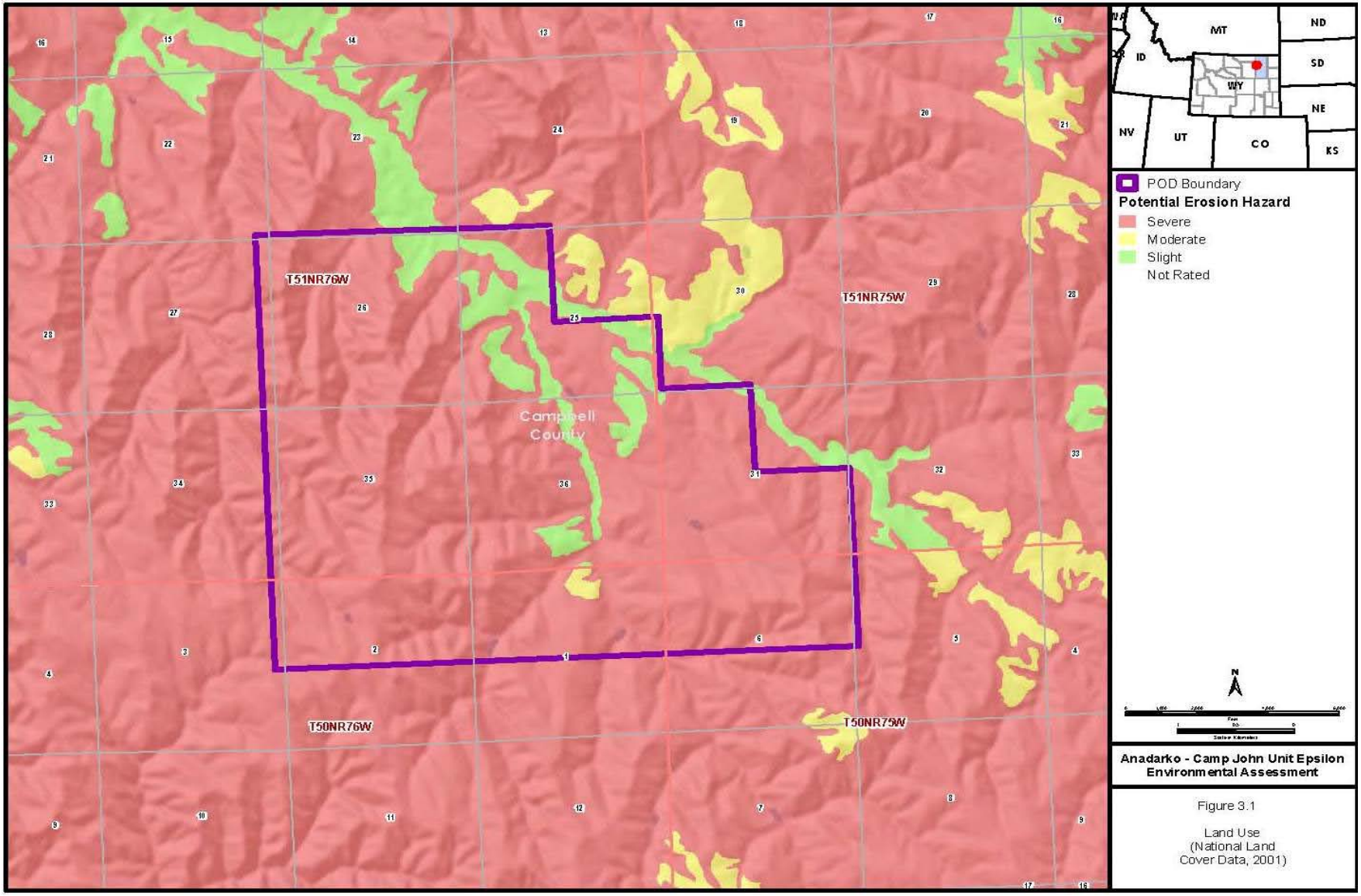
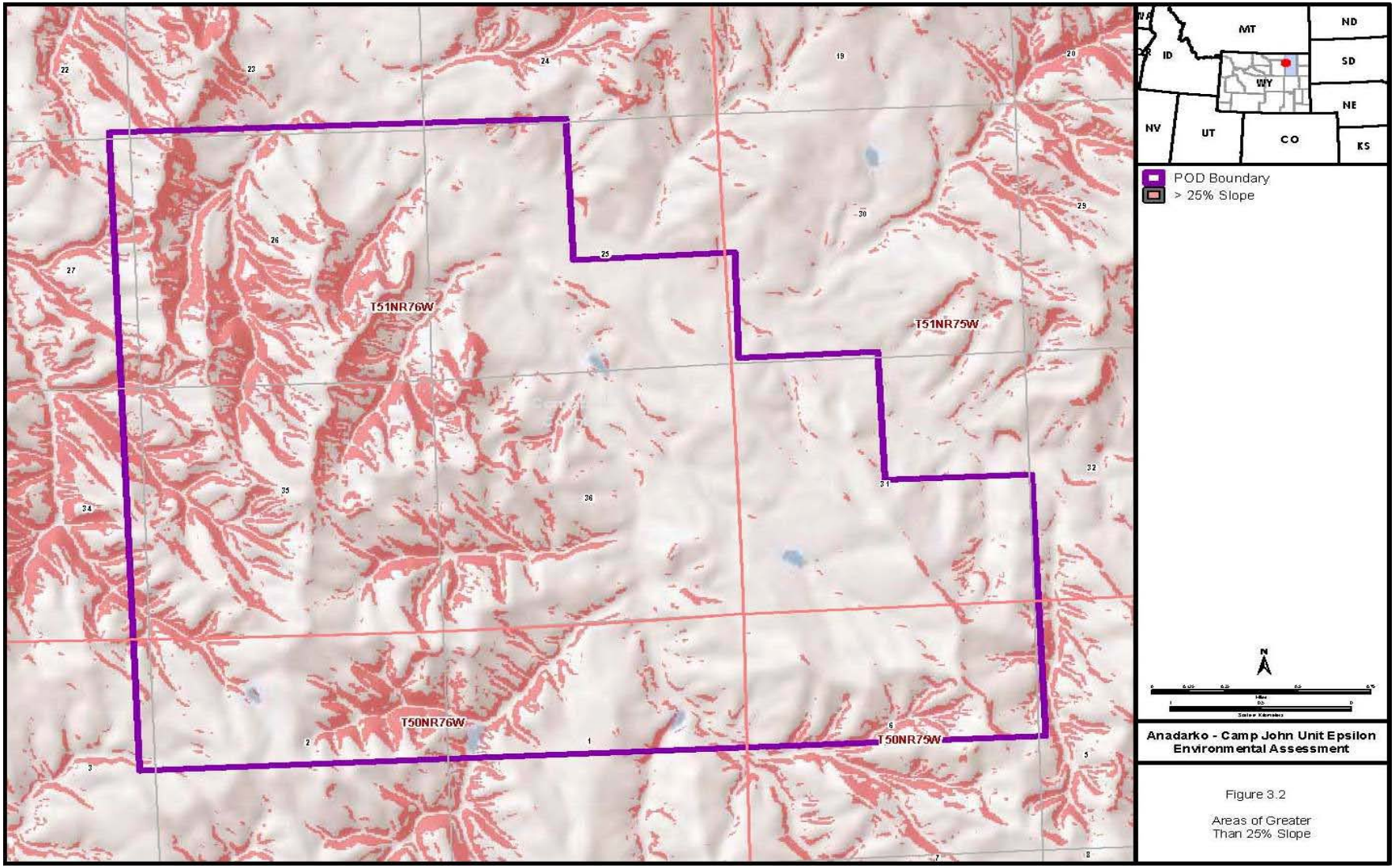


Figure 3.2 Areas of Slopes Exceeding 25 Percent within the Project Area



Soils with slopes of less than 25 percent also may be prone to high erosion because of the soil type, particle size, texture, or amount of organic matter. Soil types in the POD area with severe erosion potential and slopes 25 percent or greater, as defined by the NRCS (NRCS 2010), are listed in Tables 3.3 and 3.4, respectively, along with the number of acres and percentage of the project area.

Table 3.4 Percent Slope within the Camp John Unit Epsilon CBNG POD

Percent Slope	Approximate Acres	Percent of Project Area
0-24	3,353	81
Greater than or Equal to 25	791	19

Source: NRCS 2010.

Other contributing factors to slope stability include slope length, slope aspect and colluvium. Slope length has considerable control over runoff and potential accelerated water erosion. Slope aspect is the direction which the surface of the soil faces. Slope aspect may affect soil temperature, evapotranspiration, wind contact, and soil moisture. Colluvium is poorly sorted debris that has accumulated at the base of slopes, in depressions, or along small streams through gravity, soil creep, and local wash. It consists largely of material that has rolled, slid or fallen down the slope under the influence of gravity. The rock fragments in colluvium are usually angular, in contrast to the rounded, water-worn cobbles and stones in alluvium and glacial outwash (SCS 1993). The predominant colluviums in the POD boundary are angular fractured shales. These factors in combination with slope determine soil stability and the potential for mass soil movement.

3.2.1.3. Limited Reclamation Potential

3.2.1.3.1. Miscellaneous Areas

Miscellaneous areas generally have little to no soil or vegetation. They can result from active erosion, washing by water, unfavorable soil conditions, or human activities. Some miscellaneous areas can be made productive, but only after major reclamation efforts (USDA 2010).

Approximately 212 acres (5 percent) of the Ustic Torriorthents gullied map unit occur within the project area. As stated in Section 3.2.1 of this document, this map unit is highly dissected and erodible. Reclamation of these soils would be difficult. Riverwash is a minor component of this map unit which is frequently flooded and unstable.

Badlands occur as minor components in map units 204, 216, and 217. Badlands are moderately steep to very steep barren land dissected by many intermittent drainage channels. They occur on steep slopes and ridge tops, but may occur on all slopes which include landforms such as hillsides, ridges and escarpments. They consist of slightly to moderately weathered shale and may be high in salts and sodium. Potential runoff is very high, and erosion is active. Riverwash is unstabilized sandy, silty, clayey, or gravelly sediment that is flooded, washed, and reworked frequently by rivers (USDA 1993). Riverwash and badlands occur as minor inclusions (generally less than 5 percent of a map unit) to various soil map units in the project area.

Onsite investigations of the project area confirmed the presence of one proposed access road crossing a previously disturbed miscellaneous area with an existing road footprint. The proposed road disturbance was kept in the same corridor in order to keep disturbances within the existing disturbance footprint.

3.2.1.4. Source of Reclamation Materials

Soils with poor reclamation and revegetation potential occur throughout the project area are quantified in Table 3.5. Currently, soil conditions in the project area are being impacted by CBNG development as well

as traditional activities, including livestock grazing and wildlife use. Much of the area is covered with soils that are easily damaged by use or disturbance or are difficult to revegetate or otherwise reclaim. Soil impacts (e.g., roads, linear pipeline scars, and artificial wet areas) can be readily observed in the area. This high erosion potential could result in higher suspended sediment and turbidity levels in the Powder River.

Table 3.5 Reclamation Potential within the Camp John Unit Epsilon POD

Reclamation Potential	Approximate Acres	Percent of Project Area
Fair	3,041	73
Poor	1,103	27

Source: NRCS 2010.

In the absence of recoverable topsoil as is common throughout the project area, the surface organic matter in the form of vegetation, litter, and biological crust are critical to maintaining the integrity and viability of the soil.

Reclamation suitability of soils varies throughout the project area. The main soil limitations in the project area include: depth to bedrock, low organic matter content, and high erosion potential especially in areas of steep slopes. Many of the soils and landforms of this area present distinct challenges for development. Approximately 5 percent of the area within the boundary of the proposed action contains soil mapping units with a named component identified as being a highly susceptible water erosion and 19 percent of the area has slopes greater than 25 percent making stabilization of disturbance and reclamation challenging and possibly unachievable.

3.2.2. Vegetation

3.2.2.1. General Description

Species typical of the mixed-grass prairie community type consist of western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), needle-and-thread (*Hesperostipa comata*), and Wyoming big sagebrush (*Artemisia tridentate* var. *wyomingensis*), while species typical of the sagebrush shrubland include Artemisia spp., rabbitbrush (*Chrysothamnus* spp.), western wheatgrass, prairie junegrass (*Koeleria macrantha*), and plains pricklypear (*Opuntia* spp.). Inclusions within the dominant ecological sites are very shallow sites dominated by little bluestem (*Schyzachyrium scoparium*) and junipers (*Juniperus* spp.).

Visits to the project area were conducted by BLM staff, Lance, and Big Horn Environmental Consultants (BHEC) for the wildlife habitat surveys in June 2010 (BHEC 2010). The site visits confirmed the dominant vegetation communities, and the presence of the typical species listed above. In addition, other native graminoid species observed include plains reedgrass (*Calamagrostis montanensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), green needlegrass (*Nassella viridula*), and bulbous bluegrass (*Poa bulbosa*). Additional forb and shrub species observed during the site visit included yucca (*Yucca glauca*), common yarrow (*Achillea millefolium*), death camus (*Zigadenus venenosus*), fleabane (*Erigeron* spp.), Franklin's sandwort (*Arenaria franklinii*), ragwort (*Senecio* spp.), pale madwort (*Alyssum alyssoides*), penstemons (*penstemon* spp.), American vetch (*Vicia americana*), and milkvetch (*Astragalus* spp.). Non-native graminoids present included cheatgrass (*Bromus tectorum*), which is quite extensive in the project area. In some locations, cheatgrass is the dominant species present. Some portions of the project area are managed by prescribed burns to establish and maintain grasslands (BHEC 2010).

The site visits also confirmed the presence of tree species in draws, along the creeks, and at higher elevations in the project area. In many of the draws, juniper is extensive, while cottonwoods (*Populus*

spp.) are scattered along Fortification Creek in the riparian corridor. At higher elevations, ponderosa pines (*Pinus ponderosus*) also occur. This proposed project area clearly lacks wilderness characteristics due to extensive natural gas development and its associated infrastructure; see Section 1.4 and Tables 1.1 and 2.2 of this document for examples of the extent of existing development.

3.2.2.2. Wetlands/Riparian

The project area has numerous ephemeral draws and gullies. Based on National Wetland Inventory data available for the project area (U.S. Fish and Wildlife Service [USFWS] 2009), 4 percent of the project area is herbaceous and forested/shrub wetlands (Table 3.6). An unpermitted stock reservoir also is located within the project area (SWSW Qtr/Qtr of Section 31, T51N, R75W). An ephemeral stream, Fortification Creek runs through the northeastern corner of the project area. For more information regarding surface water refer to the PRB FEIS, pages 3-36 to 3-56.

Table 3.6 Wetlands and Riparian Areas within the Camp John Unit Epsilon POD

Wetland Type	Approximate Acres	Percent of Project Area
Herbaceous wetlands	24	2
Forested/shrub wetlands	25	2
On-channel stock reservoir	3	<1

Source: USFWS 2009.

3.2.2.3. Invasive Species

Noxious weeds remain a concern in the western U.S. based on their ability to increase in cover relative to surrounding vegetation and exclude native plants from an area. Wyoming defines noxious weeds as weeds, seeds, or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect or as carriers of diseases or parasites that exist within the state, and are on the designated list by the Wyoming Statutes (Title 11, Chapter 5, Section 102.a.xi). Campbell County also identified weeds of concern specific to the county under the authority of the Wyoming Weed and Pest Control Act. The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (page 3-104) and the Weed Species of Concern are listed in PRB FEIS Table 3-22 (page 3-105). Since publication of the PRB FEIS Russian Olive (*Elaeagnus angustifolia*), Common St. Johnswort (*Hypericum perforatum*), and Common Tansy (*Tanacetum vulgare*) were added to the State of Wyoming noxious weed list. Weeds listed in the current list of Campbell County weed species of concern are included in Table 3.7. While not a state-designated noxious weed or County weed species of concern, cheatgrass is found extensively throughout the project area and is of concern.

Table 3.7 Campbell County Weed Species of Concern

Common Name	Scientific Name
Black Henbane	*Hyoscyamus niger*
Buffalobur	*Solanum rostratum*
Common Cocklebur	*Xanthium strumarium*

Source: Wyoming Department of Agriculture 2010.

In addition to the species listed for Campbell County, Lance confirmed with the Campbell County Weed and Pest District that the following infestations and/or documented additional weed species from the State designated list of noxious weeds are located in or in the vicinity of the project area:

- Leafy spurge (*Euphorbia esula)*
- Canada thistle (*Cirsium arvense)*
- Field bindweed (*Convolvulus arvensis*)
- Spotted knapweed (*Centaurea maculosa)*

3.2.3. Ecological Sites

Ecological site descriptions provide site and vegetation information needed for resource identification, management, and reclamation recommendations. To determine the appropriate ecological sites for the area contained within this proposed POD, BLM specialists analyzed data from onsite field reconnaissance and from Natural Resources Conservation Service published soil survey soils information. The map unit symbols for the soils identified in Section 3.2.1 of this document and the associated ecological sites for the identified soil map unit symbols found in the POD boundary are summarized in Table 3.8, below.

Table 3.8 Dominant Ecological Sites and Dominant Soils Map Units within the Camp John Unit Epsilon POD

Map Unit	Ecological Site	Percent of Project Area[1]
147	Loamy (10-14NP)	64
215	Loamy (10-14NP)	
216	Loamy (10-14NP)	
217	Loamy (10-14NP)	
204	Shallow Clayey (10-14NP)	22
233	Not Assigned	5
334	Sandy (15-17NP)	<4
139	Sands (10-14NP)	
221	Sandy (10-14NP)	
285	Lowland (10-14NP)	3
327	Clayey (10-14NP)	3

[1] Ecological site information is only available for 95 percent of the project area. The remaining 5 percent is unassigned.

Source: NRCS 2010.

Dominant ecological sites and plant communities identified in this POD and its infrastructure are loamy (10-14NP) and shallow clayey (10-14NP) sites. Refer to Section 3.2.2 Vegetation, for a description of vegetation species observed during onsite field visits. Minor ecological sites and plant communities identified as areas that are difficult to reclaim include sands and sandy sites. In addition, within the project area are small inclusions areas of very shallow parent material (less than ten inches in depth). Typically, in these locations little bluestem and junipers are found, which are indicators of shallow soils. A summary of the project's ecological sites are included in Table 3.9.

Table 3.9 Summary of all Ecological Sites within the Camp John Unit Epsilon POD

Ecological Site	Approximate Acres	Percent of the Project Area
Loamy (10-14NP)	2,633	64
Shallow Clayey (10-14NP)	924	22
Not Assigned[1]	212	5
Sandy (15-17NP)	79	<4
Sands (10-14NP)	29	
Sandy (10-14NP)	13	

Table 3.9 Summary of all Ecological Sites within the Camp John Unit Epsilon POD

Ecological Site	Approximate Acres	Percent of the Project Area
Lowland (10-14NP)	137	3
Clayey (10-14NP)	118	3

[1] Unassigned an ecological site description. Unassigned site proportions are similar to those in assigned areas.

Source: NRCS 2010.

The loamy (10-14NP) ecological site (covering approximately 64 percent of the POD) is a rangeland site type, found in the southern part of the Northern rolling high plains. The topography is composed of gently undulating rolling lands. Annual precipitation is 10 to 14 inches a year, and the soils are well drained, moderately permeable, and deep to moderately deep. The dominant species found in this ecological site include western wheatgrass, needle-and-thread, green needlegrass, Cusick's bluegrass (*Poa cusickii*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass, and blue grama. Wyoming big sagebrush typically is 15 percent of the vegetative community. Disturbances such as overgrazing and changes in the fire regime lead to changes in the vegetative community. Overgrazing would increase the Wyoming big sagebrush and blue grama, and decrease cool season grasses. The absence of fire can increase the cover and percentage of Wyoming big sagebrush on the site, until it becomes the dominant species. Disturbances also can lead to the increase in cheatgrass and plains pricklypear.

The Shallow Clayey (10-14NP) ecological site (covering approximately 22 percent of the POD) is a rangeland site type, found in the Southern Part of the Northern Rolling High Plains. Annual precipitation is 10 to 14 inches a year. This ecological site can be found on ridge tops and all slopes, and the soils are shallow, typically less than 20 inches deep, and well drained. The bedrock is clay shale bedrock, which is virtually impenetrable to plant roots. Textures range from clay to silty clay loam. The dominant species are cool season midgrasses, which in addition to the two dominant species include bluebunch wheatgrass, Cusick bluegrass, Sandberg bluegrass, needleleaf sedge (*Carex duriuscula*), blue grama and plains reedgrass. The typical shrubs are Wyoming big sagebrush, and winterfat (*Krascheninnikovia lanata*). Disturbances can lead to increases in blue grama and Wyoming big sagebrush, and can lead to decreases in green needlegrass, bluebunch wheatgrass and rhizomatous wheatgrasses.

The sandy (15-17NP), sandy (10-14NP), and sands (10-14NP) ecological sites (covering approximately 4 percent of the POD) are rangeland site types, found in the Southern part of the Northern rolling high plains. Annual precipitation ranges from 10 to 17 inches. These ecological sites are found on gently undulating rolling land, alluvial fans, hillsides, plateaus, ridges, and stream terraces on nearly level to fifty percent slopes. Soils are moderately deep to very deep, well-drained, and have moderate to rapid permeability. Surface soils are 3 to 6 inches deep. These ecological site types are dominated by warm and cool season midgrasses. Typical species include needle-and-thread, prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*), little bluestem (*Schizachyrium scoparium*), Sandberg bluegrass, and Indian ricegrass (*Achnatherum hymenoides*). A dominant forb is silver sagebrush (*Artemisia cana*). Disturbances such as overgrazing can lead to a conversion of the site to a blowout community with yucca, plains pricklypear, fringed sagewort, sandbur (*Cenchrus* spp.) and western ragweed (*Ambrosia psilostachya*) dominating.

3.3. Wildlife and Protected Species

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 BFO wildlife biologists, the PRB FEIS, the WGFD big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD). Wildlife inventory surveys were performed by BHEC for Lance in 2009 and 2010. Species specific surveys included sharp-tailed grouse, greater sage-grouse, raptor nests, bald

eagle nests and winter roost sites, prairie dog colonies, mountain plover, and habitat for the Ute ladies'-tresses orchid and blowout penstemon.

WGFD has developed several guidance documents that the BFO wildlife staff relies upon in evaluating impacts to wildlife and wildlife habitats. WGFD documents used to analyze the proposed project under the current analysis are referenced in this section.

3.3.1. Habitat Types

According to the wildlife surveys conducted for the project, the project area is dominantly sagebrush grasslands. Sagebrush is interspersed with native short-grass species including blue gramma (*Bouteloua gracilis*). Western wheatgrass (*Agropyron smithii*) along with other *Agropyron* species and yucca (*Yucca glauca*) is common in the area. Cheatgrass (*Bromus tectorum*) is well established and extensive in many areas (BHEC 2010). Juniper (*Juniperus* spp.) is prevalent in many draws throughout the area with scattered individual ponderosa pines (*Pinus ponderosus*) and groves occurring in the higher elevations (BHEC 2010). Cottonwood trees (*Populus* spp.) are scattered along the Fortification Creek riparian corridor. The POD also contains areas managed by prescribed burns where a variety of tall grasses have established in former sagebrush/mixed grassland habitats (BHEC 2010). For more details on habitat types, refer to Section 3.2.2, Vegetation.

Within the POD boundary, Fortification Creek is an ephemeral drainage that typically flows during storm events. Currently, tall annual grasses, sedges and rushes dominate the channel with an abrupt transition to upland vegetation (BHEC 2010). Greasewood (*Sarcobatus vermiculatus*) and silver sagebrush (*Artemisia cana*) occupy the area directly above the creek along with several upland grass species, and Canada thistle (BHEC 2010). Other plant species present along the drainage include; foxtail barley, western wheatgrass, curlycup gumweed (*Grindelia squarrosa*), brome (*Bromus* spp.), and yellow sweetclover (*Melilotus officinalis*) (BHEC 2010). Foxtail barley (*Hordeum jubatum*) also was observed in the creek channel (BHEC 2010). Since the discharge of CBNG coproduced water stopped, the riparian vegetation community is in transition, and would most likely return to a vegetation community that is a predominantly composed of upland species. Soils along the creek are composed of heavy clay with intermittent sand and alkali deposits (BHEC 2010).

A small previously disturbed herbaceous wetland occurs in a low spot at the toe of the slope along an existing road corridor that crosses Carr Draw in Section 25, T51N, R76W. This wetland is likely anthropogenically created due to storm water backing up against the road fill.

For more details on habitat types, refer to Section 3.2.2, Vegetation.

3.3.2. Federally Threatened, Endangered, Proposed, and Candidate Species

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

3.3.2.1. Threatened and Endangered Species, including Blowout Penstemon and Ute Ladies'-tresses Orchid

Blowout penstemon is listed as endangered under the ESA. It is a regional endemic species with documented populations in the Sand Hills of west-central Nebraska and the northeastern Great Divide Basin of Carbon County, Wyoming. Suitable blowout penstemon habitat consists of sparsely vegetated, early successional, shifting sand dunes and blowout depressions created by wind. In Wyoming, the habitat is typically found on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges. As these habitat characteristics are not found in the project area, blowout penstemon does not occur in the project area. Known locations of blowout penstemon are

restricted to central Wyoming, in the dune country of the Ferris Mountains in Carbon County. Surveys verified no blowout penstemon was found in the CJU Epsilon POD in 2010 (BHEC 2010).

The Ute ladies'-tresses orchid is listed as threatened under the ESA. The affected environment for Ute ladies'-tresses orchid is discussed in the PRB FEIS, p. 3-177. The PRB FEIS reported 4 orchid populations in Wyoming. Since the writing of the PRB FEIS, 5 additional populations were discovered in the same drainages as the original populations (BLM 2010a). These drainages include Wind Creek and Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. Suitable habitat may be present within the project area along Fortification Creek in years of high moisture events. Additionally, surveys for the Ute ladies'-tresses orchid were conducted each season from 2006 thru 2009 without detecting its presence (BHEC 2010). The proposed well locations and infrastructure are in dry upland vegetation without a source of perennial water (BHEC 2010). There are no known populations of the Ute ladies'-tresses in the project area.

3.3.2.2. Proposed Species, including Mountain Plover

The affected environment for mountain plover is discussed in the PRB FEIS, pp. 3-177 to 3-178. At the time the PRB FEIS was written, the mountain plover was proposed for listing as a threatened species under the ESA. In 2003, USFWS withdrew the proposal, finding that the population was larger than had been thought and was no longer declining. On June 29, 2010, the USFWS reinstated the portion of the 2002 proposed rule that concerns the listing of the mountain plover as threatened under the ESA, as amended. In addition, the mountain plover is a Wyoming BLM sensitive species. Mountain plovers are a WGFD Species of Greatest Conservation Need (SGCN), with a rating of Native Species Status (NSS) 4, because population status and trends are unknown but are suspected to be stable, habitat is vulnerable without ongoing loss, and the species is sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They also are listed by USFWS as a Bird of Conservation Concern (BCC) for Region 17.

Suitable habitat for mountain plover exists within the POD and is limited to prairie dog colonies (Table 3.11). Surveys for nesting mountain plover were conducted on May 9, 15, 29, and June 3, 2010 following the USFWS guidelines for mountain plover surveys (USFWS 2002a). Surveys were conducted within the entire POD and extended buffer of 0.25 mile from proposed construction areas, paying particular attention to black-tailed prairie dog colonies and other suitable terrain including access roads to the project (BHEC 2010). Mountain plover were not observed during those surveys, and have not been seen in the area dating back to 2004 (BHEC 2010).

3.3.2.3. Candidate Species, including Greater Sage-grouse

In 2010, USFWS determined that the sage-grouse is warranted for federal listing across its range, but listing is precluded by other higher priority listing actions. In addition to being listed as a Wyoming BLM sensitive species, sage-grouse are listed as a WGFD species of greatest conservation need, because populations are declining and they are experiencing ongoing habitat loss (WGFD 2010a). The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They also are listed by USFWS as a BCC for Region 17.

Within the project area, sage-grouse habitat is present and portions of the POD provide valuable habitat for sage-grouse. However, the POD is not within key or connectivity habitat for sage-grouse and the area also supports extensive existing developments (Tables 1.1 and 2.2).

The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008) recommends that impacts be considered for leks within 4 miles of oil and gas

developments. WGFD records indicate that 5 sage-grouse leks occur within 4 miles of the project area (Table 3.10).

Table 3.10 Sage-grouse Leks within 4 miles of the Camp John Unit Epsilon POD

Lek Name	Legal Location	Distance from Project Area (miles)	Occupied?
Fortification	NWSW Qtr/Qtr, Section 25, T51N R76W	Within POD	Yes
Hayden I	SWSE Qtr/Qtr, Section 17, T50N, R75W	2.5	Yes
Hayden II	SESW Qtr/Qtr, Section 31, T51N, R75W	Within POD	Yes
Hayden Sat. A	SWNE Qtr/Qtr, Section 22, T50N, R75W	3.8	Yes
Montgomery	NWNW Qtr/Qtr, Section 26, T51N, R75W	3.3	Yes

Source: BHEC 2010; BLM 2010b.

3.3.3. BLM Sensitive Species

Wyoming BLM monitors sensitive Species of Conservation Concern for which management efforts are focused towards proactively maintaining populations and habitats to preclude listings as threatened or endangered species. The policy goals are to:

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

The authority for the sensitive species policy and comes from the ESA, as amended; FLPMA; USDI Manual 235.1.1A, BLM Manual 6840, and BLM WY policy. Wyoming BLM sensitive species that may be affected beyond the level analyzed within the PRB FEIS are described below.

3.3.3.1. Northern Leopard Frog

The affected environment for northern leopard frog is discussed in the PRB FEIS, p. 3-181. This is a WGFD SGCN, with a rating of NSS4, indicating that the species is common (widely distributed throughout its native range and populations are stable) and its habitat is stable. Suitable habitat is present within the project boundary along Fortification Creek, its associated tributaries, and within the wetland and riparian areas identified in the project area (Table 3.6). Individuals are not documented within the project area but their presence is suspected.

3.3.3.2. Bald Eagle

The affected environment for bald eagles is described in the PRB FEIS, p. 3-175. At the time the PRB FEIS was written, the bald eagle was listed as a threatened species under the ESA. It was removed from the ESA on August 8, 2007. The bald eagle remains under the protection of the BGEPA and the MBTA. In addition to being listed as a Wyoming BLM sensitive species, bald eagles are a WGFD SGCN with a NSS2 rating, due to populations being restricted in numbers and distribution, ongoing loss of habitat, and sensitivity to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They also are listed by USFWS as a BCC for Region 17.

In the PRB Oil & Gas Project Biological Opinion (BO) (USFWS 2002b), USFWS defined bald eagle winter roosting habitat as any mature conifer or deciduous tree where bald eagles consistently perch. A

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

Suitable nesting and winter roosting habitat is limited to sparsely scattered cottonwood trees within the riparian corridor of Fortification Creek. Aerial and ground surveys were conducted within 1 mile of the project area for bald eagle nest and winter roost sites. Nest surveys were conducted in May and June 2010, and winter roost surveys were conducted on December 12, 2009, and January 12 and February 10, 2010 (BHEC 2010). No bald eagles were observed within 1 mile of the POD and no bald eagle nests were identified (BHEC 2010).

3.3.3.3. Brewer's Sparrow

The affected environment discussion for Brewer's sparrow is in the PRB FEIS, p. 3-200. Brewer's sparrows are a WGFD SGCN, with a rating of NSS4 because populations are declining, habitat is vulnerable with no ongoing loss, and the species is insensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are listed by USFWS as a BCC for Region 17.

This species is considered a sagebrush obligate and is closely associated with sagebrush shrublands that have abundant, scattered shrubs and short grass (WGFD 2005). Suitable habitat for the Brewer's sparrow is present throughout the POD as described in Section 3.2.2.1 of this document, but individuals have not been documented by the BLM within the project area.

3.3.3.4. Ferruginous Hawk

The affected environment for ferruginous hawk is discussed in the PRB FEIS, p. 3-183., Ferruginous hawks are a WGFD SGCN, with a rating of NSS3 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, they are experiencing ongoing loss of habitat, and they are sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They also are listed by USFWS as a BCC for Region 17.

This species is found within grasslands, agricultural lands, sagebrush/saltbrush/greasewood, shrublands, and the periphery of pinyon-juniper woodlands. Suitable foraging habitat for the ferruginous hawk is present throughout the entire POD as described in Section 3.2.2.1. However, no active ferruginous hawk nests were identified during past raptor nest survey efforts (see Table 3.20) (BHEC 2010).

3.3.3.5. Loggerhead Shrike

The affected environment for loggerhead shrike is discussed in the PRB FEIS, page 3-187. Loggerhead shrikes are listed by USFWS as a BCC for Region 17. The Wyoming Bird Conservation Plan rates them as a Level II species, indicating they are in need of monitoring.

The Loggerhead Shrike occurs in habitat characterized by short grasses, interspersed with spiny shrubs and low trees. Pastures and hay meadows with hedges or shrubs are particularly suitable. Shrubs and trees are required for nesting and perching as well as for sites on which to impale their prey, which ranges from ants and spiders to small birds and mammals. Suitable habitat for the loggerhead shrike is present throughout the POD as described in Section 3.2.2.1. Yet their presence is not suspected in the POD.

3.3.3.6. Long-billed Curlew

The affected environment discussion for long-billed curlew is in the PRB FEIS, p. 3-184. Curlews are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, and habitat is vulnerable but not undergoing loss. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. USFWS lists them as a BCC for Region 17.

Short-growth grasslands, mixed-grass prairies, meadows, grazed mixed-grass and scrub communities, cultivated fields, lawns, mud flats, grassy floodplains, sandy islands, shoals, salt marshes along coastal shorelines, and edges of ponds, lakes, and other non-flowing bodies of water comprise common habitats used by the birds. Long-billed curlews rely on the cover and openness of grasslands, prairies, and pastures to nest and rear young. Suitable habitat for the long-billed curlew is present in POD areas associated with wetland and riparian areas described in Section 3.2.2.2. Yet their presence is not suspected in the POD.

3.3.3.7. Northern Goshawk

The affected environment for northern goshawk is discussed in the PRB FEIS, pp. 3-193 to 3-194. Northern goshawks are a WGFD SGCN, with a rating of NSS4, because the species is widely distributed, population status and trends are unknown but are suspected to be stable, habitat is vulnerable but not undergoing loss, and the species is sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action.

This species uses coniferous and deciduous forest habitats. Suitable habitat for the northern goshawk is present, but minimal within the POD as described in Section 3.2.2.1 of this document. Additionally, individuals are not suspected to be present within the project area. Additionally, no active northern goshawk nests were identified during past raptor nest survey efforts (see Table 3.20) (BHEC 2010).

3.3.3.8. Peregrine Falcon

The affected environment for peregrine falcon is discussed in the PRB FEIS, p. 3-194. Peregrine falcons are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, habitat is restricted but not undergoing substantial loss, and they are sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They also are listed by USFWS as a BCC for Region 17.

The peregrine falcon preys on smaller birds and forages in a variety of open habitats from open woodlands and forests to shrub-steppe, grasslands, marshes, and riparian habitats (WGFD 2005). It nests on cliffs that are usually proximate to habitats with abundant prey (WGFD 2005). Suitable foraging habitat for the peregrine falcon is present throughout the entire POD as described in Section 3.2.2.1 of this document. However, no active peregrine falcon nests were identified during past raptor nest survey efforts (see Table 3.20) (BHEC 2010).

3.3.3.9. Sage Sparrow

The affected environment for sage sparrow is discussed in the PRB FEIS, pp. 3-200 to 3-201. Sage sparrows are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, habitat is restricted but not undergoing substantial loss, and they are sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They also are listed by USFWS as a BCC for Region 17.

Restricted to open shrub lands and grasslands, sage sparrows are found in areas of with mature big sagebrush stands. These sparrows prefer sites with sparse shrub cover, arranged in patches, with bare ground in between. Suitable habitat for the sage sparrow is present inthe POD as described in Section 3.2.2.1 of this document; however, individuals are not suspected to be present within the project area.

3.3.3.10. Sage Thrasher

The affected environment for sage thrasher is discussed in the PRB FEIS, pp. 3-199 to 3-200. Sage thrashers are a WGFD SGCN, with a rating of NSS4, because populations are declining, habitat is vulnerable but not undergoing loss, and the species is not sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level II species, indicating the action and focus should be on

monitoring and because Wyoming has a high percentage of and responsibility for the breeding population. They also are listed by USFWS as a BCC for Region 17.

Considered sagebrush obligate, the Sage Thrasher inhabits prairie and foothills shrubland habitat where sagebrush is present. It prefers shrublands with tall shrubs and low grass cover, where sagebrush is clumped in a patchy landscape. Suitable habitat for the sage thrasher is present throughout the POD as described in Section 3.2.2.1 of this document; however, individuals are not suspected to be present within the project area.

3.3.3.11. Western Burrowing Owl

The affected environment for western burrowing owl (burrowing owl) is discussed in the PRB FEIS, p. 3-186. In addition to being listed as a Wyoming BLM sensitive species, burrowing owls are a WGFD SGCN, with a rating of NSS4 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, habitat is restricted or vulnerable without recent or on-going significant loss, and it may be sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action, and they are also a USFWS BCC in Region 17.

Current population estimates for the United States are not well known but trend data suggest declines throughout the burrowing owl's North American range (McDonald et al. 2004). Primary threats are habitat loss and fragmentation, mostly due to intensive agricultural and urban development and habitat degradation, due to declines in populations of colonial burrowing mammals (Klute et al. 2003).

The BFO database indicates no burrowing owl nests within 0.25 mile of the CJU Epsilon project area. However, suitable habitat exists within prairie dog colonies listed in Table 3.11 of this document.

3.3.3.12. Black-tailed Prairie Dog

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

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

BHEC (2010) delineated 4 black-tailed prairie dog colonies within 0.25 mile of the POD (Table 3.11).

Table 3.11 Black-tailed Prairie Dog Colonies within 0.25 Mile of the Camp John Unit Epsilon

Qtr/Qtr	Section(s)	Township (N)	Range (W)	Size (acres)
NWSW	31	51	75	13.4
SENE	36	51	76	25.3
SWSW	25	51	76	0.3
NENE	27	51	76	4.0

3.3.3.13. Fringed Myotis

The affected environment for fringed myotis is discussed in the PRB FEIS, pp. 3-188 to 3-189. Fringed myotis is a WGFD SGCN, with a rating of NSS2, because populations are restricted in distribution, they are experiencing ongoing substantial loss of habitat, and they are sensitive to human disturbance. The fringed myotis is commonly found in xeric woodlands, such as juniper, ponderosa pine, and Douglas-fir. It typically forages over water, along forest edges, or within forests and woodlands. Roost sites and hibernacula include rock crevices, tree cavities, caves, abandoned mines, and buildings (WGFD 2005). Suitable habitat is present in the POD, but individuals are undocumented in the POD area.

3.3.3.14. Long-eared Myotis

The affected environment for long-eared myotis is discussed in the PRB FEIS on p. 3-201. Long-eared myotis is a WGFD SGCN, with a rating of NSS2, because populations are restricted in distribution, they are experiencing ongoing substantial loss of habitat, and they are sensitive to human disturbance. The long-eared myotis inhabits coniferous forest and woodland, including juniper, ponderosa pine, and spruce-fir and typically forages over rivers, streams, and ponds within the forest-woodland environment (WGFD 2005). Roosts include: cavities in snags, under loose bark, stumps, buildings, rock crevices, caves, and abandoned mines (WGFD 2005). During winter it likely hibernates in caves and abandoned mines (WGFD 2005). Suitable habitat exists in the POD, though its presence is undocumented.

3.3.4. Big Game

3.3.4.1. General

Big game species expected to be in the CJU Epsilon CBNG POD include pronghorn antelope, mule deer, and elk. The WGFD determined the POD area has winter range for the Gillette pronghorn antelope herd (hunting unit #351), winter-yearlong range for the Powder River mule deer herd (unit #319), yearlong range for the Powder River white-tailed deer herd (unit #303), and yearlong, crucial winter, and parturition range for elk. Big game range maps are in the PRB FEIS, pp. 3-119 to 3-143). The PRB FEIS discusses affected environment for pronghorn, pp. 3-117 to 3-122 and for mule deer, pp. 3-127 to 3-132.

The affected environment for the Fortification Creek elk herd is discussed in the PRB FEIS, pp. 3-132 to 3-140. The PRB FEIS generally considered cumulative impacts to elk but could not specifically address the issues to the isolated Fortification Creek elk herd in the absence of specific development proposals. CBNG development is likely throughout and surrounding the elk herd's seasonal ranges, as extrapolated from sales of federal oil and natural gas leases and the on-going development progression of those leases.

3.3.4.2. Elk Habitat and Availability

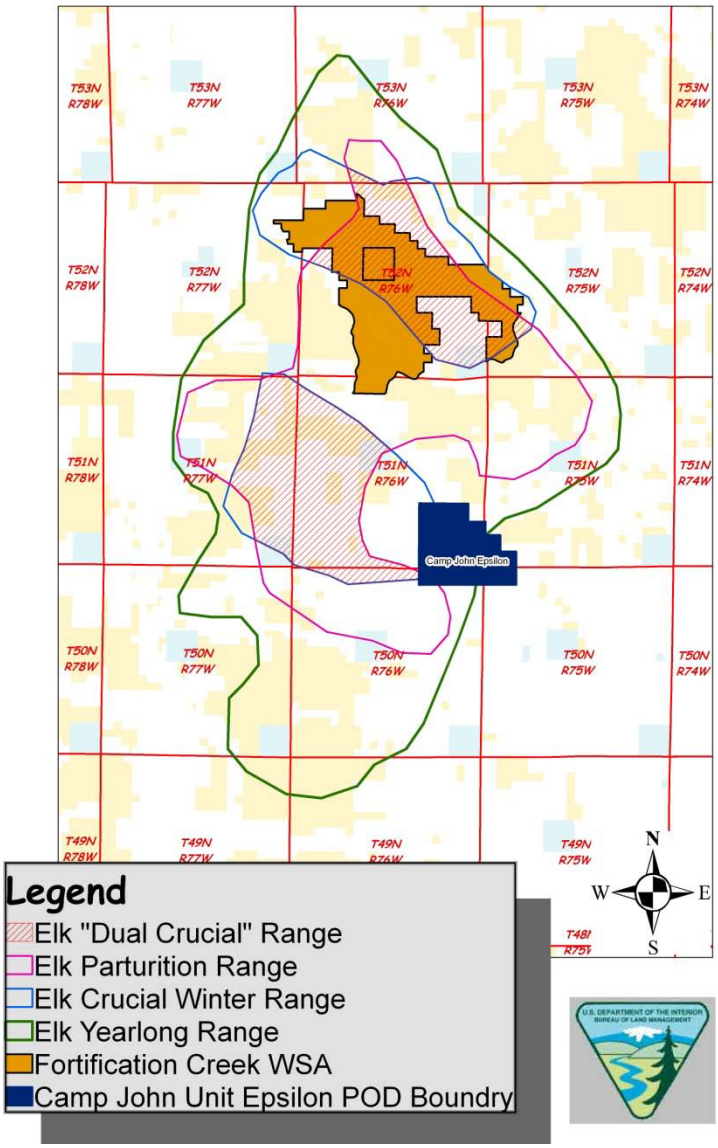
In 1992, a 2.5 year study of the Fortification Creel elk herd was initiated by the WGFD, in cooperation with the BLM and area landowners, with the collaring of 17 cows. Data from this study allowed the WGFD to better delineate crucial elk winter range, elk summer/yearlong range, and elk parturition range (BLM 2006). The study area included the yearlong range of the Fortification Creek elk herd. The WGFD defined 2 types of important elk habitats within the greater Fortification Creek area that are located within

the elk yearlong range; crucial winter range and parturition (calving) range (Table 3.12 and Figure 3.3). Both provide important seasonal habitat functions during sensitive periods for elk. These crucial ranges overlap on the landscape and the overlapping area is referred to as “dual crucial” range.

Table 3.12 Fortification Creek Elk Ranges

Range	Size (acres)
Yearlong	122,930
Crucial Winter	38,233 (31% of Yearlong Range)
Parturition	59,291 (48% of Yearlong Range)
“Dual Crucial”	25,770 (21% of Yearlong Range)

Figure 3.3 Affected Environment - Fortification Elk Herd Ranges



3.3.4.2.1. Habitat Effectiveness

Habitat effectiveness is the degree to which habitat features fulfill specific functions; (i.e., the degree to which a species or population is able use their habitat).

A security area is defined as "any area that will hold elk during periods of stress because of geography, topography, vegetation, or a combination of those features" (Lyon and Christensen 1992). Hillis et al. (1991) quantified security areas as nonlinear blocks of hiding cover≥ 250 acres in size and ≥ 0.5 miles from any open road (Canfield 1991, Hillis et al 1991). WGFD also uses this definition (WGFD 2004).

In the 2007 Environmental Report, BLM used the elk relocation data (prior to 2008) and a viewshed model to identify and further define security habitat within the Fortification Creek area based on elk avoidance of oil and gas wells and roads (BLM 2007). Two types of habitat were considered in the model: habitat effectiveness and security habitat. Habitat effectiveness is the total area greater than 0.5 miles from roads or less than 0.5 miles from a road but not visible from a road. It generally refers to the available habitat during non-hunting conditions, particularly summer and fall (Lyon 1983). To simplify the model, all area meeting these criteria is considered useable habitat. Vegetation and other factors that could affect habitat suitability are not considered. Security habitat is a subset of effective habitat. Elk often retreat when disturbance in their usual range is intensified, such as during the hunting season, with elk appearing to be most comfortable or secure within effective habitat areas of a minimum size (Lyon 1983). A commonly used minimum patch size for security habitat is 250 contiguous acres more than 0.5 miles from an open road (Christensen et al. 1991, Leege 1984). Table 3.13 shows the available elk security habitat within the identified Fortification Creek elk ranges as of 2009. Approximately 64,000 acres identified as elk security habitat existed prior to non-federal oil and gas development that began in May 2008 and reduced to approximately 60,000 acres in 2009.

Table 3.13 2009 Elk Security Habitat within the Fortification Creek Elk Herd Ranges

Range	Security Habitat (Acres)
Yearlong	60,000
Crucial Winter	23,150 (39% of security habitat)
Parturition	33,770 (56% of security habitat)
"Dual Crucial"	17,957 (30% of security habitat)

WGFD submitted a letter to BFO dated December 29, 2009, as a public comment on a modification to the Augusta Unit Zeta Environmental Assessment (WY-070-08-154), Fortification Elk Cumulative Impact Assessment. Statements from the letter include:

"*Relocation data retrieved from radio-collared elk from the ongoing Fortification Elk study confirm the importance of the crucial winter range and parturition ranges during those seasons. Furthermore, the relocation data shows that elk select the "security habitat" within those seasonal birthing time periods were within the delineated seasonal ranges. During the parturition season more than 70% and during the winter more that 80% of those relocations were found to be within the security habitat contained in the seasonal habitats. Although the 2010 winter season has just begun, relocations are again showing frequent use of both seasonal ranges and security habitat with the crucial winter range.*

CBNG development that has taken place in the southern portion of the Fortification Elk Herd Unit has reduced the amount of available security habitat has resulted in "high" or "extreme" impacts based on number of well sites, to parts of delineated crucial ranges. Taking into consideration the current level of impacts to the southern portion of the herd unit, we recommend that BLM make additional efforts to reduce negative impacts to elk habitats as development proceeds. We believe it is appropriate to employ an approach that gives the greatest consideration to areas that as within both crucial winter and parturition seasonal ranges and also overlap with identified security habitat. We recommend that within these "dual crucial" overlap areas the BLM strive to retain all identified remaining security habitat. For security habitats which overlap with only one delineated crucial range (winter or Parturition) we recommend the BLM strive to retain 75% of the remaining security habitat. Finally, within the yearlong

range, we recommend the BLM strive to retain at least 50% of the remaining security habitat. When planning for development that could impact security habitat, we recommend using the elk relocation data to further identify portions of security habitat that receive heavy versus light use by elk and focus on retaining the functionality of heavy use areas.

We want to reiterate the importance of maintaining habitat function in crucial seasonal ranges. Under extreme impacts of more than 4 well sites per square mile habitat function is substantially impaired of lost. We recommend the BLM take a thorough look at managing the number of operating well sites to avoid an extreme impact scenario in crucial ranges and particularly dual crucial ranges. To reduce disturbance of elk, visits to well sites should be restricted at night, dawn and dusk (e.g. allow only daylight visits except in the case of emergency situations and repair). We also want to emphasize the need to not only require but monitor the success of reclamation to assume it occurs in a timely manner. Recognizing that efforts to stabilize and successfully reclaim slopes of greater that 25% are problematic. We reiterate our position that development on steep slopes should be avoided." (WGFD 2009a).

A relatively lower proportion within the CJU Epsilon POD includes crucial winter, parturition, effective habitat, or security habitat, relative to the overall Fortification Creek elk herd area. Table 3.14 provides the areas and percent of these range types within the project area.

Table 3.14 Acres of Elk Ranges/Habitats within the Camp John Unit Epsilon POD

Range/Habitat	Size (Acres)	Percent Area of the CJU Epsilon Project Area
Yearlong	3,148	76%
Crucial Winter	771	18.6%
Parturition	109	2.6%
"Dual Crucial"	10	0.24%
Effective Habitat	121	2.9%
Security Habitat	0	0%

The habitat effectiveness within and adjacent to the project area is marginal due to prior oil and development.

3.3.4.2.2. Pattern of Habitat Use

In April 2005, 26 elk (5 yearling bulls and 21 adult cows) from the Fortification Creek elk herd were fitted with VHF radio collars. One cow was fitted with a GPS collar in February 2005. The collars transmit a signal that can be manually tracked with a VHF receiver or they can be tracked via satellite by the GPS receiver. Radio-telemetry (VHF) and GPS collaring data collected by BLM and WGFD since 2005 have shown that the Fortification elk tend to avoid oil and gas development by moving to less developed areas. Disruptive activity is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gusey 1986, WGFD 2000), albeit at 50 percent or less of the previous levels in forested environments (Hayden-Wing Associates 1990).

Sawyer et al. (2005) observed a similar response of elk within the more open terrain of the Jack Morrow Hills of Wyoming. The literature consistently shows a correlation between elk avoidance response and the level of human activity associated with roads, including those servicing oil and gas development.

Studies of elk radio telemetry from the Fortification Creek herd in the early 1990s showed elk ranging out of the Fortification Creek area as far north as Montana. Recent studies of elk radio telemetry from the Fortification Creek herd have shown that between 15 and 20 percent of the collared animals were

observed, at least seasonally, in other locations including; east of Wild Horse Creek and the Fortification Creek area, on the west side of the Powder River, south along the Kinney Divide, and occasionally as far north as Sonnette, Montana. Even with this movement the elk yearlong range in the Fortification Creek Area remains the core use area for the vast majority of this herd (Laird 2005). Some elk from this population moved out of the Fortification Creek herd unit and may be pioneering new, small, local populations in surrounding areas in recent years, although these bands are currently not officially recognized as "herds" by the WGFD. The long distance range use extensions of this herd to Montana in the north may be reflective of relative habitat continuity along the Powder River Breaks. These observations are consistent with the fact that elk are a wide ranging species, and will naturally move around to some degree from their core habitat at least seasonally, and in some instances, on a permanent basis (BLM 2006).

Monitoring the movement patterns of the Fortification Creek elk continued with deployment of 38 additional VHF/GPS collars in March 2008 and 17 additional collars in December 2008 for a total of 55 VHF/GPS collared elk. The VHF/GPS collars are susceptible to moisture resulting in the loss of GPS function for 35 of the collars as of December 2010. Each VHF/GPS collar may indicate 2 elk (cow with calf), for each cow tested positive for pregnancy inconjunction with the collaring.

Data collected in 2008-2010 have shown similar trends as previously discussed with as many as 6 of 55 VHF/GPS collared elk from the Fortification Creek elk herd relocated outside of the herd unit for periods exceeding 6 months (See Table 3.15). As of December 2010, 4 of the elk with functional VHF/GPS collars remained outside the herd unit.

Table 3.15 Fortification Creek Elk with GPS Collars

	Elk GPS/VHF Collar #	Date Deployed	Status as of December 2010
1	216228	3/26/2008	Failed 9/12/09
2	315311	3/26/2008	Active
3	315495	3/26/2008	Failed 8/13/08
4	317530	3/26/2008	Failed 12/6/2008
5	319130	3/26/2008	Active
6	319176	3/26/2008	Active
7	323407	3/26/2008	Active
8	323491	3/26/2008	Failed 6/11/2008
9	324155	3/26/2008	Failed 6/4/2008
10	324395	3/26/2008	Failed 2010
11	326171	3/26/2008	Active
12	335184	3/26/2008	Failed 9/14/2009
13	335286	3/26/2008	Failed 5/24/2009
14	335291	3/26/2008	Failed 6/6/2008
15	335293	3/26/2008	Active
16	335296	3/26/2008	Failed 2010
17	335300	3/26/2008	Failed 4/19/2008
18	335327	3/26/2008	Failed 5/23/2008
19	335328	3/26/2008	Active

Table 3.15 Fortification Creek Elk with GPS Collars

	Elk GPS/VHF Collar #	Date Deployed	Status as of December 2010
20	335342	3/26/2008	Failed 6/14/2008
21	335346	3/26/2008	Failed 5/23/2008
22	335353	3/26/2008	Failed 5/23/2008
23	335355	3/26/2008	Active
24	335358	3/26/2008	Failed 2010
25	335359	3/26/2008	Failed 4/22/2009
26	335360	3/26/2008	Failed 1/4/2009
27	335367	3/26/2008	Failed 6/10/2008
28	335398	3/26/2008	Failed 5/30/2008
29	335401	3/26/2008	Failed 5/10/2009
30	335663	3/26/2008	Failed 5/18/2008
31	335664	3/26/2008	Failed 5/4/2008
32	335666	3/26/2008	Failed 7/7/2009
33	335672	3/26/2008	Failed 5/2/2009
34	335673	3/26/2008	Failed 4/29/2009
35	335698	3/26/2008	Active
36	335714	3/26/2008	Active
37	335399	3/27/2008	Failed 5/7/2009
38	330469	12/6/2008	Failed 2010
39	330485	12/6/2008	Active
40	330510	12/6/2008	Active
41	330523	12/6/2008	Active
42	330978	12/6/2008	Active
43	330988	12/6/2008	Failed 9/8/2009
44	331020	12/6/2008	Failed 3/5/2009
45	332416	12/6/2008	Failed
46	332435	12/6/2008	Active
47	350470	12/6/2008	Active
48	350472	12/6/2008	Active
49	356905	12/6/2008	Active
50	330448	12/7/2008	Failed 7/4/2009
51	330465	12/7/2008	Active
52	330479	12/7/2008	Active
53	330524	12/7/2008	Failed 2010
54	332422	12/7/2008	Active
55	330973	12/8/2008	Failed 2010

Data from 8 GPS collars recorded 431 observations within the CJU Epsilon project area over a 33-month window (March 2008 through December 2010). Of the 127,000 locations recorded, approximately 400 (0.3 percent) were recorded within the CJU Epsilon POD project boundary. Four of these collars were deployed during the collaring operation conducted March 2008 and the other 4 collars were deployed December 2008. Seven of the 8 GPS collars have failed to date (Table 3.16) and the remaining elk with functional collars are currently located south of the herd unit.

Table 3.16 GPS/VHF Collared Elk Re-located within the CJU Epsilon POD

Elk Collars and Status	
335399 – Failed	332416 – Failed
335673 – Failed	330448 – Failed
335672 – Failed	330465
317530 – Failed	356905 – Failed

3.3.4.2.3. Population

The WGFD 2010b Job Completion Report provides a 2009 post-season population estimate for the Fortification Creek elk herd of 232, down from the 9-year average (2000-2009) of 241. The current WYGF objective for the herd is 150 (WGFD 2010b).

The elk in the Fortification Creek area are locally and regionally important. One measure of their regional importance is the herd was once extirpated – then restocked due to public demand. Another measure of importance is regulated hunting use. Elk hunts in the Fortification Creek area are destination hunts and are highly sought after with few licenses issued annually. Access is largely limited by the land ownership pattern (Jahnke 2006). Public interest on the effect of CBNG development on elk in the Fortification Creek area is high as gauged by the response to recent RMP amendment scoping sessions (BLM 2006).

Prairie elk herds, such as the Fortification Creek herd, are uncommon, unique because the non-mountainous range does not provide a great deal of security for the animals. Due to limited security, these populations are generally vulnerable to disturbance. There are other prairie elk herds in this region (e.g., Tisdale Mountain portion of the Powder River herd, Pine Ridge herd, Rochelle Hills herd, Custer National Forest herd across the Montana border). Prairie elk herds are locally prized and often protected by the local and regional residents (BLM 2006).

3.3.5. Upland Game Birds, Including Plains Sharp-tailed Grouse

Surveys for grouse species were conducted using WGFD and BLM protocols that required surveys extend 0.63 mile beyond the proposed project boundary. Aerial surveys were conducted for grouse species on April 4 and 20, 2010. Ground surveys were conducted on April 14 and 21, and on May 2, 2010 (BHEC 2010). One historic sharp-tailed grouse lek, the Fortification/Hayden lek, was located and determined inactive in 2010 (Table 3.17) (BHEC 2010). The affected environment for plains sharp-tailed grouse is discussed in the PRB FEIS, p. 3-148 to 3-150.

Table 3.17 Plains Sharp-tailed Grouse Lek Sites within the CJU Epsilon POD

Lek Name	2010 Peak Males	Qtr/Qtr	Section	Township (N)	Range (W)	UTM_E	UTM_N
Fortification/Hayden	0	NWNW	31	51	75	425566	4911936

3.3.6. Aquatic Species

The Powder River Basin ecosystem and fishery is discussed in further detail in the PRB FEIS, pp. 3-153 to 3-166. The CJU Epsilon POD boundary includes portions of Fortification Creek. However, this waterbody is considered ephemeral historically (BHEC 2010). Perennial streams within northeastern Wyoming were sampled by U.S. Geological Survey (USGS) between 1980 and 1981, and generally supported invertebrate communities that included taxa adapted to flowing water. Ephemeral stream communities generally were composed of taxa adapted to standing water (Peterson 1990).

Table 3.18 lists the fish that occur in the Upper Powder River sub-basin and their WGFD NSS designation, if applicable. WGFD has identified SGCN within the state, all of which are given NSS designations. Seven of the species that may occur in the Upper Powder River sub-basin are designated as either 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 ESA. For these species, WGFD recommends that no loss of habitat function occur. WGFD allows for some modification of the habitat, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged). NSS 4-7 refers to populations that are widely distributed throughout their native range and are stable or expanding. Habitats also are stable. There is no special concern for these species.

Table 3.18 Fish Occurring in the Upper Powder River Sub-basin

Wyoming Native Species Status	Species	Wyoming BLM Sensitive?
NSS1	Sturgeon chub	Yes
NSS2	Goldeye	No
	Sauger	No
NSS3	Black bullhead	No
	Flathead chub	No
	Mountain sucker	No
	Plains minnow	No
NSS4	Channel catfish	No
	Northern redhorse	No
	Quillback	No
	River carpsucker	No
	Stonecat	No
NSS6	Fathead minnow	No
	Plains killifish	No
NSS7	Longnose dace	No
	Sand shiner	No
	White sucker	No
None	Common carp	No
	Rock bass	No
	Shovelnose sturgeon	No

Source: BLM 2010c.

Amphibian and reptile species (herpetiles) occur throughout the Basin. WGFD conducted a baseline inventory of herpetiles along the Powder River and its major tributaries from 2004-2006 (Turner 2007).

WYNDD completed the first year of a 3-year herpetile study in the Power River Basin in order to detect impacts from CBNG development (Griscom et al. 2009). Herpetiles expected to occur in the Powder River Basin, according to these studies, are listed in Table 3.19 (Turner 2007; Griscom et al. 2009). Eight of the species listed are classified by WGFD as SGCNs, all with a rating of NSS4, indicating that they are widely distributed throughout their native ranges, and populations are stable. Of the species listed in Table 3.19, WYNDD reported that, for 2008 surveys, boreal chorus frogs were the most abundant amphibian in the PRB and were located in a variety of habitats. The second most abundant amphibian was Woodhouse's toad, which occurred along rivers, temporary ponds, and in CBNG reservoirs. Plains spadefoot and Great Basin toads were the least common species, occurring primarily in temporary ponds fed by rainstorms. Relatively few observations were made for reptile species. Bullsnakes and sagebrush lizards were most commonly seen. Turtles were rarely observed, due to their almost exclusive occurrence in deep backwaters. Two of the herpetiles listed in Table 3.19, northern leopard frog and Columbia spotted frog, are Wyoming BLM sensitive species and will be discussed in detail later in this document.

Table 3.19 Herpetile Species Expected to Occur in the Powder River Basin

Species	Verified by Survey[1]	WGFD Status	Wyoming BLM Sensitive?
Tiger salamander	Yes	NSS4	No
Northern leopard frog	Yes	NSS4	Yes
Milk Snake	No	NA	No
Columbia spotted frog	Yes	NSS4	Yes
Bullfrog	Maybe	NSS4	No
Spiny softshell	Yes	NA	No
Northern prairie lizard	No	NA	No
Boreal chorus frog	Yes	NSS4	No
Great plains toad	Yes	NSS4	No
Woodhouse's toad	Yes	NSS4	No
Plains spadefoot toad	Yes	NSS4	No
Short-horned lizard	Yes	NA	No
Sagebrush lizard	Yes	NA	No
Eastern yellowbelly racer	Yes	NA	No
Prairie rattlesnake	Yes	NA	No
Western hog-nosed snake	Yes	NA	No
Bullsnake	Yes	NA	No
Terrestrial garter snake	Yes	NA	No
Plains garter snake	Yes	NA	No
Common garter snake	Yes	NA	No
Snapping turtle	Yes	NA	No
Painted turtle	Yes	NA	No

[1] As reported in Turner (2007) and Griscom et al. (2009).

Source: BLM 2010c.

3.3.7. Migratory Birds

The affected environment for migratory birds is discussed in the PRB FEIS, pp. 3-150 to 3-153). On April 12, 2010, the BLM and USFWS signed a Memorandum of Understanding (MBTA MOU) to promote the conservation of migratory birds. The MBTA MOU strengthens migratory bird conservation by identifying

and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the parties, in coordination with state, tribal, and local governments.

Sagebrush communities are the primary vegetation type (i.e., migratory bird habitat) in the project area. Migratory birds most dependent on sagebrush ecosystems for survival are considered obligates (e.g., sage thrasher, Brewer's sparrow, sage sparrow) (Rowland et al. 2006). Many of these species are socially and/or ecologically important, including several Wyoming BLM sensitive species.

3.3.8. Raptors

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

Aerial and ground surveys were conducted for raptors in May and June 2010 (BHEC 2010). Surveys were conducted within 1 mile of the project area for bald eagle nests and within 0.5 mile of the project area for all other raptor species. According to the 2010 wildlife surveys and the BLM database, 11 raptor nests are found within 0.5 mile of the project area (Table 3.20). All of the nests were inactive in 2010.

Table 3.20 Documented Raptor Nests within 0.5 mile of the Camp John Epsilon POD

Nest ID	UTME	UTMN	Legal	Substrate[1]	Year Observed	Condition	Status[2]	Species[3]
662	427260	4911443	Section 32 T51N R75W	CTL	2010	Unknown	DNLO	NA
					1998	Unknown	Active	GRHO
2654	426978	4911353	Section 31 T51N R75W	CTL	2010	Unknown	DNLO	NA
					2009	Good	Inactive	NA
					2008	Unknown	Inactive	NA
					2006	Good	Inactive	NA
					2005	Good	Inactive	NA
					2004	Good	Inactive	NA
2655	423717	4913933	Section 23 T51N R76W	CTL	2010	Good	Inactive	NA
					2009	Good	Active	RETA
					2008	Excellent	Active	RETA
					2007	Good	Active	RETA
					2006	Good	Active	RETA
					2005	Good	Active	RETA
					2004	Good	Active	RETA
2656	423658	4914113	Section 23 T51N R76W	CTL	2010	Nest Gone	Inactive	NA
					2009	Remnants	Inactive	NA
					2008	Fair	Inactive	NA
					2007	Good	Active	GRHO
					2006	Good	Inactive	NA
					2005	Good	Active	GRHO
					2004	Good	Inactive	NA

Table 3.20 Documented Raptor Nests within 0.5 mile of the Camp John Epsilon POD

Nest ID	UTME	UTMN	Legal	Substrate[1]	Year Observed	Condition	Status[2]	Species[3]
2661	427219	4911524	Section 32 T51N R75W	CTL	2010	Fair	Inactive	NA
2663	424679	4913178	Section 25 T51N R76W	CTL	2010	Good	Inactive	NA
					2009	Excellent	Active	GOEA
					2008	Excellent	Active	GOEA
					2007	Fair	Inactive	NA
					2006	Good	Active	GOEA
					2005	Good	Active	GOEA
					2004	Good	Inactive	NA
3349	427223	4911533	Section 32 T51N R75W	JUN	2010	Nest Gone	DNLO	NA
					2009	Unknown	Inactive	NA
					2008	Excellent	Unknown	NA
					2006	Good	Inactive	NA
					2005	Good	Active	RETA
					2004	Nest Gone	Inactive	NA
3704	424992	4910390	Section 1 T50N R76W	CTL	2010	Good	Inactive	NA
					2009	Good	Inactive	NA
					2008	Good	Inactive	NA
					2007	Good	Active	GRHO
					2005	Good	Inactive	NA
					2004	Nest Gone	Inactive	NA
3760	425954	4908875	Section 7 T50N R75W	JUN	2010	Poor	Inactive	NA
					2009	Poor	Inactive	NA
					2008	Good	Inactive	NA
					2007	Good	Inactive	NA
					2006	Fair	Inactive	NA
					2005	Nest Gone	Inactive	NA
					2004	Nest Gone	Inactive	NA
4124	425261	4909837	Section 1 T50N R76W	CTL	2010	Nest Gone	DNLO	NA
					2009	Nest Gone	DNLO	NA
					2008	Poor	DNLO	NA
					2009	Poor	Inactive	NA
					2006	Nest Gone	Inactive	NA
5100	424977	4914017	Section 24 T51N R76W	CLF	2010	Remnants	Inactive	UNRA
					2010	Remnants	Inactive	NA
					2007	Poor	Inactive	NA

Table 3.20 Documented Raptor Nests within 0.5 mile of the Camp John Epsilon POD

Nest ID	UTME	UTMN	Legal	Substrate[1]	Year Observed	Condition	Status[2]	Species[3]
5883	424941	4910642	Section 36 T51N R76W	CTL	2010	Good	Inactive	NA
					2010	Good	Inactive	UNRA
					2010	Fair	Inactive	NA
6442	424941	4910642	Section 36 T51N R76W	CTL	2010	Unknown	Inactive	NA
					2008	Unknown	Active	RETA
6443	424942	4910606	Section 36 T51N R76W	CTL	2010	Good	Inactive	NA
					2009	Good	Inactive	NA
					2008	Unknown	ACTI	GRHO
10811	408488	4967147	Section 5 T56N R77W	POL	2010	Good	Inactive	NA
12111	424947	4910603	Section 36 T51N R76W	CTL	2007	Good	Active	RETA
12113	424348	4910155	Section 1 T50N R76W	JUN	2007	Fair	Inactive	NA
12117	425009	4910444	Section 1 T50N R76W	CTL	2010	Unknown	Inactive	NA
12118	424980	4910334	Section 1 T50N R76W	Unknown	2010	Unknown	DNLO	NA
12386	427359	4911580	Section 32 T51N R75W	CTL	2010	Good	Inactive	UNRA

[1] JUN – Juniper; CTL – Cottonwood Live; CLF – Cliff; POL – Ponderosa Pine (Live).
[2] DNLO – Did not locate.
[3] UNRA – Unknown Raptor; RETA – Red-tailed hawk; GRHO – Great horned owl; GOEA – Golden eagle; NA – Not Applicable.
Source: BLM 2010b.

3.4. Water Resources

The project area is within the Upper Powder River drainage system (Hydrologic Unit Code 10090202), and is located primarily within the Upper Fortification Creek subwatershed. A small portion (approximately 40 acres) of the project area also occurs within the Lower Barber Creek subwatershed; however, no new surface disturbance due to project components is proposed in this area under this POD. The region is characterized by unglaciated semi-arid rolling plains and dissected river breaks, with soils derived mainly from shale, sandstone, or related alluvium, valley fills, or fan remnants (Chapman et. al. 2004). The project area reflects this regional setting, and has numerous ephemeral draws and gullies dissecting the upland surface. Regionally, the vegetation is dominated by mixed-grass prairie and sagebrush steppe (Chapman et al. 2004).

Fortification Creek is the main tributary to the Upper Powder River in the project area. The USGS operates stream gages on the Powder River approximately 22 miles upstream (USGS Site No. 06313590) and 12 miles downstream (USGS Site No. 06317000) of the Fortification Creek confluence. Other named tributaries in the reach between gages include Dead Horse Creek, Barber Creek, and Crazy Woman Creek. Between the 2 Powder River gages, the total drainage area increases from 4,290 square miles to 6,050 square miles, this is an increase of approximately 41 percent in the drainage area. Recent comparable USGS data (July 2003 through September 2009) from the above gaging stations indicate that on an average annual basis, the intervening contribution is a flow of about 30 cubic feet per second (cfs), of which Crazy Woman Creek accounts for a minimum of 60 percent of this increase. In 2 of the 6 years the flows from Crazy Woman Creek exceed the difference in the upstream and downstream flows in the Powder River. This indicates that this reach of the Powder River is a losing stream for portions, if not most, of the year. Flows from tributaries likely occur during the spring runoff and potentially during large storm events during the rest of the year.

The WDEQ assumed primacy from the USEPA for maintaining the water quality in the waters of the state. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state. The WOGCC have authority for permitting and bonding off channel pits that are located over State and fee minerals.

3.4.1. Groundwater

The groundwater in this project area has historically been used for stock water or domestic purposes. A search of the WSEO Ground Water Rights Database for this area found 10 registered stock and domestic water wells within a 1 mile radius of the proposed POD wells, with depths ranging from 16 to 1,376 feet and with static water levels in the wells at the time of their initial production from 12 to 185 feet below ground surface. For additional information on water refer to the PRB FEIS, pp. 3-1 to 3-36.

WDEQ water quality parameters for groundwater classifications (Chapter 8, Quality Standards for Wyoming Groundwater, WDEQ 2005) define the following general limits for Total Dissolved Solids (TDS): 500 milligrams per liter (mg/l) TDS for Drinking Water (Class I), 2,000 mg/l for Agricultural Use (Class II) and 5,000 mg/l for Livestock Use (Class III). For additional water quality limits for groundwater, please refer to the WDEQ web site.

The PRB ROD (2003b) includes a Monitoring, Mitigation, and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation.

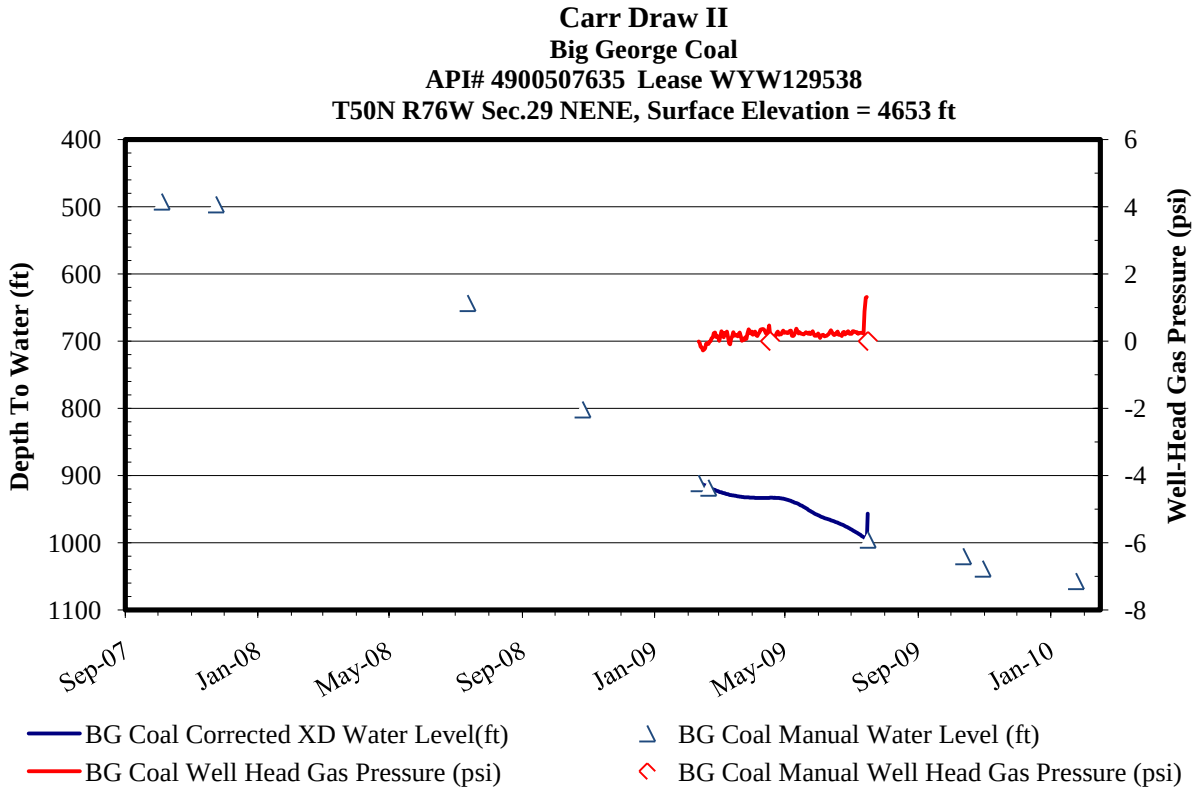
Specifically relative to groundwater, the plan identified the following (PRB ROD, p. E-4):

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

The production of CBNG necessitates the removal of some degree of the water saturation in the coal zones to temporarily reduce the hydraulic head in the coal. According to WOGCC, 56 CBNG wells currently exist within the POD boundary. As a result, the target coal zone pressure may have been reduced through off-set water production.

The BFO monitored coal zone pressures as expressed in depth to water from surface since the early 1990s in the PRB. The Carr Draw II Unit groundwater monitoring well was installed by Williams Production RMT Company as a part of the BLM deep groundwater monitoring program. The initial water level of the Big George Coal, measured in December 2007, which is indicative of the pressure in the target coal zone, was recorded at 492 feet below ground level (Figure 3.4). The most recent measurement, from February 2010, recorded the water level at 1,057 feet below ground level, for a decline of 565 feet since the well was completed.

Figure 3.4 Depth to Water from Surface



This level of depressurization is generally within the potential drawdown predicted for the Upper Fort Union Formation coals for 2009 (Figures 4-6, 4-7, and 4-8 in the PRB FEIS), which was determined through the Regional Groundwater Model for that document. For additional information refer to the groundwater discussion in the PRB FEIS Chapter 4 and the Wyoming State Geological Survey's Open File Report 2009-10 titled "1993-2006 Coalbed Natural Gas (CBNG) Regional Groundwater Monitoring Report: Powder River Basin, Wyoming," which is available at http://www.wsgs.uwyo.edu.

Additional groundwater monitoring wells are found near the POD area. Information for these sites is summarized in Table 3.21. The Carr Draw II and wells are completed to sands, the Big George Coal, and the Wall Coal. The Cedar Draw wells are completed to sands and Wall Coal, the Echeta well is completed to in the Big George Coal, the Bull Creek wells are completed to sands and the remaining Anderson Coal, and the Rose Draw wells are completed to sands and an unnamed coal.

Water level declines in the Big George Coal ranges between 148 feet at the Echeta well to 551 feet at the Carr Draw well (Table 3.21). Monitoring at the Carr Draw II wells in both the Big George Coal and the sands reflect decreased water levels that mirror one another, suggesting a hydraulic connection; however, the corresponding increase in water levels in the Wall Coal indicate little or no connection with the deeper coal layer. Water levels at the remaining wells generally show decreased water levels throughout the monitoring periods.

Table 3.21 Existing Groundwater Monitoring Wells Nearest the Camp John Unit Epsilon POD

Monitoring Well Name	Legal Description	Approx. Distance from POD (miles, direction)	Initial Coal Water Level (feet bgs)[1]	Recent Coal Water Level (feet bgs)[1]	Ground Elevation (feet)
Carr Draw II	NENE Qtr/Qtr, Section 29, T50N R76W	4.5, SW	492.3 (10/07)	1,057 (2/10)	4,653
Cedar Draw (KMD 2-31 Cedar Draw)	NESW Qtr/Qtr, Section 2, T51N R75W	5, NE	227.3 (2/04)	724.25 (6/10)	4,287
Echeta	NENE Qtr/Qtr, Section 30, T52N R75W	6, N	245.9 (9/99)	389.9 (4/10)	4,625
Bull Creek	NWSE Qtr/Qtr, Section 12, T52N R77W	9, NW	213.91 (12/05)	233.54 (3/10)	3,909
Rose Draw	NESE Qtr/Qtr, Section 19, T52N R77W	12, NW	44.91 (5/09)	71.92 (3/10)	3,914

1 Below ground surface (bgs) with month and year of measurement.
2 Source: Wyoming State Geological Survey (WSGS) 2010.

3.4.2. Surface Water

The project area is within the Upper Fortification Creek drainage which is tributary to the Upper Powder River watershed. Most of the area drainages 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). Drainage features consist of narrow ephemeral draws, steep-sided gullies in various stages of stability or active erosion, and broader meandering streams in alluvial valleys. The latter include Upper Fortification Creek and its major tributaries, which may have intermittent flows supported by groundwater contributions for

part of the summer. Stratified alluvial deposits of silts and sands occur along the major streams, supporting sagebrush and grasses. Vegetation contributes to stabilizing the drainage network in many parts of the project area and surrounding locale.

Flood Insurance Rate Maps published by the Federal Emergency Management Agency (FEMA) indicating hazard zones that include "Zone A" 100-year floodplains (1 percent chance of flood in any year) are available for the project area, however the entire area falls within "Zone X," which is defined as 500-year or greater floodplain (0.2 percent or less chance of flood in any year) (FEMA 2008). Geomorphically, potentially floodprone areas do exist in narrow bands of streamlain alluvium along the active stream channels. These low-lying areas are unlikely to be inundated except in large, rare, runoff events.

The PRB FEIS presents the historic mean electrical conductivity (EC) in microSiemens per centimeter (µS/cm) and sodium adsorption ratio (SAR) by watershed at selected USGS Gauging Stations in Table 3-11 (PRB FEIS, p. 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the project area. The representative stream water quality is used in the impact analysis presented in Section 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, p. 3-48. For the Upper Powder River, the EC ranges from 1,797 mµS/cm at maximum monthly flow to 3,400 µS/cm at low monthly flow and the SAR ranges from 4.76 at maximum monthly flow to 7.83 at low monthly flow. These values were determined at the USGS station "Powder River at Arvada, WY," PRB FEIS, p. 3-49.

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

3.5. Economics and Recovery of CBNG Resources

Development of this project may have effects on the local, state, and national economies. Past economic benefits of natural gas recovery show that well production is variable and prices are also volatile (Table 3.22). The federal government collects 12.5 percent of the royalties from all producing federal wells and approximately 49 percent of the royalties from producing wells is returned to the State of Wyoming.

The price of natural gas, based at the Henry Hub, December 10, 2010 was $4.5 per million metric British thermal units (MMBtu). The projected price of natural gas is expected to be $5.1 per MMBtu in December of 2011, a 13 percent increase (Financial Forecast Center 2010). As shown in Table 3.22, the natural gas market is volatile, with significant price swings.

Table 3.22 Historical Average of Natural Gas Prices at the Henry Hub

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Price[1]	2.1	2.3	4.3	4.0	3.4	5.5	5.9	8.8	6.7	7.0	8.9	4.0	4.6

[1] Price is in dollars per MMBtu.
Source: Financial Forecast Center 2011

3.6. Cultural Resources

A Class III cultural resource inventory was performed for the CJU Epsilon POD prior to on-the-ground project work (BFO project no. 70080126). North Platte Archaeological Services conducted a combination block and linear Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48 CFR 190) and the Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports. A BFO archaeologist

reviewed the report for technical adequacy and compliance with BLM standards, and determined it to be adequate. Table 3.23 lists resources located in or near the project area.

Table 3.23 Cultural Resource Sites In or Near the Camp John Unit Epsilon POD

Site Number	Site Type	Eligibility
48CA1865	Historic Homestead	Not Eligible
48CA1891	Prehistoric Site	Not Eligible
48CA1995	Prehistoric Site	Not Eligible
48CA5260	Prehistoric Site	Unevaluated
48CA5261	Prehistoric Site	Eligible
48CA5262	Prehistoric Site	Unevaluated
48CA5263	Prehistoric Site	Eligible
48CA5265	Prehistoric Site	Eligible
48CA5266	Prehistoric Site	Unevaluated
48CA5662	Prehistoric Site	Eligible
48CA5670	Historic Site	Not Eligible

Some of the project area analyzed in this EA occurs on deep alluvial deposits. Alluvial deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory (Ebert and Kohler 1988; Eckerle 2005).

3.7 Wilderness

The CJU Epsilon POD area includes 56 producing CBNG wells, about 18 miles of mechanically maintained rural roads, 9 miles of overhead powerlines, a water treatment facility, and a compressor station.

4. ENVIRONMENTAL EFFECTS

This section describes the environmental effects of the No Action Alternative (Alternative A), and the Proposed Action (Alternative B). The effects analysis addresses the direct and indirect effects of implementing the Proposed Action, the cumulative effects of the proposed action combined with reasonably foreseeable federal and non-federal actions, identifies and analyzes mitigation measures (COAs), and discloses any residual effects remaining following mitigation.

Design changes to the original proposed project, described in Section 2.3 of this document, resulted in the development of Alternative B, Proposed Action. These changes mitigated some impacts to the environment that would result from adopting the proposed project; therefore, only the environmental consequences of Alternative B are described below.

4.1. Alternative A

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

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

Resource		Type of Effect	Page(s) of PRB FEIS
Project Area Description	Geologic Features and Mineral Resources	Direct and Indirect Effects	4-164 and 4-134
		Cumulative Effects	4-164 and 4-134

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

Resource		Type of Effect	Page(s) of PRB FEIS
Soils, Vegetation, and Ecological Sites	Soils	Direct and Indirect Effects	4-150
		Cumulative Effects	4-152
	Vegetation	Direct and Indirect Effects	4-163
		Cumulative Effects	4-164
	Wetlands/Riparian	Direct and Indirect Effects	4-178
		Cumulative Effects	4-178
Wildlife	Sensitive Species - Greater Sage-Grouse	Direct and Indirect Effects	4-271
		Cumulative Effects	4-271
	Aquatic Species	Direct and Indirect Effects	4-246
		Cumulative Effects	4-249
	Migratory Birds	Direct and Indirect Effects	4-234
		Cumulative Effects	4-235
	Big Game	Direct and Indirect Effects	4-186
		Cumulative Effects	4-211
	Raptors	Direct and Indirect Effects	4-224
		Cumulative Effects	4-225
Water	Groundwater	Direct and Indirect Effects	4-63
		Cumulative Effects	4-69
	Surface Water	Direct and Indirect Effects	4-77
		Cumulative Effects	4-69
Economics and Recovery of CBNG Resources		Direct and Indirect Effects	4-362
		Cumulative Effects	4-370
Cultural Resources		Direct and Indirect Effects	4-286
Air Quality		Direct and Indirect Effects	4-386
		Cumulative Effects	4-386
Visual Resources		Direct and Indirect Effects	4-313
		Cumulative Effects	4-314

4.2. Alternative B

4.2.1. Project Area Description

4.2.1.1. Geologic Features and Mineral Resources

The potential effects for all minerals which exist within the POD associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS. For detail of potential effects associated with mineral resources, please refer to the referenced PRB FEIS, pp. 4-127 to 4-129.

4.2.1.2. Land Ownership

The proposed project would not result in any direct or indirect effects to land ownership. Therefore, cumulative effects analysis is not applicable. Likewise, mitigation measures are not warranted and residual effects are not applicable.

4.2.1.3. Land Use

4.2.1.3.1. Direct and Indirect Effects

Short-term direct effects would exist for land use within or adjacent to the project area due to construction activities, including land access due to the construction of access roads and wells pads, dust generation, and noise associated with heavy equipment operation. Construction, initial operation, well and generator servicing and maintenance would likely cause most of the Fortification Creek elk to use other habitats over those found within the boundary of CJU Epsilon POD, which would reduce success of elk hunting in

the area. These effects would continue until drilling and construction activities are complete, interim reclamation and stabilization measures achieve a steady state, and well and generator visitation is minimized. Elk would likely return to the area once construction and operation activities are reduced, with a return to previous elk hunting success rates.

Indirect effects include geologic hazards triggered by well development and CBNG production activities. Geologic hazards associated with CBNG production activity are discussed in the PRB FEIS. For details on geologic hazards, refer to the PRB FEIS.

4.2.1.3.2. Cumulative Effects

Land use within the project area would be affected on both a short-term and long-term basis. Interim reclamation would revegetate portions of the well pads and roads no longer needed after construction is complete and therefore result in impacts that would be short-term. Long-term impacts would result from the pads and roads needed for operations and maintenance for the life of the project (approximately 10 to 20 years). It is anticipated that these lands would not be available for livestock grazing or other land uses during that time frame.

4.2.1.3.3. Mitigation Measures

Proposed project design features that maximized the use of current infrastructure, minimized well pad sites, and have no impoundments minimize adverse effects to current land use. No site-specific COAs applicable to land use are anticipated.

4.2.1.3.4. Residual Effects

Land use at the wells and along the roads and utility corridors would be converted either permanently or for the duration of the well operation to a mineral development use. During this timeframe, the proposed lands would no longer offer grazing potential.

4.2.2. Soils, Vegetation, and Ecological Sites

4.2.2.1. Soils

4.2.2.1.1. Direct and Indirect Effects

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

Impacts anticipated to occur include soil rutting and mixing, compaction, increased erosion potential, and loss of soil productivity. The most notable impacts to soils would occur in association with the construction of well pads, staging areas, and roads. Grading and leveling would be required to construct these facilities with the greatest level of effort required on more steeply sloping areas. During construction, the soil profiles would be mixed with a corresponding loss of soil structure. Mixing may result in removal, dilution, or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Less desirable inorganic compounds such as carbonates, salts, or weathered materials could be relocated and have a negative impact on revegetation.

Construction of wells with no pad and no slot would result in less soil disturbance to the soil resource. No soil would be removed or graded. Where reserve pits are constructed for these wells, soil productivity and soil quality would be negatively altered if subsoil is spread on the surface of the soil.

Soils would be compacted as a result of the construction of well and associated facilities, with compaction maintained, at least in part, by continued vehicle and foot traffic as well as operational activities. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction leads to a loss of soil

structure; decreased infiltration, permeability, and soil aeration; as well as increased runoff and erosion. Increased erosion can lead to a decrease in soil fertility and an increase in sedimentation. The duration and intensity of these impacts would vary according to the type of construction activity to be completed and the inherent characteristics of the soils to be impacted. During interim and final reclamation, practices such as catwalking following distributing top soil over steep slopes will only further compact soils and increase runoff and erosion.

The potential for erosion would increase through the loss of vegetation cover and soil structure as compared to an undisturbed state. A Wyoming Pollutant Discharge Elimination System (WYPDES) permit is required for construction activities, and would address runoff and erosion leading to sedimentation impacts. Culverts would be installed to control stormwater runoff associated with construction within the CJU Epsilon POD. Soil productivity would decrease, primarily as a result of profile mixing and compaction along with the loss in vegetative cover. The primary variables affecting microbial action of top soil include stockpile depth and duration of time top soil is stored. A decrease in soil productivity also would occur in association with soil salvage and stockpiling activities as microbial action is curtailed and topsoil viability declines . These impacts would begin immediately as the soils are subjected to grading and construction activities and impacts would continue for the term of operations. Topsoil viability can be lost completely if microbial activity ceases.

Rutting affects the surface hydrology of a site as well as the rooting environment. The process of rutting physically severs roots and reduces the aeration and infiltration of the soil, thereby degrading the rooting environment. Rutting may result in mixing of topsoil and subsoil, thereby reducing soil productivity. Rutting also disrupts natural surface water hydrology by diverting and concentrating water flows creating accelerated erosion. Soil mixing typically results in a decrease in soil fertility and a disruption of soil structure.

Additional effects to soils resulting from well pad, access roads, and utility corridor construction include:

- Loss of soil vegetation cover, biologic crusts, organic matter, and productivity; and
- Increased soil erosion and reduced soil health and productivity. Erosion rates are site-specific and are dependent on soil, climate, topography, and cover.

An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (Belnap et al. 2001). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily damaged or destroyed by surface disturbances associated with construction activities.

The produced CBNG water from the proposed project would be disposed of off-site; either at an existing treatment facility permitted through WDEQ or through re-injection to the Madison Aquifer near Midwest, Wyoming. If the option to re-inject CBNG water is chosen, a pipeline would need to be constructed from the project area to the County Line Pump Station, which would be constructed and installed under a separate permitting process. No impacts associated with CBNG produced water discharge are anticipated.

During initial site visits to the well sites, BLM staff observed site conditions for well pads and access roads. As stated in Section 2.3 of this document well sites were adjusted or moved to minimize siting on steep slopes, minimize soil erosion, and minimize facilities on soils with low reclamation potential. Because most well pad sites were adjusted to avoid these types of features or soils only one access road is located on soils identified as having limited reclamation potential, i.e. rated poor as a source of

reclamation material due to depth to bedrock (very shallow) and high erosion pential. This was a previously disturbed site that was partially reclaimed. No wells are located on highly erodible soils. Approximately 11,324 feet of new disturbance for road and utility corridor would be on soils with poor reclamation suitability. New disturbance of approximately 3,803 feet of road and utility corridor are located on severely erodible soils.

Lance would take a number of actions to lessen the impacts to soils and maintain soil productivity potential to the degree possible. Applicant-committed measures and BLM COAs would be implemented to mitigate or reduce the impacts associated with construction and operation. In addition, Lance has committed to site-specific reclamation plans for areas of concern to reduce site impacts. The topsoil would be salvaged, stockpiled, and returned to graded surfaces as an integral part of the construction of all project elements, thereby reducing the impacts to soil productivity status. Well pads and associated facility disturbances would be re-graded to match existing topography and revegetated following project termination. The reclamation section of Appendix B of this document includes measures for both interim and final reclamation. Interim reclamation consists of minimizing the footprint of disturbance by reclaiming all portions of construction disturbance no longer needed for production operations. Final reclamation would meet the guidelines outlined in the statewide reclamation policy, and would be evaluated by the BFO's standards. The MMRP details the revegetation, site stabilization, and reclamation actions Lance would take to reduce the impacts to the soil resource. These actions would notably reduce intensity of the impacts to soils as well as the estimated time it would take to return the disturbed soils to a stable and productive state.

4.2.2.1.2. Cumulative Effects

The designation of the duration of disturbance is defined in the PRB FEIS, pages 4-1 and 4-151). Most soil disturbances would result in short term impacts with expedient interim reclamation and site stabilization, as committed to by the operator in their POD Surface Use Plan and as required by the BLM in COAs. Long-term impacts would result in relation to project roads and well pads necessary for operations and maintenance. Impacts would continue until successful final reclamation has been achieved.

Produced CBNG water for this project would be treated off-site or re-injected. If re-injection of CBNG water is the option chosen, a pipeline from the project area to the County Line Pump Station would be constructed. Impacts would be disclosed under a separate permitting process.

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

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

4.2.2.1.3. Mitigation Measures

The site-specific reclamation plan for wells 32-35-5176WA/BG, as well as COAs, mitigation measures, and applicant committed measures discussed in the COAs will help to mitigate or reduce the impacts described above. Additionally, the following resource-specific BLM COAs will be implemented:

1. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-2009-022); See http://www.blm.gov/wy/st/en/programs/reclamation.htmlfor details.
2. Topsoil stored for a period greater than 90 days will not exceed piles of 3 feet in depth and will be seeded with a BLM approved seed mix to prevent wind and water erosion.
3. Erosion control fabric used for reclamation of steep slopes should be photodegradable or biodegradable. Non-photodegradable/biodegradable erosion control fabric will be removed from the federal leases following establishment of a self-perpetuating native plant community and sustained soil stability.
4. In the absence of manufacture's specifications included in the operator's Master Surface Use Plan, erosion control fabric will be installed as follows:
    a. The fabric will be 'keyed' into the slope by digging a small trench at the top of the slope.
    b. Lay the top end of the material into the trench to line it.
    c. To line it the edge is folded underneath itself and then it is secured using staples.
    d. The trench is then filled in to the previous soil level.
    e. Fabric should be overlapped no less than 0.3 meter on edges and stapled on 1 meter spacing and at every seam.
5. Stabilization of steep slopes greater than 4H:1V will include but is not limited to the following components to minimize soil erosion and loss of seed:
    a. Surface roughening/pocking or scarification perpendicular to the slope;
        i. Install slope breakers such as waddles and water bars at the appropriate spacing.
    b. Seed with appropriate seed mix.
    c. Apply straw mulch or bio/photodegradable erosion control fabric on highly erodible soils.
6. Waddling is most effective as erosion control if applied on slopes less than 3H:1V. In the absence of manufacture's specifications included in the operator's Master Surface Use Plan, the minimum spacing requirements will be as follows:

Slope	6-inch waddle	9-inch waddle	12-inch waddle
<4H:1V	20 feet	40 feet	60 feet
3H:1V	15 feet	30 feet	45 feet

7. Soil compaction will be remediated on all compacted surfaces and prior to the redistribution of topsoil on disturbed surfaces to the depth of compaction by methods that prevent mixing of the soil horizons. BLM's recommended methods are subsoiling, paraplowing, or ripping with a winged shank (as shown in the figure in Appendix C of the EA). Scarification is acceptable on areas identified as very shallow or shallow soils in the Master Surface Use Plan.
8. All pit spoil must be placed back in the pit once the pit is dry or fluids are removed. Subsoil must then be replaced in the reserve pit before topsoiling. Under no circumstances would any by-products from drilling or subsoil to be spread on top of topsoil. The pit area should usually be mounded slightly or restored to the original contour to allow for settling and positive surface drainage.
9. For all wells spudded after November 1, the reserve pit fluids must be removed immediately following completion activities to avoid potential conflicts with wildlife timing limitations and

the standard COA that reserve pits be closed within 90 days, unless an exception is granted by the BLM Authorized Officer.A site specific reclamation plan and 30 day stabilization COA is applied to the access road associated with well number 22-35-5176WA/BG to expedite revegetation and mitigate soil losses caused by wind and water erosion.

10. The CJU Epsilon Project area is dominated by steep slopes and/or fragile soils. Improved roads used in conjunction with accessing federal wells must be fully built (including all water control structures such as wingditches, culverts, relief ditches, low water crossings, surfacing, etc.) and functional to BLM standards as outlined in the BLM Manual 9113 prior to drilling of the well. This applies to the entire CJU Epsilon project area. This measure will help to improve the overall safety (as discussed in Appendix E of this document) and reduce erosion and sedimentation relative to the use of incomplete roads at insufficient stages of completion.
11. The CJU Epsilon Project area is dominated by soils that have been identified to have limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities. This applies to all of Sections 26 and 35, T51N, R76W within the CJU Epsilon Project area.
12. 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.
13. For newly constructed roads, a minimum of the top 12 inches of road grade will be thoroughly compacted to 90% standard maximum dry density.
14. The main existing road through Sections 35, 26, 25, 36, & 31 will require maintenance to level ruts and reestablish crown. Surfacing material on this portion of road will meet the grading requirements for “Grading W” as outlined in the Wyoming Highway Department’s Standard Specification for Road and Bridge Construction due to the high anticipated levels of Average Daily Traffic (ADT).

4.2.2.1.4. Residual Effects

Residual effects would include a long-term loss of soil productivity associated with well pads and roads. Residual effects were identified in the PRB FEIS, p. 4-408, such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established.

4.2.2.2. Vegetation

4.2.2.2.1. General Vegetation

4.2.2.2.1.1. Direct and Indirect Effects

Direct and indirect effects to vegetation are discussed in the PRB FEIS, pp. 4-153 to 4-164). Direct effects to vegetation would occur from ground disturbance caused by construction of well pads, ancillary facilities, associated pipelines, and roads. Short-term effects would occur where vegetated areas are disturbed and reclaimed within 2 years of the initial disturbance. Long-term effects would occur where well pads, compressor stations, roads, water-handling facilities, or other semi-permanent facilities would result in loss of vegetation and where reclamation for the life of the project. Indirect effects, as described in the PRB FEIS, would include the spread and/or establishment of noxious weeds, the alteration in surface water flows affecting vegetation communities, alteration in ecosystem biodiversity, and changes in wildlife habitat. These impacts would be mitigated by expediently stabilizing the disturbance through interim reclamation, and the implementation of erosion control measures.

Areas that are difficult to reclaim include sands and sandy sites and areas where the parent material is very shallow (less than 10 inches in depth). Areas that were difficult to reclaim were identified during initial site visits to the well sites. Well sites were adjusted or moved to avoid most of these areas as described in Section 2.3 of this document. One access road, located on a previously disturbed site, is located on soils rated poor as a source of reclamation material, as described above in Section 4.2.2.1.1, Soils Direct and Indirect Effects. In addition, portions of the road and utility corridors are located on poor reclamation potential soils as on the ground alternatives were limited. The plant communities on these areas can be difficult to re-establish, especially in areas of shallow parent material.

Long-term impacts to sagebrush are anticipated due to slow recovery rates and the duration between construction and re-disturbance during final reclamation. Complete restoration of sagebrush shrubland after disturbance can often take decades. Studies of Wyoming big sagebrush post fire recovery intervals indicated that post-fire regeneration of this species can take 50 to 120 years to regenerate naturally (Cooper et al. 2007; Baker 2006). Wyoming big sagebrush took approximately 17 years to re-establish after chemical removal in Wyoming (Johnson 1969) and sagebrush species can take 3 to 7 years to begin to spread in locations where seed drilling or transplant of seedlings occurred (Tirmenstein 1999).

4.2.2.2.1.2. Cumulative Effects

Cumulative effects to vegetation from oil and gas development are discussed in the PRB FEIS, pp. 4-164 and 4-172. Most surface disturbances would result in short-term impacts to grasses and forbs related to construction activities that would be reclaimed through interim reclamation and site stabilization, as committed to by the operator and as required by the BLM in COAs. The proposed project is planned in an area already impacted by mineral development and other associated infrastructure, which currently represents approximately 4 percent of the land surface within the POD boundary. By comparison, the proposed project represents an additional 1 percent of land surface disturbance within the POD boundary.

Final reclamation would disturb all sites disturbed by construction and operation activities, including those previously reclaimed during interim reclamation. Disturbance associated with final reclamation activities would alter the composition of species in reclaimed areas relative to undisturbed areas by replacing diverse native communities with communities consisting of a few favored reclamation species.

Cumulative effects from the discharged produced CBNG water from the POD would be avoided through the proposed off-site options for the discharge of produced CBNG water for the project.

4.2.2.2.1.3. Mitigation Measures

Impacts to vegetation from surface disturbance will be reduced through the implementation of the mitigation measures in the COAs; the CJU Epsilon POD, and its associated plans including the Integrated Weed and Pest Management Plan, the WMP and the MSUP (specifically Section 10, Plans for Reclamation of the Surface). These documents are included in the Administrative Record for the CJU Epsilon POD at the BFO.

In addition, the operator will follow the guidance provided in the Wyoming Policy on Reclamation (Instruction Memorandum WY-90-231). The Wyoming Reclamation Policy applies to all surface-disturbing activities. Authorizations for surface-disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. Final reclamation measures will be used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures will be used to achieve this short-term goal.

The site-specific reclamation plans for wells 32-35-5176WA/BG, as well as COAs provide additional mitigation for impacts identified in those areas.

In addition to those COAs listed in Section 4.2.2.1 of this document for soils, the following resource and site-specific BLM COAs will be implemented:

15. BLM has developed seed mixes for each ecological site identified within the project area based on the NRCS ecological site description, the reference plant community and desired species richness with the intent of maximizing revegetation potential. The operator will seed on the contour to a depth of no more than 0.5 inch. To maintain quality and purity, certified seed with a minimum germination rate of 80 percent and a minimum purity of 90 percent will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the mixes summarized in the table below:

Site-specific Seed Mixes by Ecological Site

Sandy Ecological Site Seed Mix	
Species	Lbs PLS*
Thickspike Wheatgrass (*Elymus lanceolatus ssp. lanceolatus*)	3.5
Prairie sandreed (*Calamovilfa longifolia*)	4.6
Indian ricegrass (*Achnatherum hymenoides*)	3.5
Blue grama (*Bouteloua gracilis*) Or ***Needleandthread*** (*Hesperostipa comate*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpureum*)	0.8
Blue flax (*Linum lewisii*)	0.8
Fourwing saltbush (*Atriplex canescens*) Or ***Wyoming big sagebrush*** (*Artemisia tridentate*) Or ***Winterfat*** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or ***Green rabbitbrush*** (*Chrysothamnus viscidiflorous*)	0.5
Totals	16 lbs/acre
Loamy Ecological Site Seed Mix	
Species	Lbs PLS*
Western Wheatgrass (*Pascopyrum smithii*) Or ***Thickspike Wheatgrass*** (*Elymus lanceolatus ssp. lanceolatus*)	3.9
Bluebunch Wheatgrass (*Pseudoroegneria spicata ssp. Spicata*)	1.5
Green needlegrass (*Nassella viridula*)	3.4

Site-specific Seed Mixes by Ecological Site

Sandy Ecological Site Seed Mix	
Species	Lbs PLS*
Slender Wheatgrass (*Elymus trachycaulus ssp. trachycaulus*)	2.8
Blue grama (*Bouteloua gracilis*) Or ***Needleandthread*** (*Hesperostipa comate*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpureum*)	0.8
Rocky Mountain beeplant (*Cleome serrulata*)	0.8
Fourwing saltbush (Atriplex canescens) Or ***Wyoming big sagebrush (Artemisia tridentate)*** Or ***Winterfat (Krascheninnikovia lanata)***	***0.5***
Rubber rabbitbrush (Ericameria nauseousus) Or ***Green rabbitbrush (Chrysothamnus viscidiflorous)***	***0.5***
Totals	16 lbs/acre

Clayey Ecological Site Seed Mix	
Species	Lbs PLS*
Western Wheatgrass (*Pascopyrum smithii*)	4.6
Green needlegrass (*Nassella viridula*)	5.2
Slender Wheatgrass (*Elymus trachycaulus ssp. trachycaulus*)	1.8
Blue grama (*Bouteloua gracilis*) Or ***Needleandthread*** (*Hesperostipa comate*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpureum*)	0.8
Rocky Mountain beeplant (*Cleome serrulata*)	0.8
Fourwing saltbush (*Atriplex canescens*) Or ***Wyoming big sagebrush*** (*Artemisia tridentate*) Or ***Winterfat*** (*Krascheninnikovia lanata*)	0.5

Site-specific Seed Mixes by Ecological Site

Sandy Ecological Site Seed Mix	
Species	Lbs PLS*
Rubber rabbitbrush (*Ericameria nauseousus*) Or ***Green rabbitbrush*** (*Chrysothamnus viscidiflorous*)	0.5
Totals	16 lbs/acre
Shallow Clayey Ecological Site Seed Mix	
Species	Lbs PLS*
Western Wheatgrass (*Pascopyrum smithii*)	2.4
Green needlegrass (*Nassella viridula*)	2.4
Blue grama (*Bouteloua gracilis*) Or ***Needleandthread*** (*Hesperostipa comate*)	1.0
American vetchz (*Vicia Americana*)	1.0
Blue flax (*Linum lewisii*)	0.2
Fourwing saltbush (*Atriplex canescens*) Or ***Wyoming big sagebrush*** (*Artemisia tridentate*) Or ***Winterfat*** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or ***Green rabbitbrush*** (*Chrysothamnus viscidiflorous)*	0.5
Totals	8.0 lbs/acre

If applied correctly, BLM selected seed mixes which contain native grasses and forbs could restore disturbed areas to properly functioning vegetation communities. BLM can only require there use on BLM surface. The seed mix selected on private land is selected solely by the surface owner and may be more beneficial to cattle grazing.

In addition to the site-specific COAs, the following programmatic COA will be implemented:

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.).

4.2.2.2.1.4. Residual Effects

Residual effects also were identified in the PRB FEIS, p. 4-408, such as the loss of vegetative cover despite expedient reclamation for several years until reclamation is successfully established. In the event the operator fails or reneges on their obligation to successfully reclaim the area as defined by the

Wyoming Policy on Reclamation (Instruction Memorandum WY-90-231), the bond will not be released for the site and the BLM will be responsible for site reclamation.

4.2.2.2.2. Wetlands/Riparian

4.2.2.2.2.1. Direct and Indirect Effects

Effects to wetland and riparian areas from CBNG development are disclosed in the PRB FEIS, pp. 4-173 to 4-179; these include analysis of direct and indirect impacts, cumulative impacts, and residual impacts. Direct and indirect impacts to wetlands and riparian areas in the corridor could result from the construction of a utility corridor through an herbaceous wetland and the discharge of co-produced water.

The proposed utility corridor parallels an existing county road that crosses 45 feet of a previously disturbed herbaceous wetland running north and south along Carr Draw in Section 25, T51N, R76W. The utility corridor crosses the drainage at a point within the toe of slope created from the road corridor. The wetland is likely anthropogenically created due to storm water back up against the road fill. There would be not additional impact to the wetland beyond that which has been previously disturbed. Unavoidable impacts from linear features crossing wetlands and riparian areas are mitigated through application of the measures in described in the operator's WMP and the measures included in the COAs.

The produced CBNG water from the proposed POD would be disposed of off-site; either at an existing treatment facility permitted through WDEQ or through re-injection to the Madison Aquifer near Midwest, Wyoming. Either option would avoid impacts from discharged produced CBNG water in the project area.

4.2.2.2.2.2. Cumulative Effects

Changes in surface water flow due to project disturbances associated with construction and operation activities could lead to increased erosion, increased sediment in streams, and changes in water levels in channels located within and near the project site. These impacts would be mitigated by expediently stabilizing the disturbance and reducing the amount of sediment reaching the streams.

4.2.2.2.2.3. Mitigation Measures

Crossings of wetland/riparian areas by linear features, such as pipelines, roads, and power lines will be avoided to the extent practicable. Where crossings cannot be avoided, impacts would be minimized through use of the programmatic COAs.

4.2.2.2.2.4. Residual Effects

Turbidity and sediment loading in the streams would probably increase due to erosion of project disturbed areas and sediment transport to the associated drainages due to storm water runoff. These impacts are mitigated by expediently stabilizing the disturbance and reducing the amount of sediment reaching the streams.

4.2.2.2.3. Invasive and Noxious Weed Species

4.2.2.2.3.1. Direct and Indirect Effects

Direct and indirect effects resulting from invasive and/or noxious species are discussed in the PRB FEIS, pp 4-158 to 4-162. The use of existing facilities along with the surface disturbance associated with construction of proposed wells, access roads, pipelines, water management infrastructure, and related facilities will present opportunities for weed invasion and spread. Following surface disturbance activities, weeds may readily colonize areas that typically lack or have minimal vegetation cover. As stated in the PRB FEIS, weeds have the ability to displace native vegetation, can reduce the carry capacity for livestock, reduce available forage and habitat for wildlife, and hinder reclamation efforts.

4.2.2.2.3.2. Cumulative Effects

Cumulative effects resulting from weed species are discussed in the PRB FEIS, p. 4-171. Species of concern indentified in the PRB FEIS for the PRB are Canada thistle (*Cirsium arvense*), Scotch thistle (*Onopordum acanthiuim*), salt-cedar (*Tamarix ramosissima*), leafy spurge (*Euphorbia esula*), Russian knapweed (*Centaurea repens*), and hoary cress (*Cardaria draba*). Of these species, only leafy spurge and Canada thistle were identified in the project area.

4.2.2.2.3.3. Mitigation Measures

The operator has committed to the control of noxious weeds and weed species of concern using measures identified in their Integrated Weed and Pest Management Plan. Additionally, successful reclamation through application of the operator's reclamation plans will discourage establishment of invasive species during operations. Likewise, measures incorporated into the programmatic COAs will further mitigate the potential spread and establishment of weed species.

4.2.2.2.3.4. Residual Effects

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

4.2.2.3. Ecological Sites

4.2.2.3.1. Direct and Indirect Effects

Direct and indirect effects to ecological sites are discussed in the PRB FEIS, pp. 4-153 to 4-164. As proposed, the project would potentially alter the disturbance regimes in the project area, especially the frequency of fire due to increased activity in the project area. Additional effects include the increase in noxious weeds and alterations in vegetation community diversity and cover.

The proposed off-site options for the discharge of co-produced water for the project would avoid the direct and indirect impacts to ecological sites from discharged produced water in the project area.

4.2.2.3.2. Cumulative Effects

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

4.2.2.3.3. Mitigation Measures

Impacts to vegetation from surface disturbance would be reduced through the implementation of the mitigation measures in the COAs, the CJU Epsilon POD design, and its associated plans including the Integrated Weed and Pest Management Plan, the WMP and the MSUP (specifically Section 10 Plans for Reclamation of the Surface). In addition, the site-specific reclamation plan for wells 32-35-5176WA/BG would provide additional mitigation for impacts identified in that area.

4.2.2.3.4. Residual Effects

The alteration of biodiversity of ecological sites could result from changes in disturbance regimes, alterations in vegetation in reclaimed areas, and the spread and establishment of weed species.

4.2.3. Wildlife and Protected Species

4.2.3.1. Habitat Types

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (WGFD 2009c), WGFD developed impact thresholds to evaluate impacts to wildlife from oil and gas development. For species or habitats discussed in this EA where impact thresholds were developed, those thresholds are disclosed and discussed both in relation to the current conditions (Section 3 of this document, Affected Environment) and in relation to reasonable foreseeable development, including development associated with the proposed project (Impacts Analysis). Moderate impacts occur when impairment of habitat function becomes discernable. High impacts occur when impairment of habitat function increases. Extreme impacts occur where habitat function is substantially impaired. Mitigation for each level of impact is discussed in the guidelines. Thresholds for impacts generally are determined by well densities.

4.2.3.1.1. Direct and Indirect Effects

Direct effects to wildlife habitats due to surface disturbances would cause direct loss of 38.8 acres of habitat and habitat fragmentation. These impacts would result from construction and operation of the proposed project. Habitat loss or alteration would result in direct losses of smaller, less mobile species of wildlife, such as small mammals and reptiles, and the displacement of more mobile species into adjacent habitats. Displacement also could result in some local reductions in wildlife populations, if adjacent habitats are at carrying capacity.

Project-related surface disturbance also would result in an incremental increase in habitat fragmentation, until reclamation is completed and vegetation is re-established. Impacts to wildlife species from habitat fragmentation effects in the project area include, but are not limited to, increased noise levels, elevated human presence, dispersal of noxious weeds and invasive species, and dust deposition from project construction and unpaved road traffic, which would extend beyond the boundaries of the proposed project facilities. These effects would result in changes in habitat quality, habitat loss, increased animal displacement, reductions in local population and breeding success, and species composition. However, the severity of these effects on terrestrial wildlife would depend on factors such as sensitivity of the species, seasonal use, type and timing of project activities, and physical parameters (e.g., topography, cover, forage, and climate).

4.2.3.1.2. Cumulative Effects

The historic rangeland within the CJU Epsilon POD has been exposed to existing oil and gas development and is considered previously disturbed; see Section 1.4, Table 1.1, Table 2.2, Section 3.3.4.2.1, and Section 3.4.1 of this document for examples of disturbance. Impacts to wildlife habitats are discussed in the sections in this document on Vegetation and in the PRB FEIS, pp. 4-151 and 4-181. Additional discussions on species-specific impacts are discussed in the following sections.

4.2.3.1.3. Mitigation Measures

Impacts to wildlife habitats from surface disturbance would be reduced through the implementation of the mitigation measures in Section 4.2.2.2 (Vegetation); the CJU Epsilon POD design, and its associated plans including the Integrated Weed and Pest Management Plan, the site-specific reclamation plans for well pads, access roads, and corridors, the WMP, the elk Best Management Practices (BMPs), the sage-grouse BMPs, and the MSUP.

4.2.3.1.4. Residual Effects

Residual effects identified in the PRB FEIS, p. 4-408, include the loss of vegetative cover (i.e., wildlife habitats), despite expedient reclamation, for several years until reclamation is successfully established.

4.2.3.2. Federally Threatened and Endangered Species, including Blowout Penstemon and Ute Ladies'-Tresses Orchid

There are no known populations or the presence of suitable habitat for blowout penstemon within the project area. Implementation of the proposed project would have no effect on the blowout penstemon. There are no known populations of Ute ladies'-tresses orchid, but the presence of suitable habitat within the project area may exist in years of high moisture events. Implementation of the proposed project would have no effect on the Ute ladies'-tresses orchid. As a result, cumulative effects and residual effects are inapplicable. Mitigation measures beyond those proposed by the operator to encourage successful reclamation are not proposed.

4.2.3.3. Proposed Species, including Mountain Plover

4.2.3.3.1. Direct and Indirect Effects

Direct and indirect effects to mountain plover are discussed in the PRB FEIS, pp. 4-254 to 4-255. Suitable mountain plover habitat is present and is limited to the identified prairie dog colonies within the project area. Direct impacts to prairie dog colonies are discussed in Section 4.2.3.5.12.1 of this document. No mountain plover were observed in the area from surveys in 2004 to 2010 (BHEC 2010).

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

Recent analysis of the USWFS Breeding Bird Survey data suggests that mountain plover populations have declined at an annual rate of 3.7 percent a year over the last 30 years, which represents a cumulative decline of 63 percent during the last 25 years (Knopf and Rupert 1995).

Use of roads and disturbed construction areas by mountain plovers may increase their vulnerability to vehicle collision. Designing roads for a travel speed up to 25 miles per hour provides drivers an opportunity to notice and avoid mountain plovers and allow mountain plovers sufficient time to escape from approaching vehicles. Even if a nesting plover flushes in time, the nest likely will still be destroyed.

4.2.3.3.2. Cumulative Effects

The cumulative impacts to mountain plovers are discussed in the PRB FEIS.

4.2.3.3.3. Mitigation Measures

Measures intended to avoid, minimize, or mitigate impacts to mountain plover habitat, including COAs:, :

1. A mountain plover nesting survey is required in suitable habitat prior to commencement of surface-disturbing activities in the following areas:

Qtr/Qtr	Section(s)	Township (N)	Range (W)
NW and SW	31	51	75
SENE	36	51	76
SW	25	51	76

Mountain plover nesting surveys shall be conducted by a biologist following the most current USFWS Mountain Plover Survey Guidelines (the survey period is May 1-June 15). A BLM approved biologist will conduct the surveys. Once occupied mountain plover nesting habitat is

located, the BLM will reinitiate Section 7 consultation with the USFWS on any project-related activities proposed for such habitat. The amount and nature of ground-disturbing activities will be limited within identified nesting areas in a manner to avoid the abandonment of these areas. All survey results must be submitted in writing to the BFO and approved prior to initiation of surface-disturbing activities.

2. No surface-disturbing activities are permitted in the suitable habitat area listed above, from March 15-July 31, unless a mountain plover nesting survey has been conducted during the current breeding season. This timing limitation will be in effect unless surveys determine no plovers are present. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
T51N/R76W	25	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NESW of this section.
T51N/R76W	31	Well location(s): 12-31-5175BG, 12-31-5175WA, 14-31-5175BG, 14-31-5175WA, 23-31-5175BG, and 23-31-5175WA All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SWNW and SW of this section.
T51N/R76W	36	All access roads and associated utility corridors and 2 power drops within the NENE, SESE, and NESE of this section.

3. If occupied mountain plover habitat is identified, then a seasonal disturbance-free buffer of 0.25 mile shall be maintained between March 15 and July 31. If no mountain plover observations are identified, then surface-disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
4. No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.
5. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
6. The BLM will monitor all road-associated carcasses, jackrabbit sized and larger, along project (operator-maintained) roads. The presence of carrion could attract mountain plover predators.
7. When above ground markers are used on capped and abandoned wells they will be identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.
8. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

In addition, any mountain plovers, previously undetected by surveys, that may use the area, would receive some protection from raptor and sage-grouse timing limitations.

4.2.3.3.4. Residual Effects

There is potential for plovers to be impacted by project-related traffic outside the project boundary and a potential for impacts if individuals were undetected at the time of survey.

4.2.3.4. Candidate Species, including Greater Sage-grouse

4.2.3.4.1. Direct and Indirect Effects

Impacts to sage-grouse associated with energy development are discussed in detail in the *12-Month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened or Endangered* (USFWS 2010). Impacts to sage-grouse are generally a result of loss and fragmentation of sagebrush habitats associated with roads and infrastructure. Research indicates that sage-grouse hens also avoid nesting in developed areas. Approximately 3,358 acres are considered high quality sage-grouse habitat. Direct habitat loss of approximately 38.8 acres from the facilities themselves, roads and traffic, and the associated noise is a potential within the POD. Indirect impacts to suitable sage-grouse habitat may be possible throughout the entire project area.

Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). In a study of greater sage-grouse population response to natural gas field development in western Wyoming, Holloran (2005) concluded that increased noise intensity, associated with active drilling rigs within 5 kilometers (3.1 miles) of leks, negatively influenced male lek attendance. In 2002, Braun et. al. documented approximately 200 CBNG facilities within 1 mile of sage-grouse leks. Sage-grouse numbers were found to be consistently lower for these leks than for leks without this disturbance. Direct habitat losses from the facilities themselves, roads, traffic, and the associated noise were found to be the likely reason for this finding.

Infrastructure associated with noise concerns includes wellhead compressors and diesel generators. If a powerline network is not completed before the wells are in production, then temporary diesel generators shall be placed at the seven power drops. Generators are projected to be in operation for 24 months. Fuel deliveries are anticipated to be 2 to 3 times per week during the summer months and 4 times per week during the winter. Noise level is expected to be 100.5 dB at 1 meter distance. However, generators are not included in the proposed project.

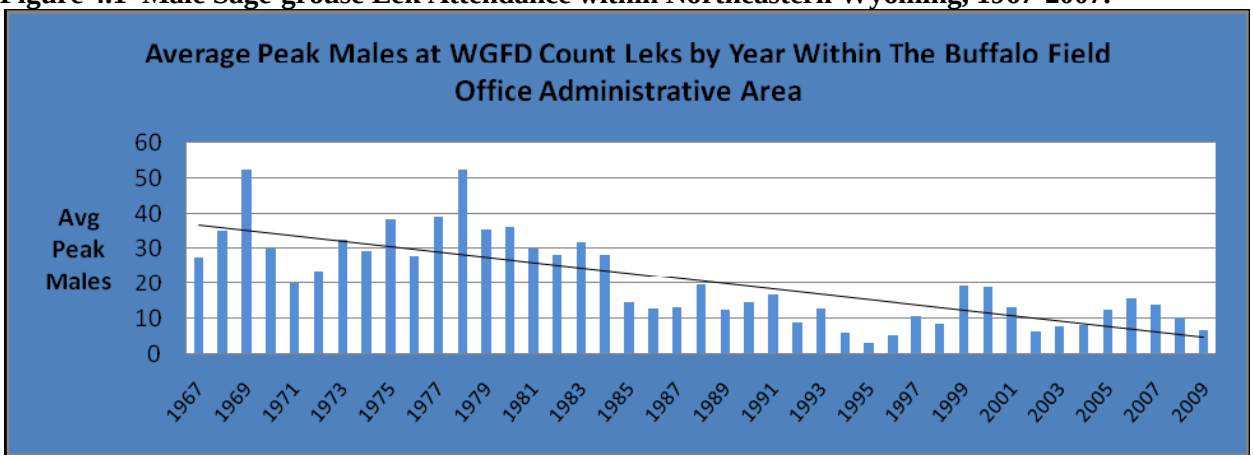
In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats*, WGFD (2009) categorized impacts to sage-grouse by number of well pad locations per square mile within 2 miles of a lek and within identified nesting/brood-rearing habitats greater than 2 miles from a lek. Studies indicate that oil or gas development exceeding approximately 1 well pad per square mile resulted in calculable impacts on breeding sage-grouse populations (Holloran et al. 2005; Walker et al. 2007). According to WGFD (2009) recommendations, the extreme threshold of impact occurs at a CBNG well density of 3 wells per square mile. Extreme impacts are those that occur within 2 miles of leks or within identified nesting/brood-rearing habitat, and cause loss or impairment of habitat function that cannot be mitigated on site and will lead to eventual abandonment of most leks. Under Alternative B, there are 21 proposed wells within the project area in addition to the 56 already existing within the POD boundary. Well density will be 14.5 wells per square mile, well above the 1 well per square mile recommendation by the State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development (2008).

4.2.3.4.2. Cumulative Effects

Recent research suggests that the cumulative and synergistic effects of current and foreseeable CBNG development within the vicinity of the project area will be likely to extremely impact the local sage-grouse population, cause declines in lek attendance, and may result in local extirpation. The cumulative impact assessment area for this project encompasses the project area and the area that is encompassed by a 4-mile radius around the sage-grouse leks that occur within 4 miles of the project boundary. Analysis of impacts up to 4 miles was recommended by the State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008). Furthermore, the multi-state recommendations presented to the WGFD for identification of core sage-grouse areas acknowledges there may be times when development in important sage-grouse breeding, summer, and winter habitats cannot be avoided. In those instances they recommend, "…infrastructure should be minimized and the

area should be managed in a manner that effectively conserves sagebrush habitats" (State Wildlife Agencies' Ad Hoc Committee for Sage-grouse and Oil and Gas Development 2008). The sage-grouse population within northeast Wyoming showed a steady long term downward trend, as measured by lek attendance (WGFD 2008). Figure 4.1 illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Research suggests that these declines may be a result, in part, of CBNG development, as discussed in detail in USFWS (2010).

Figure 4.1 Male Sage-grouse Lek Attendance within Northeastern Wyoming, 1967-2007.



Excluding the CJU Epsilon POD, there are approximately 3,617 existing wells (http://wogcc.state.wy.us/2010) within the 4-mile cumulative effects analysis area (approximately 395 square miles). The existing well density is approximately 9.15 wells per square mile, already considered an extreme level of impact on sage-grouse. With approval of Alternative B (21 wells at 12 proposed well locations), well density would increase to 9.21 wells per square mile.

Based on the summary of research describing the impacts of energy development on sage-grouse, efforts to reduce habitat loss and fragmentation are likely to be the most effective in ensuring long-term lek persistence. Walker et. al., 2007, indicates the size of a no-development buffer sufficient to protect leks will depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Also, rather than limiting mitigation to timing restrictions, design specifically included in the proposed POD and in the COA's that would minimize impacts to sage-grouse include:

- Burying power lines (Connelly et al. 2000);
- Minimizing road and well pad construction;
- Restrictions on vehicle traffic including confining all equipment and vehicles to the access road(s), pad(s), and area(s) specified in the approved APD or POD;
- Restrictions on noise (Lyon and Anderson 2003; Holloran 2005); and
- Managing produced water to prevent the spread of mosquitoes with the potential to be a vector for West Nile Virus in sage-grouse habitat (Walker et al. 2007).

The PRB FEIS acknowledged and disclosed anticipated effects on sage-grouse in the PRB by stating that "the synergistic effect of several impacts will likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its [f]ederal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area (PRB) or the entire range of the species is not likely to be compromised (page 4-270)." Based on the impacts described in the PRB FEIS and the findings of more recent research, the proposed POD may

contribute to a decline in male attendance at the 4 leks that occur within 4 miles of the project area, and, potentially, extirpation of the local grouse population.

The Governor's Sage Grouse Implementation Team developed a "Core Population Area" strategy in an effort to conserve the greater sage-grouse population in Wyoming encouraging development outside of core areas (WGFD 2010). The Governor's Executive Order 2008-2, Greater Sage-Grouse Core Area Protection, provides direction for managing sage-grouse in core areas and non-core areas. This project proposal occurs in a non-core area for sage-grouse management and also is outside the possibility of a "connectivity" corridor (WGFD 2010).

Energy development began in the PRB in the late 1800s, but development accelerated after the 1960s and includes mainly coal mining, conventional oil, and development of CBNG (BLM 2005). Energy-related disturbance in the PRB is projected to increase from 220,257 acres in 2003 to 514,732 acres in 2020 (BLM 2005), but the area of sagebrush-specific disturbance is unknown. While reclamation measures have been, or will be applied to most of this area, habitat function for sage-grouse will not recover for many decades. Sage-grouse will re-occupy disturbed areas following ecological recovery (Braun 1998). However, energy-related disturbances are occurring at much greater rates than ecosystem recovery. Consequently, energy-related impacts to sage-grouse accrue as disturbance advances across the landscape.

4.2.3.4.3. Mitigation Measures

Measures intended to avoid, minimize, or mitigate impacts, including COAs, to greater sage-grouse nesting and brood rearing habitat include:

1. No surface-disturbing activities are permitted from March 15 to June 30. This condition will be implemented on an annual basis for the life of the project. This condition affects the following locations:

Township/Range	Section	Wells and Infrastructure
T51N/R76W	25	All access roads and associated utility corridors within the ENTIRE section.
T51N/R76W	26	All access roads and associated utility corridors within the ENTIRE section.
T51N/R76W	35	Well location(s): 31-35-5176WA; 31-35-5176BG; 22-35-5176WA; 22-35-5176BG; 32-35-5176WA; 32-35-5176BG; 42-35-5176WA; 43-35-5176WA; 33-35-5176WA; 14-35-5176BG; 14-35-5176WA; 24-35-5176BG; 24-35-5176WA All access roads and associated utility corridors within the ENTIRE section and 2 power drops.
T51N/R76W	36	All access roads and associated utility corridors and 2 power drops within the NENE, SESE and NESE of this section
T51N/R75W	31	Well location(s): 12-31-5175BG; 12-31-5175WA; 23-31-5175BG; 23-31-5175WA; 14-31-5175BG; 14-31-5175WA; 24-31-5175BG; 24-31-5175WA All access roads and associated utility corridors within the ENTIRE section and 1 power drop.

2. A 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.

4.2.3.4.4. Residual Effects

The Buffalo FO RMP (BLM 2001) and the PRB ROD (BLM 2003b) included a 2-mile timing limitation on surface-disturbing activities around sage-grouse leks. The 2-mile measure originated with the Western Association of Fish and Wildlife Agencies (BLM 2004). Wyoming BLM adopted the 2-mile recommendation in 1990 (BLM 1990).

The 2-mile recommendation was based on early research indicating that most nests were located within 2 miles of a lek (BLM 2004). However, recent research conducted within the Great Plains portion of the sage-grouse range indicated that nest location is related more to habitat quality (e.g., concealment) than to lek proximity (Herman-Brunson et al. 2009). For example, Moynahan et al. (2007) found that 40 percent of sage-grouse hens nested further than 3 miles from leks in north central Montana. Recent research in the PRB suggests that impacts to leks from energy development are discernable out to a minimum of 4 miles, and that some leks within this radius were extirpated as a direct result of energy development (Walker et al. 2007; Naugle et al. In press). Based on these studies, the BLM determined that a 2-mile timing limitation is insufficient to prevent population decline. Consequently, timing stipulations to protect breeding, nesting, and brood-rearing sage-grouse were considered as potentially applicable to the entire POD area. However, the application of timing restriction COAs will be applied on a well-specific basis as a result of the field onsite review (i.e., consideration of the well in proximity to a lek and presence of suitable sagebrush habitat). COAs address measures designed to avoid, minimize, and mitigate impacts to Greater sage-grouse.

While measures designed to reduce effects to sage-grouse were employed throughout the planning process, it is likely that the proposed activity would further degrade habitat effectiveness and depressed sage-grouse recruitment and survival in the area. These effects were analyzed and disclosed in the PRB FEIS, p. 4-270.

4.2.3.5. BLM-Sensitive Species

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22A reads that "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories will not be necessary." The PRB FEIS discusses impacts to sensitive species, pp. 4-257 to 4-265. Therefore additional direct and indirect impacts, cumulative effects, and residual effects are not anticipated for the majority of the BLM sensitive species from this project and, along with additional mitigation measures, are not discussed in this EA.

4.2.3.5.1. Northern Leopard Frog

4.2.3.5.1.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.1.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.1.3. Mitigation Measures

No additional mitigation measures are required.

4.2.3.5.1.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.2. Bald Eagle

4.2.3.5.2.1. Direct and Indirect Effects

Impacts to bald eagles are discussed in the PRB FEIS, pp. 4-251 to 4-253. A study completed in 2004 suggests that two-tracks and improved project roads pose minimal collision risk to bald eagles. In 1 year of monitoring road-side carcasses, the BFO reported 439 carcasses, 226 along Interstates (51 percent), 193 along paved highways (44 percent), 19 along gravel county roads (4 percent), and 1 along an improved CBNG road (less than 1 percent) (Bills 2004). No road-killed eagles were reported; bald and golden eagles were observed feeding on 16 of the reported road-side carcasses (less than 4 percent). The risk of big-game vehicle-related mortality along CBNG project roads is insignificant or discountable, when combined with the lack of bald eagle mortalities associated with highway foraging, leads to the conclusion that CBNG project roads do not affect bald eagles.

No bald eagle nests or winter roosts were identified within 1 mile of the project area. However, suitable habitat exists within the project area. Implementation of the proposed project would not likely adversely impact the bald eagle.

4.2.3.5.2.2. Cumulative Effects

Refer to the PRB FEIS, pp. 4-251 to 2-253, for the cumulative effects of Alternative B on bald eagles.

4.2.3.5.2.3. Mitigation Measures

Measures intended to avoid, minimize, or mitigate impacts, including COAs, to bald eagles include:

1. In the event that a bald eagle (dead or injured) is located during construction or operation, the USFWS' Wyoming Field Office (307-772-2374) and the USFWS' Law Enforcement Office (307-261-6365) will be notified within 24 hours.
2. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of Sundry Notices.
3. 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.

Additionally, application of the BLM's 2010 MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.2.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.3. Brewer's Sparrow

4.2.3.5.3.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.3.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.3.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.3.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.4. Ferruginous Hawk

4.2.3.5.4.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273. Additional impacts expected from project actions are described in the Section 4.2.3.10. Additionally, due to the territorial nature of ferruginous hawks, there is greater potential for disturbance to nesting ferruginous hawks. However, no active ferruginous hawk nests were identified during the past survey efforts (See Table 3.20) (BHEC 2010) and therefore, adverse impacts to this species are not anticipated.

4.2.3.5.4.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.4.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.4.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.5. Loggerhead Shrike

4.2.3.5.5.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.5.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.5.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.5.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.6. Long-billed Curlew

4.2.3.5.6.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.6.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.6.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.6.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.7. Northern Goshawk

4.2.3.5.7.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273. Additional impacts expected from project actions are described in the Section 4.2.3.10 of this document. However, no active northern goshawk nests were identified during the past survey efforts (See Table 3.20) (BHEC 2010) and therefore, adverse impacts to this species are not anticipated.

4.2.3.5.7.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.7.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.7.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.8. Peregrine Falcon

4.2.3.5.8.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273. Additional impacts expected from project actions are described in the Section 4.2.3.10 of this document. However, no active peregrine falcon nests were identified during the past survey efforts (See Table 3.20) (BHEC 2010) and therefore, adverse impacts to this species are not anticipated.

4.2.3.5.8.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.8.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.8.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.9. Sage Sparrow

4.2.3.5.9.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.9.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.9.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.9.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.10. Sage Thrasher

4.2.3.5.10.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.10.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.10.3. Mitigation Measures

No additional mitigation measures are required. Application of the BLM's MBTA MOU with the USFWS will serve to further mitigate potential effects to this migratory bird.

4.2.3.5.10.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.11. Western Burrowing Owl

4.2.3.5.11.1. Direct and Indirect Effects

There are no known burrowing owl nests within the CJU Epsilon POD area, however, suitable habitat is found within the identified prairie dog colonies listed in Table 3.11 of this document. Direct impacts to prairie dog colonies are discussed in Section 4.2.3.4.12.1 of this document. Impacts expected from project actions are the same as those described on p. 4-263 of the PRB FEIS and in Section 4.2.3.10. In addition to the impacts listed in these sections, use of roads may increase owl vulnerability to vehicle collision.

4.2.3.5.11.2. Cumulative Effects

The cumulative impacts to burrowing owls are similar to those discussed for all raptor and migratory bird species and are discussed in the PRB FEIS, pp. 4-221 and 4-235.

4.2.3.5.11.3. Mitigation Measures

The Thunder Basin National Grasslands in Campbell County, Wyoming, who cooperated with the BLM in the creation of the 2003 PRB FEIS, recommends a 0.25-mile timing restriction buffer zone for burrowing nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to "use the least restrictive stipulations that effectively accomplish the resource objectives or uses." Alteration of the general raptor nest timing limitation (February 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to 4.5 months (see Section 3 for breeding, nesting, and migration chronology) from 6.5 months and from 0.5 mile to 0.25 mile. The COAs address measures to minimize and mitigate impacts to burrowing owls.

Measures intended to avoid, minimize, or mitigate impacts to nesting burrowing owls, including COAs include:

1. No surface-disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface-disturbing activities within the prairie dog town(s). This timing limitation will be in effect unless surveys determine the nest(s) to be inactive. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
T51N/R76W	25	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NESW of this section.
T51N/R76W	31	Well location(s): 12-31-5175BG, 12-31-5175WA, 14-31-5175BG, 14-31-5175WA, 23-31-5175BG, and 23-31-5175WA All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SWNW and SW of this section.
T51N/R76W	36	All access roads and associated utility corridors and 2 power drops within the NENE, SESE and NESE of this section

4.2.3.5.11.4. Residual Effects

There would be an increase in traffic, construction activity, and human presence in the area throughout the life of the project that would affect the quality of the area for nesting burrowing owls. Timing limitations during the construction phase of the project would protect nests from disturbance, but there would be activities during well operation that may discourage burrowing owls from using the nest locations.

4.2.3.5.12. Black-tailed Prairie Dog

4.2.3.5.12.1. Direct and Indirect Effects

Two proposed well sites and approximately 100 feet of proposed roads pass through the prairie dog colonies. Wells located within prairie dog towns include 12-31-5175BG and 12-31-5175WA and wells within 0.25 mile of prairie dog towns include: 12-31-5175BG, 12-31-5175WA, 14-31-5175BG, 14-31-5175WA, 23-31-5175BG, and 23-31-5175WA. Therefore, there would be direct habitat loss associated with the road construction and vehicle traffic would increase prairie dog mortality along the road. Additional impacts to the black-tailed prairie dog are discussed in the PRB FEIS, pp. 4-255 to 4-256.

4.2.3.5.12.2. Cumulative Effects

The PRB FEIS discusses cumulative effects to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.12.3. Mitigation Measures

No additional mitigation measures are required.

4.2.3.5.12.4. Residual Effects

The PRB FEIS discusses residual effects to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.13. Fringed Myotis

4.2.3.5.13.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.13.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.13.3. Mitigation Measures

No additional mitigation measures are required.

4.2.3.5.13.4. Residual Effects

No residual effects are anticipated.

4.2.3.5.14. Long-eared Myotis

4.2.3.5.14.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.14.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to sensitive species, pp. 4-257 to 4-273.

4.2.3.5.14.3. Mitigation Measures

No additional mitigation measures are required.

4.2.3.5.14.4. Residual Effects

No residual effects are anticipated.

4.2.3.6. Big Game

General

Big game in the area including elk, mule deer, and pronghorn antelope are expected to respond in similar fashion. However, deer and pronghorn do not move as easily as elk through deep snow, so winter disturbance could impact these shorter species more severely. The most important difference between the elk herd and deer or antelope herds is that the Fortification Creek elk are a relatively isolated herd residing primarily within the yearlong range. Yearlong and crucial winter range for elk, winter range for pronghorn antelope, and winter yearlong range for mule deer would be directly disturbed by the construction of wells, pipelines, and roads resulting in habitat loss. Table 2.2 of this document summarizes the proposed activities associated with the development of the CJU Epsilon POD; items identified as long term disturbance would result in direct habitat loss. Short-term disturbances also would result in direct habitat loss as vegetative cover is removed. Short term disturbances may provide some habitat value as these areas are reclaimed and native vegetation becomes established. However, they also may increase vehicular collision when adjacent to roads.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 mile (Hiatt and Baker 1981). The WGFD indicates a well density of 8 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). The foreseeable development within the CJU Epsilon POD includes an additional 21 wells at 12 locations to an existing 77 wells at 32 locations within 6.5 square miles, resulting in a well density of approximately 15 wells per section.

Big game animals may return to the project area following drilling and construction activities if Lance practices a very, very low number of well and generator visits; however, populations would 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.

The Pinedale Anticline study (Sawyer et. al. 2005) suggests, mule deer do not readily habituate. A study in North Dakota wrote, “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 are documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as winter progresses. Survival below the maintenance level requires behavior emphasizing energy conservation.

Canfield et al. (1999) wrote 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 death.

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

4.2.3.6.1. Elk Direct and Indirect Effects

The WGFD defined two types of important wildlife habitats that are located within the yearlong range: crucial winter range and parturition range. Both provide important seasonal habitat functions during sensitive periods for elk, (Figure 3.3 and Table 3.12).

For the purposes of this analysis, the BLM selected three factors and corresponding metrics to evaluate effects of development upon elk. These factors (and metrics) are: (1) habitat condition and availability (security habitat and connectivity), (2) pattern of elk use (collaring data), and (3) population objectives (number of elk).

Past and Present Actions Resulting in Effects to the Fortification Elk Herd

To disclose the past and present actions within the cumulative impact assessment area (CIAA) the following information was used; WOGCC well data, Federal wells verified with Automated Fluid Minerals Support System (AFMSS), and an updated GIS layer[3] displaying existing oil and gas access roads. The information used to evaluate the CIAA provides a reasonably complete assessment of current oil and gas development on fee, state, and federal lands including the Camp John Augusta POD, Augusta Unit Zeta (AUZ) POD, the Carr Draw III West (CD3W) POD, Carr Draw V Add II POD, Carr Draw IV (CDIV) POD, Williams Draw Unit Gamma and Delta (WDU) PODs and the Kinney Divide Unit Gamma (KDU) POD.

Impacts to elk habitat and elk in the Fortification Creek area occurred during prior construction and drilling activities related to federal and non-federal wells. This analysis considers cumulative impacts to elk within the entire CIAA utilizing the most recent available data.

Habitat and Availability

CBNG development fragments habitats through placement of linear facilities such as roads, utility corridors, and pipelines. The impacts from fragmentation can vary depending on the use of the feature. For example, a road used daily would displace elk by reducing habitat effectiveness as well as by fragmenting habitat. The placement of linear elements can also act as vector routes for the establishment of invasive plant species (e.g., Japanese brome and leafy spurge) that can reduce the forage value of the area by out-competing native plants, and in the case of brome, can increase the potential for wildfire (BLM 2006).

The foreseeable development within the CJU Epsilon project area includes an additional 21 new wells at 12 locations. There are also currently 56 existing well locations within the project area (WOGCC as of January 18, 2011) 50 of which are federal wells. The addition of the 21 new wells would result in an

[3] During the 2009 & 2010 field season, BFO staff conducted field verification of "existing oil and gas roads" within the CIAA. View shed analysis, utilizing GIS models and the best available data, continue to be utilized by the Buffalo FO to determine security habitat effectiveness within the CIAA. The results of the most current analysis reflect statistics that may differ from those documented in the prior environmental analyses.

average well density throughout the 6.5 square mile project area of 9.5 wells per section. Proposed project elements associated with the proposed development that are anticipated to impact the Fortification elk herd are: 12 well locations, 3.7 miles of new roads, 2.5 miles utility corridors and pipelines, increased vehicle traffic on established roads, and increased noise from compressor stations.

Approximately 110 acres of parturition range falls in the southwest corner of the project area however none of the proposed project components fall within the parturition range. 770 acres of crucial winter range occurs along the west side of the project area and 3,140 acres falls within the elk yearlong range. Two of the 12 federal well locations (14-35-5176BG/WA and 22-35-5176BG/WA) are proposed within elk crucial winter range and no wells are proposed within the parturition range. One proposed federal well location (22-35-5176BG/WA) is within effective elk habitat and is likely to increase impacts to elk habitat beyond the impacts already associated with the existing road oil and gas activities.

Indirect disturbance from human activity is probably the largest potential impact from the proposed action. The PRB FEIS used “habitat effectiveness” to assess the effect of human disturbance on elk populations. Habitat effectiveness is 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. For elk, the habitat effectiveness of areas within 0.5 mile of an active road or well would be reduced. In Powell's study on elk response to oil and gas development in the Jack Morrow Hills area of southwestern Wyoming, elk avoided areas within 2 kilometers (1.25 miles) of active roads (Powell 2003).

In an attempt to quantify the loss, both actual and functional, of crucial elk habitat (i.e., crucial winter range and parturition areas) in the Fortification Creek area resulting from CBNG development, a geographic information system (GIS) model was prepared to portray the physiographic and elk habitat data. Key assumptions were used in the development of the model:

- The ability of elk to see CBNG development activities within 0.5 mile resulted in the non-use/lost functionality (i.e., lack of security) of the intervening habitat;
- Secure elk habitat was defined as those blocks of contiguous habitat greater than 250 acres in size that would be unaffected by CBNG activities (Christensen et al. 1991); and
- The presence of gas field roads and well pads (excluding the WSA) would be the parameter of measurement for development.

Security habitat occurs throughout the yearlong range and, subsequently, throughout the crucial winter and parturition ranges (Figure 4.2). Elk security habitat areas are important to minimize stress to elk from human disruption as well as to provide fair chase during big game hunting. Open roads are the most common impact to security cover.

As listed in Table 3.13 approximately 60,000 acres of security habitat existed within the entire elk yearlong range in 2009. Approximately 4,720 contiguous acres of yearlong range were within the vicinity of the CJU Epsilon POD project area and 199 acres of yearlong range are located within 0.5 miles of the project area boundary. Population monitoring conducted by WGFD as disclosed in the annual Big Game Herd Unit Reports suggests connectivity between remaining security patches was relatively unimpeded prior to 2009 (WGFD 2010b) .

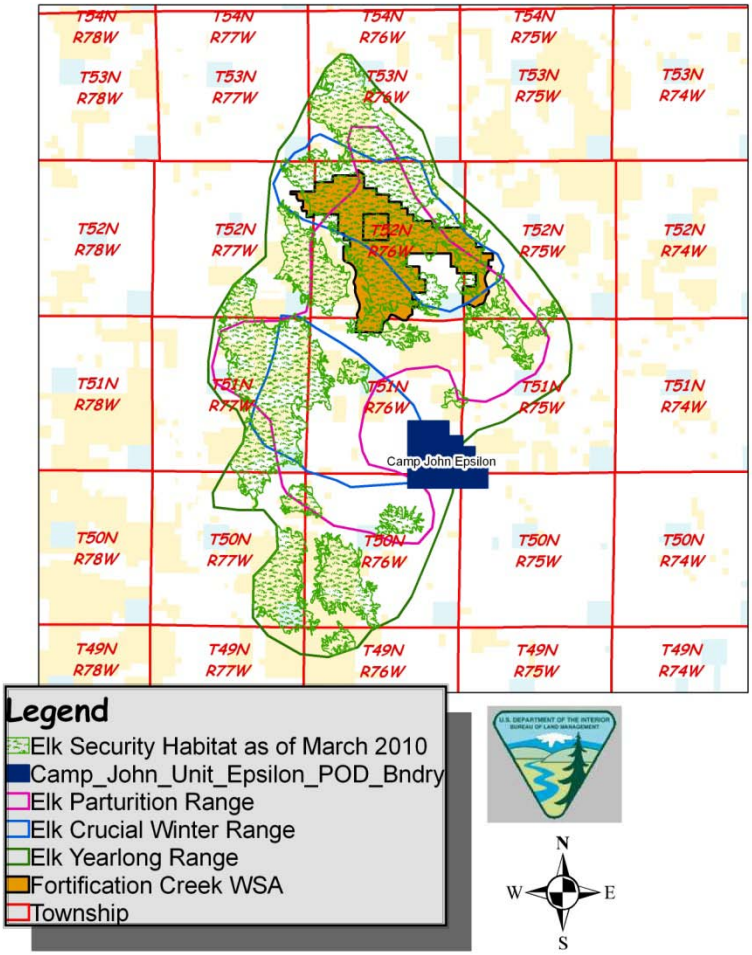
A view shed analysis utilizing the geographic information system (GIS) model was conducted to determine habitat effectiveness within the CJU Epsilon POD project boundary following the field visits conducted 2009-2010 confirming the existing oil and gas roads (Figure 4.3). The following statistics summarize the direct and indirect impacts to habitat effectiveness from the proposed project:

1. Approximately 121 acres (2.9%) of effective elk habitat exists within the vicinity (0.5 mile) of the

CJU Epsilon POD project area.

2. With the adoption of Alternative B; approximately 22 acres of effective habitat within the project boundary would be compromised.
3. No security habitat exists within the project boundary; no loss of elk security habitat would result from the implementation of the project.

Figure 4.2 Elk Security Habitat Remaining within the CIAA (as of March 2010)



Pattern of Habitat Use

In the absence of forest cover, elk seem to rely on a combination of shrubs, topography, and low human disturbance to meet their thermal and hiding cover requirements (Sawyer et al. 2007). Table 4.2 details the percentage of documented elk collar locations in each of the defined ranges within the CIAA as of March 2010. Elk use of the identified range focused on the time period when the elk are most apt to be using the given range. BLM and WGFD assume a period of 2 weeks for elk to acclimate to reduced oil and gas activity during the TLS periods. Table 4.2 documents observations within the parturition range occurred May 15-June 30 (TLS for elk parturition range is May 1 – June 30). Observations within the crucial winter range were recorded December 1 through April 30 (TLS for elk crucial winter range is November 15 to April 30) of the corresponding year.

Table 4.2 Documented Elk Collar Locations in each of the Defined Ranges in the CIAA (%)

Year / Range	Total Observation Points	Total Observation Points within Respective Range	% Use of Respective Range
2008 Yearlong	32,709	28,257	86%
2009 Yearlong	49,604	43,839	88%
2008 Crucial Winter Season	6,203	4,615	74%
2009 Crucial Winter Season	27,125	19,119	71%
2008 Parturition Season	7,626	5,594	73%
2009 Parturition Season	8,955	5,948	66%

As of 2009 an estimated 232 elk are in the Fortification Creek elk herd, down from an average of 272 in 2002. The current WYGF objective for the herd is 150 (BLM 2006).

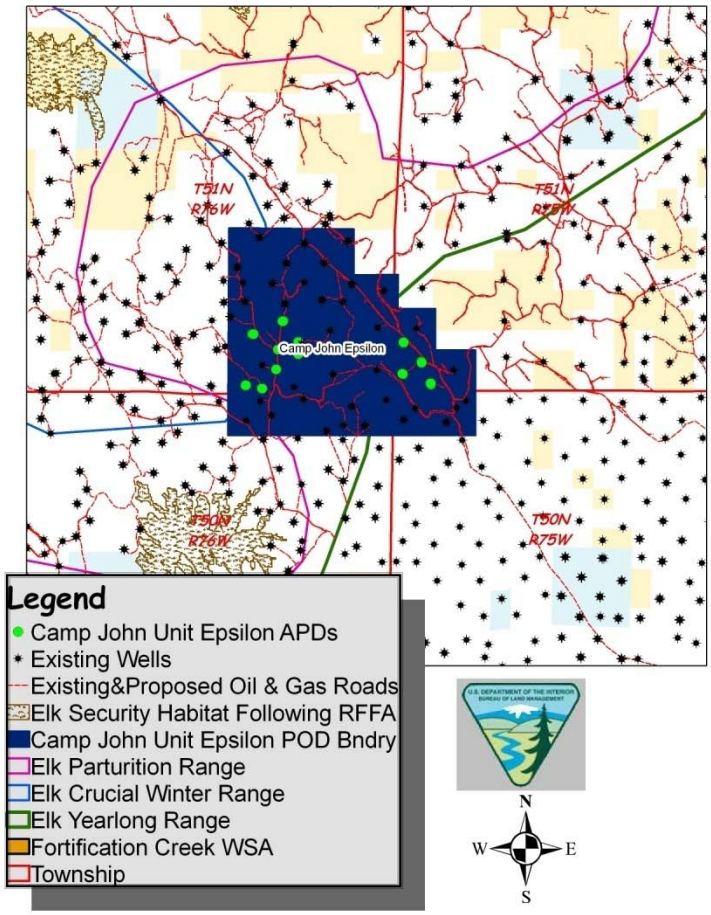
The CJU Epsilon POD is expected to affect elk occupying the Fortification Creek area and the immediate surrounding habitat. There is anticipated habitat effectiveness loss due to avoidance and displacement of animals and altered behavior from reactions to CBNG activities. Most of these impacts are anticipated to occur during project construction.

Movement patterns of elk captured north of Fortification Creek versus elk captured south of Fortification Creek were compared through December 2010. Typically, elk captured in the northern portion of the elk yearlong range stay north of Fortification Creek, but elk captured in the southern portion of the yearlong range tend to roam more between the north and south halves of the yearlong range. Nine (50 percent) of the 18 elk collared south of Fortification Creek spent considerable time north of Fortification Creek (April 1, 2008 - July 17, 2009), with 37 percent of the location from 'southern' elk captured north of Fortification Creek. While of 37 elk collared north of Fortification Creek only 3 (8 percent) spent much time south of Fortification Creek; only 4 percent of the locations from the 'northern elk were south of Fortification Creek. Effective elk habitat along the southern boundary of the Fortification Creek Planning Area (FCPA) provides connectivity for these elk between the north and south halves of the elk yearlong range. The CJU Epsilon POD is south and west of the FCPA on the west boundary of the elk yearlong range (Figure 4.3).

Following non-federal CBNG development initiated within the Augusta Unit in May of 2008, more than half the collared elk that were within the AUZ POD area left. Consistent with the literature, less than 50 percent of the collared elk returned to the POD area to date. Only 6 of the original (March 2008) 25 GPS collared elk relocated using the remaining effective habitat within the AUZ's western boundary 2009. That use reduced to 3 or less collared elk using the effective habitat within AUZ in 2010. The highest number of elk relocations were observed in February; 79 of a total 695 or 11 percent. It is likely that connectivity of the effective habitat within the AUZ POD was compromised at least for the mid-term, and perhaps until that POD is reclaimed. Likewise, fewer elk relocations were recorded in the CD3W and CDIV project areas even though 720 acres of security habitat was maintained within those PODs. Security habitat provides refuge for elk when stressed by human disturbance.

It is likely that elk displacement in the CJU Epsilon project area would be similar to displacement seen in other area developments. Human disturbance would cause displacement for prolonged periods of time or areas would be avoided altogether with the loss of security areas.

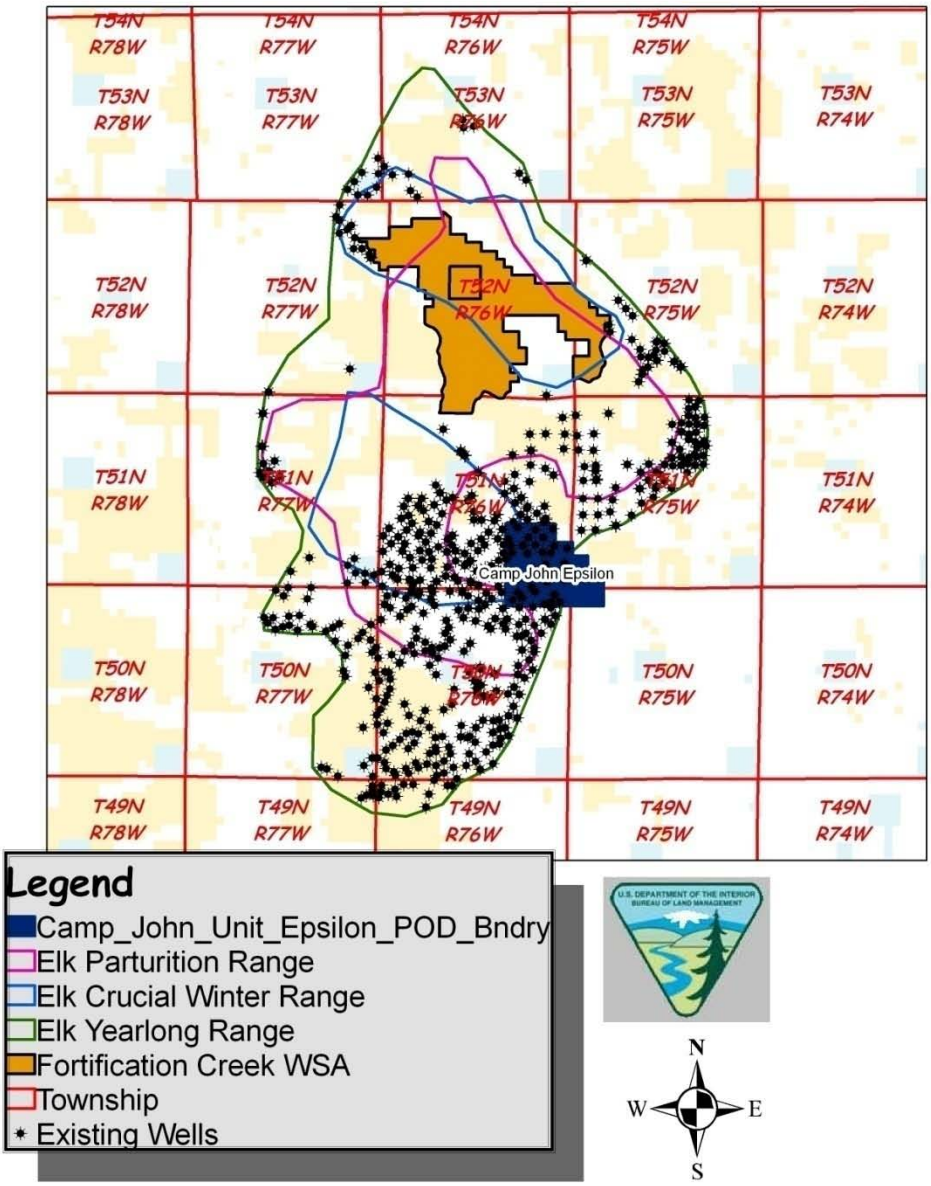
Figure 4.3 Camp John Unit Epsilon Elk Security Habitat Remaining Under Alternative B



4.2.3.6.2. Elk Cumulative Effects

The cumulative CIAA for elk is the Fortification elk herd yearlong range as defined by the WGFD, which consists of approximately 123,000 acres. As of September 14, 2010, WOGCC reported 554 existing federal and non-federal oil and gas wells (including 13 oil, 56 conventional gas, and 485 CBNG wells) at approximately 406 locations within the CIAA, distributed in a non-uniform manner (Figure 4.4). The majority of these existing wells are concentrated in developed CBNG and conventional oil and gas fields across roughly 48,000 acres within the elk yearlong range. This includes 162 existing well locations within the crucial winter range and 177 existing well locations within the parturition range. The proportion of existing federal well locations that are within the crucial winter range and parturition range are 51.9 percent and 55.9 percent respectively.

Figure 4.4 Existing Wells within the CIAA as of September 14, 2010



Virtually 100 percent of the federal mineral estate within the CIAA, excluding the WSA, is leased, therefore the BFO anticipates additional APD filings. WOGCC and BLM data were used to predict the reasonably foreseeable future development (RFFD) within the CIAA. Oil and gas wells were considered reasonably foreseeable if the WOGCC data showed the locations as Approved Permit status (AP) for state & fee locations, or if the BLM had received an APD. Access roads to federal locations are frequently submitted with the APDs, and these alignments were used to predict future disturbance (assuming an average short-term disturbance width of 50 feet) and arrangement of activities within the CIAA that are disruptive to elk. BLM used the best available data collected in the field, as well as, data received from various operators, including road alignments to federal wells and where possible, to non-federal locations. Access road alignments to all non-federal locations are not available, and are not included in this analysis. The reasonably foreseeable future development within the CIAA as proposed within these parameters

consists of 520 additional CBNG well locations, 436.2 miles of new roads resulting in approximately 2,644 acres of surface disturbance.

Habitat and Availability

Of the 520 proposed new well locations within the CIAA, 70 are within elk crucial winter range and include approximately 200 miles of new roads and 1,200 acres of surface disturbance with 145 within parturition range, resulting in approximately 146 miles of new roads and 885 acres of surface disturbance (Figure 4.4). The proposed CJU Epsilon project proposes 3.8 percent of the wells, 0.8 percent of the new roads and 1.4 percent of the total surface disturbance within the CIAA for the RFFD.

To date, the total loss of elk security habitat in the Fortification Creek area occurring as a result of the CBNG development is approximately 15,800 acres. Elk security habitat remaining within the "dual crucial" overlap areas was reduced to 84 percent of that prior to the CIAA analysis. Likewise, elk security habitat remaining within the delineated crucial ranges (parturition & crucial winter ranges) and the yearlong range was reduced to 84 percent and 63 percent of baseline, respectively (Table 4.3, Figure 4.5). These elk habitat thresholds are considered to be guidelines, without regulatory authority.

Figure 4.5 Fortification Elk Ranges

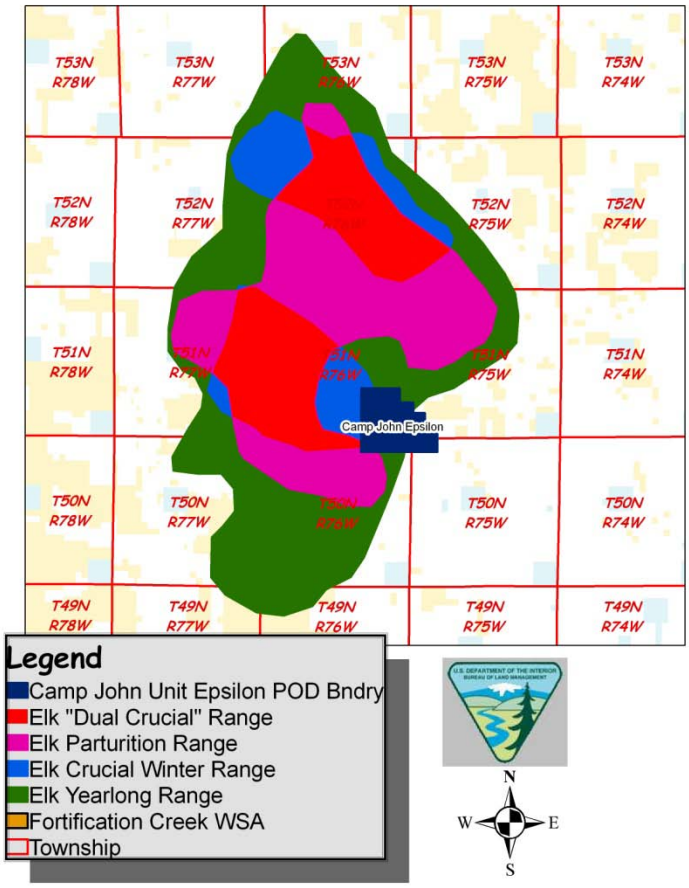


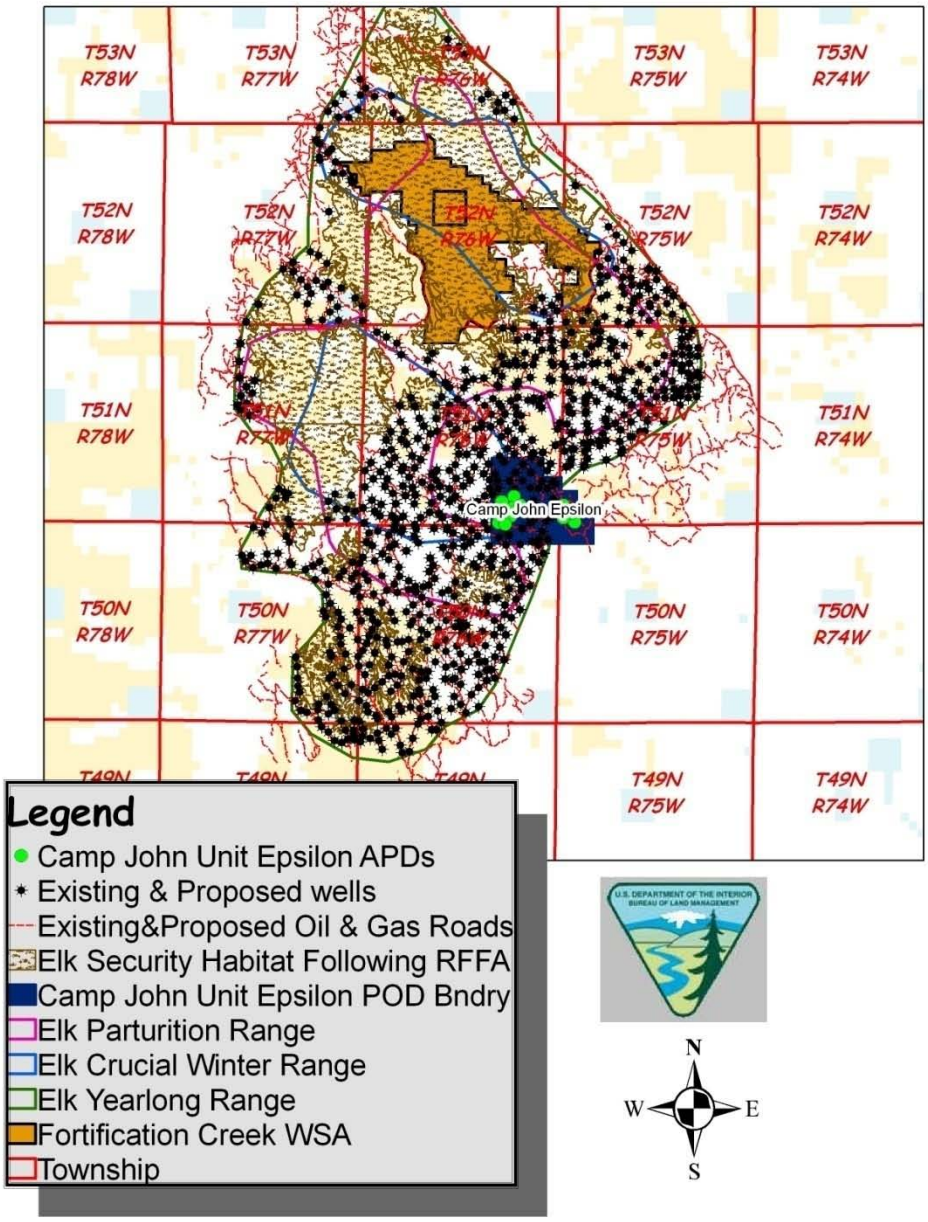
Table 4.3 Loss of Elk Security Habitat Calculated within Identified Elk Ranges over Time

Time Line Beginning Dec. 2008	Elk Range	Acres	Percent Total ESH Lost	Percent Total ESH Remains
Baseline conditions (no development)	All-ESH remaining	64,102	0.0	100.0
	Yearlong	25,138	0.0	100.0
	Parturition & Cr. Winter	21,007	0.0	100.0
	Dual Crucial	17,957	0.0	100.0
Augusta Unit; Non-Fed. Dev. (May 2008) = 4,102 acres lost Augusta Unit Zeta POD (July 2009) = 3,983 acres lost Carr Draw III West POD (Sept. 2009) = 3,932 acres lost Carr Draw V additions II POD (Sept. 2009) = 0 acres lost	All-ESH remaining	52,085	18.7	81.3
	Yearlong	18,901	24.8	75.2
	Parturition & Cr. Winter	18,152	13.6	86.4
	Dual Crucial	15,032	16.3	83.7
Carr Draw IV POD (March 2010) = 1,760 acres lost	All-ESH remaining	50,325	21.5	78.5
	Yearlong	17,372	30.9	69.1
	Parturition & Cr. Winter	17,921	14.7	85.3
	Dual Crucial	15,032	16.3	83.7
Williams Draw Unit Gamma and Delta PODs (May 2010) = 1,075 acres lost	All-ESH remaining	49,250	23.2	76.8
	Yearlong	16,544	34.2	65.8
	Parturition & Cr. Winter	17,674	15.9	84.1
	Dual Crucial	15,032	16.3	83.7
Kinney Divide Unit Gamma (Sept. 2010) = 639 acres lost	All-ESH remaining	48,611	24.2	75.8
	Yearlong	16,544	34.2	65.8
	Parturition & Cr. Winter	17,035	18.9	81.1
	Dual Crucial	15,032	16.3	83.7
Camp John Unit Epsilon POD (Jan. 2010) = 0 acres lost	All-ESH remaining	48,611	24.2	75.8
	Yearlong	16,544	34.2	65.8
	Parturition & Cr. Winter	17,035	18.9	81.1
	Dual Crucial	15,032	16.3	83.7
Reasonably Foreseeable Future Development	All-ESH remaining	44,484	30.6	73.3

Ranching, hunting, and various other recreational activities are expected to occur within the CIAA as identified in the PRB FEIS and 1985 RMP (BLM 1985) but it uncertain at this time how these will be

affected. Large expanses of yearlong range containing security habitat without any oil and gas development will remain following the foreseeable development (Figure 4.6) but development plans are ongoing for all leased parcels.

Figure 4.6 Elk Security Habitat Remaining Post RFFD

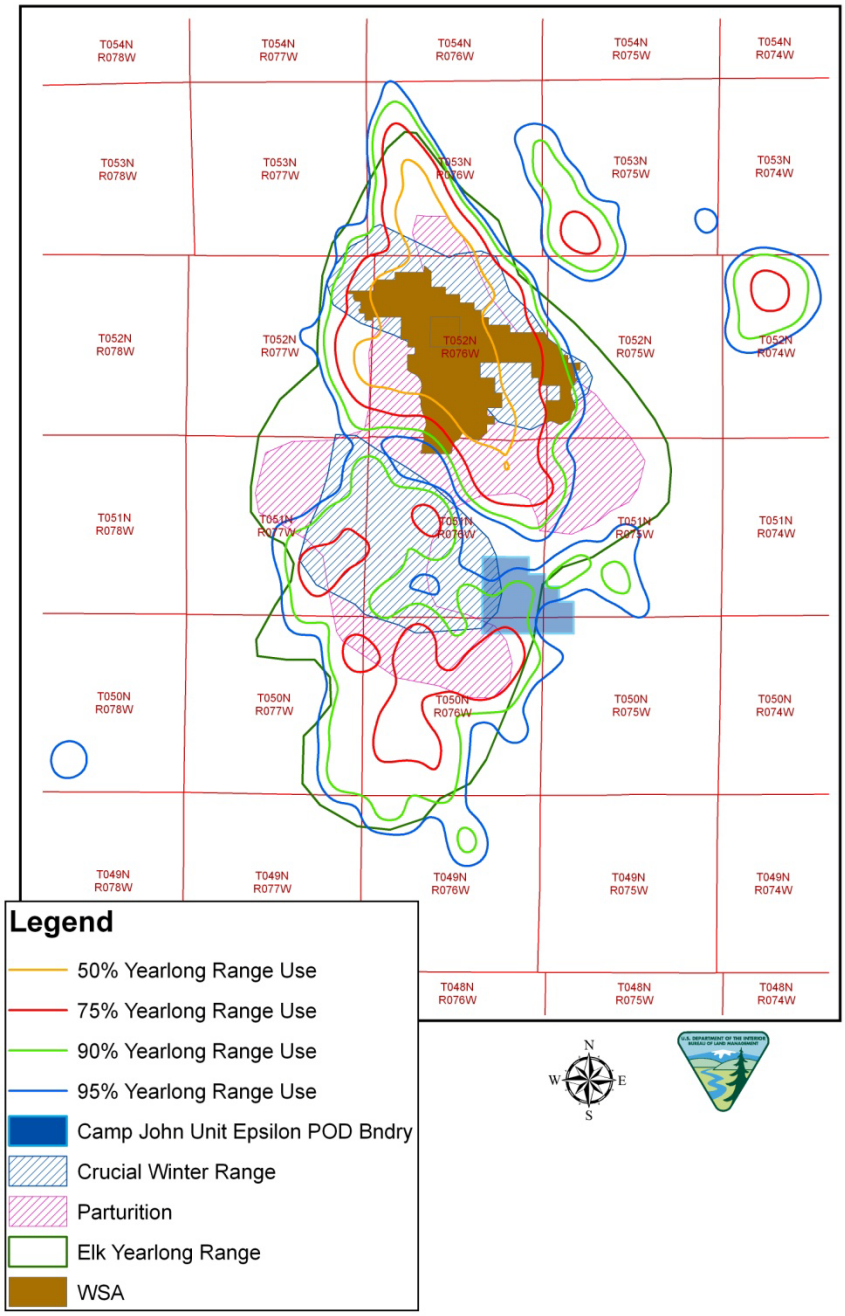


Pattern of Habitat Use

Continued use of radio-telemetry and GPS collaring data will show changes to the pattern of elk use arising from oil and gas development, natural causes, and from other land uses within the Fortification Creek elk herd yearlong range. Projected loss of habitat and connectivity will affect past patterns of use; however, due to the projected amounts of remaining security habitat and the imposed TLS, it is anticipated that the elk usage patterns will decrease initially in areas of development and then gradually return to 50 percent or less of pre-disturbance levels after the facilities are constructed (Figure 4.7). Since

big game are anticipated to avoid areas frequented by human activity during the production phase of the CBNG development; the level of human activity will determine the level of elk return.

Figure 4.7 Fortification Creek Elk Yearlong Range Use



As more information is gathered about the foreseeable future CBNG development (new APDs not received to date or permits relinquished etc), it is likely the foreseeable future development could change. Future site-specific analysis will be updated as additional data is collected with the continued use of radio-telemetry and GPS collaring data. Current radio-telemetry data is summarized in Figures 4.7

through 4.9. Figure 4.7 represents yearlong use, Figure 4.8 represents winter use, and Figure 4.9 represents parturition use as captured from the radio-telemetry and GPS collaring data.

Figure 4.8 Fortification Creek Elk Crucial Winter Range Use

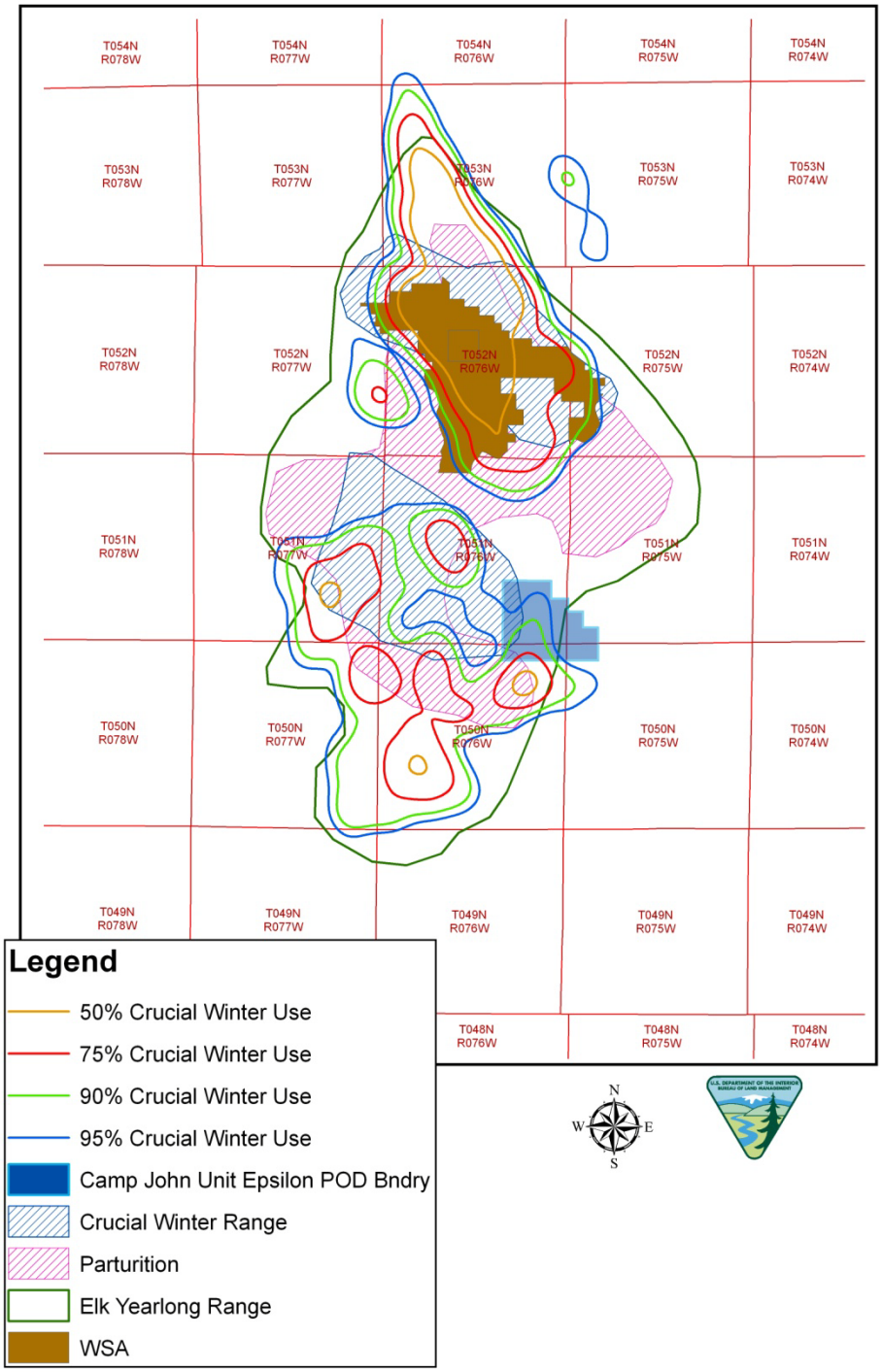
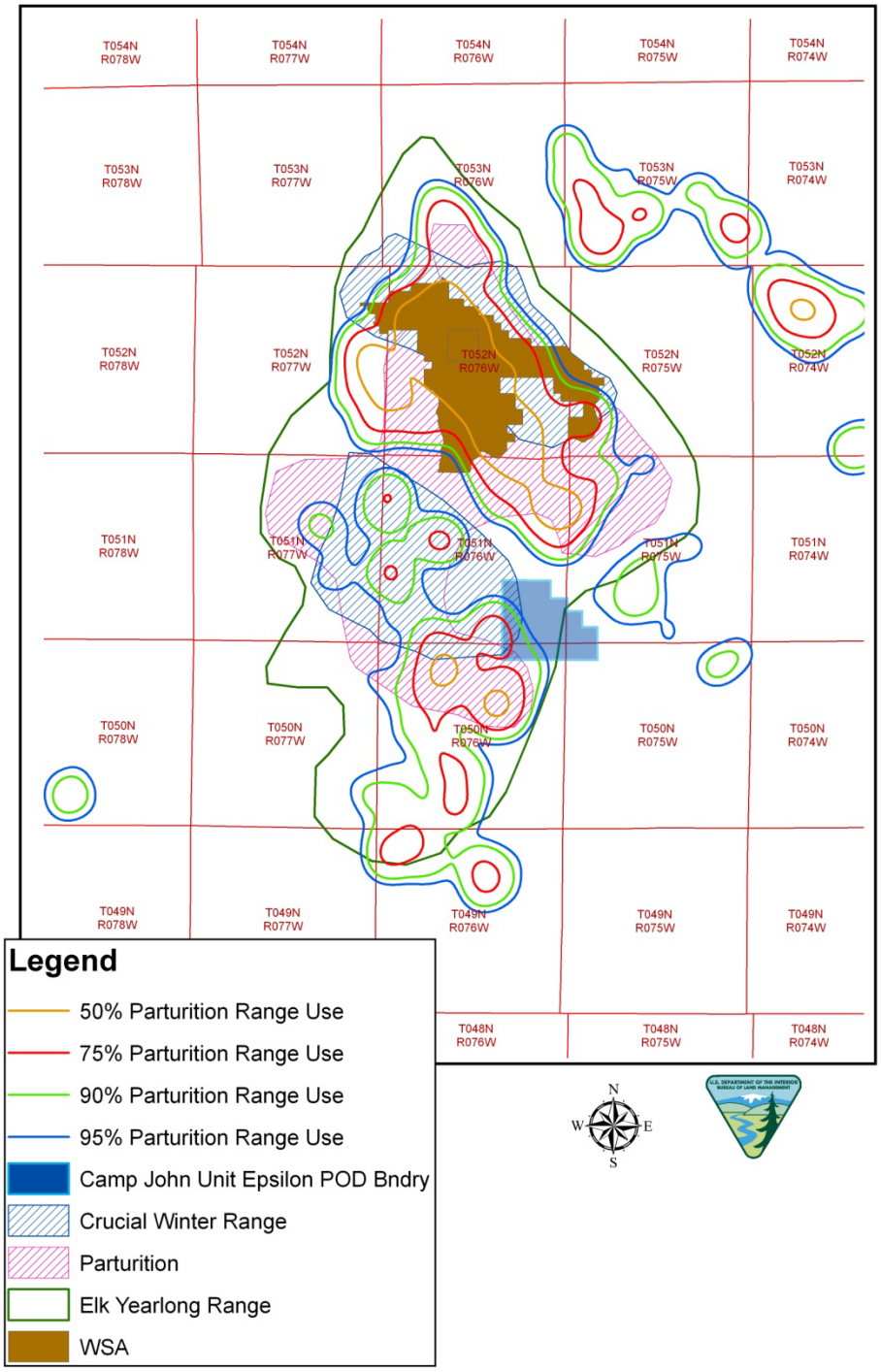


Figure 4.9 Fortification Creek Elk Parturition Range Use



Population Objectives

The effects of the proposed project on elk populations are difficult to predict because of the many unknown factors associated with each of the potential effects and the potential for a synergistic or countervailing relationship among the individual effects. Because determining the reaction of elk in the Fortification Creek area is difficult, it may be more appropriate to frame the potential cumulative effects of CBNG development to this species in terms of a likelihood, or probability. In September 2007, the

BFO issued the Environmental Report: Coalbed Natural Gas Effects on the Fortification Creek Area Elk Herd to identify potential impacts to the elk and their habitats (BLM 2007). This report identified three scenarios: mass abandonment of the entire Fortification Creek area (least probable), complete habituation of CBNG activities (possible, but unlikely), and reduced herd residing in Fortification Creek (most probable).

Because of the affinity of elk for the Fortification Creek area and their wary nature, the most probable scenario for elk response to the proposed CBNG development is for the herd to seek out security patches within the Fortification Creek herd unit and attempt to avoid the CBNG activities during project construction. During the peak of proposed development, road and facility construction, and human activity on most ridges and some drainages in the CJU Epsilon project area, the elk population is expected to be stressed and impacted almost continuously during project construction.

While some habituation may occur over time, a reduction in the elk population through displacement should be expected. This displacement is usually temporary in nature, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000). In forested environments, elk have returned at 50 percent or less of the previous levels (Hayden-Wing Associates 1990). Elk may also shift their centers of distribution to the least impacted sites, such as the WSA. This trend is supported by data collected on collared elk within the Fortification Creek herd unit and the response to ongoing non-federal CBNG development. When monitoring the impacts of development on the elk population, it would be a concern if:

- The current population trend, about 3 percent population decrease per year, were to precipitously decline (i.e., rapid rate increase);
- The overall total herd population were to drop below an estimated 120 animals (about 52 percent of the current population);
- The rate of elk ventures outside the Fortification Creek area were to drastically increase above 15 percent of the herd;
- The nature (i.e., longevity) of elk ventures outside the Fortification Creek area were to shift from mostly seasonal to mostly permanent; or
- Degradation of security/effective habitat occurs due to elk concentrating within the remaining available habitat.

A factor to consider is when populations are reduced to near viability threshold levels, their small size can also be an impact. Small elk populations are subject to genetic inbreeding, and stochastic events such as fires, severe winter, disease, and drought, and are therefore intrinsically more vulnerable to extirpation (Gilpin 1986). Populations that are isolated, like the Fortification Creek elk herd, are more sensitive to these internal (genetic) and external (stochastic) elements. In isolated populations, with a closed gene pool with no gene immigration, deleterious genes can become more prevalent through time. While gene pool isolation may be a possibility in the Fortification Creek elk herd, currently there is enough interbreeding and genetic interchange with surrounding elk herds that this occurrence is a low likelihood (Jahnke 2006). Stochastic events 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 (BLM 2006).

There would be some additional mortality due to vehicular collisions and poaching (Jahnke 2006), as demonstrated in other parts of the Powder River Basin (BLM 2006).

Through on-going research with BLM's partners (WGFD and University of Wyoming); the impacts of development on the Fortification elk population will continue to be monitored. Response of elk to

development will be evaluated and BLM will coordinate with WGFD to identify objectives for future management decisions.

Due to the anticipated loss of habitat effectiveness within and adjacent to the project area, the population is likely to be effected negatively by the proposed project.

4.2.3.6.3. Mitigation

In a letter dated August 31, 2009, WGFD commented to the BLM: "Efforts should be made to decrease disturbance on crucial winter and parturition ranges by implementing seasonal stipulations and/or limiting visits. Design of the gas field should be to avoid or reduce miles of roads and numbers of well pad sites within existing security habitat areas and/or remove unneeded roads to create security patches" (WGFD 2009b).

No surface-disturbing activity shall occur within identified elk calving range from May 1 to June 30. No timing limitation stipulations for drilling, construction and associated activities will be applied to protect elk during critical winter as there are no project elements of the project area within the identified range that fall under the federal action. It is anticipated that elk will avoid those areas frequented by human disturbance during the production phase of the CBNG development since well monitoring and maintenance is not restricted by the timing limitation stipulation.

BLM's goal is to minimize impacts to wildlife and their habitat. Through management decisions we become more conscious of the mechanisms driving shifts in wildlife behavior and habitat selection, and further understand the resulting effects of these behavioral shifts on fitness. Consequently, to properly mitigate the impacts of energy development on wildlife we must accrue knowledge of direct and indirect disturbances associated with energy development. These understandings will assist in creating more efficient conservation and management plans while still meeting energy demands. Beginning June 2009, the BLM in conjunction with the University of Wyoming initiated a study to identify levels of direct and indirect disturbances that influence habitat selection by elk in the Fortification Creek Area. These findings will be documented in quarterly reports and along with the monthly work reports will facilitate adaptive management to minimize direct and indirect impacts on elk habitat selection. This study is ongoing and funded to 2011 with a current cooperative agreement underway to secure funding to 2014.

Measures to minimize or mitigate impacts to elk, including site-specific COAs include:

1. No surface-disturbing activity shall occur within identified elk crucial winter range from November 15 to April 30. This timing limitation will affect the following

Township/Range	Section	Wells and Infrastructure
T51N/R76W	35	Well location(s): 22-35-5176BG, 22-35-5176WA, 32-35-5176BG, 32-35-5176WA, 14-35-5176BG, 14-35-5176WA, 24-35-5176BG, and 24-35-5176WA. All access roads and associated utility corridor within the SWNE, NENW, SWSW, and SESW

4.2.3.6.4. Residual Effects

It is anticipated that big game would be displaced from these areas during the construction and drilling phase and continue to avoid those areas frequented by human activity (well monitoring and associated maintenance) during the production phase of the CBNG development. The effectiveness of the timing limitation stipulations is greatly reduce as they do not apply to maintenance and monitoring activities nor do they apply to the non-federal wells located within the crucial ranges.

4.2.3.7. Upland Game Birds, including Plains Sharp-tailed Grouse

4.2.3.7.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, and cumulative effects, to plains sharp-tailed grouse, pages 4-221 to 4-226. The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS.

Sharp-tailed grouse are expected to be impacted by the proposed project because suitable habitat exists throughout the project area and has potential to support them. There would be no direct or indirect impacts to sharp-tailed grouse lek sites within the project area (See Section 3.3.5 of this document). Construction and maintenance activities associated with development of the CJU Epsilon PODs would be likely to cause a direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also would influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998; Gelbard and Belnap 2003).

4.2.3.7.2. Cumulative Effects

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

4.2.3.7.3. Mitigation Measures

Measures to minimize or mitigate impacts to plains sharp-tailed grouse, including site-specific COAs include:

1. No surface-disturbing activities are permitted from March 1 to June 15. This condition will be implemented on an annual basis for the life of the project. This condition affects the following locations:

Township/Range	Section	Wells and Infrastructure
T51N/R76W	25	All associated utility corridors within the SWSE of this section.
T51N/R76W	36	All access roads and associated utility corridors and 2 power drops within the NENE, SESE and NESE of this section
T51N/R75W	31	Well location(s): 12-31-5175BG; 12-31-5175WA; 23-31-5175BG; 23-31-5175WA; 14-31-5175BG; 14-31-5175WAAll access roads and associated utility corridors and 1 power drop within the NW, NESW, SESW and SWSW of this section.

2. A survey is required for sharp-tailed 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.
3. If an active lek is identified during the survey, the 0.64 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. The required sharp-tailed grouse survey will be conducted by a biologist following WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface-disturbing activities.

4. Creation of raptor hunting perches will be avoided within 0.64 miles of documented sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on grouse.

4.2.3.7.4. Residual Impacts

The effectiveness of the mitigation measures are limited because the timing limitation stipulations (TLS) do not apply to well monitoring and maintenance while the wells are in the production phase. Impacts would span the life of the wells which is anticipated to be 10 years or more. Furthermore, the TLS fails to mitigate for impacts to sharp-tailed grouse nesting and brood rearing habitat beyond 0.64 mile of leks.

4.2.3.8. Aquatic Species

4.2.3.8.1. Direct and Indirect Effects

The PRB FEIS discusses impacts, including direct and indirect effects, to aquatic species, pages 4-235 to 4-247.

4.2.3.8.2. Cumulative Effects

The PRB FEIS discusses impacts, including cumulative effects, to aquatic species, pages 4-235 to 4-247. The cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pages 4-235 to 4-247.

4.2.3.8.3. Mitigation Measures

No additional mitigation measures are required.

4.2.3.8.4. Residual Effects

No residual effects are anticipated.

4.2.3.9. Migratory Birds

4.2.3.9.1. Direct and Indirect Effects

Direct and indirect effects to migratory birds are discussed in the PRB FEIS. pages 4-231 to 4-235. Disturbance of habitat within the project area is likely to impact migratory birds. Native habitats would be lost directly with the construction of wells, roads, and pipelines. Reclamation and other activities that occur in the spring may be detrimental to migratory bird survival. Prompt revegetation of short-term disturbance areas should reduce habitat loss impacts. Activities would likely displace migratory birds farther than the immediate area of physical disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003a).

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

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

habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity, and nests may be destroyed by equipment.

4.2.3.9.2. Cumulative Effects

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

4.2.3.9.3. Mitigation Measures

Migratory bird species within the project area nest in the spring and early summer and are vulnerable to the same effects as sage-grouse and raptor species. Though no timing restrictions typically are applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds also will receive protection. These mitigation measures are addressed in the COAs. Migratory birds also will be afforded additional protection from measures listed in the PRB FEIS under the BLM's MBTA MOU with the USFWS.

4.2.3.9.4. Residual Effects

Those species and individuals that are still nesting when the sage-grouse timing limitations are over (June 15) may have nests destroyed or disturbed by construction activities. Sage-grouse timing limitations would apply to the entire project. Protections around active raptor nests (February 1 to July 31) extend past most migratory bird nesting seasons. Only a percentage of known nests are active any given year, so the protections for migratory birds from June 15 to July 31 will depend on how many raptor nests are active.

4.2.3.10. Raptors

4.2.3.10.1. Direct and Indirect Effects

Direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS, pages 4-216 to 4-221. No direct impacts to raptor nests are anticipated from the Project. However, indirect impacts may occur as a result of Project activities. Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 mile of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to overheating or chilling of eggs or chicks and can result in egg or chick mortality. Prolonged disturbance also can lead to the abandonment of the nest by the adults. Routine human activities near these nests also can draw increased predator activity to the area and resulting in increased nest predation.

To reduce the risk of decreased productivity or nest failure, the BFO requires a 0.5-mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation be located in such a way as to provide adequate biologic buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities. A list of documented raptor nests within 0.5 mile of project components is shown in Table 4.4.

Table 4.4 Proposed Project Infrastructure within 0.5 mile of Documented Raptor Nests

BLM Raptor Nest ID	Infrastructure
2663	1 compressor station; 0.72 mile of utility corridors
3704	2 power drops; 0.29 mile of roads/utility corridors
5883	2 wells; 2 power drops; 0.38 mile of roads/utility corridors

Table 4.4 Proposed Project Infrastructure within 0.5 mile of Documented Raptor Nests

BLM Raptor Nest ID	Infrastructure
6442	2 wells; 2 power drops; 0.38 mile of roads/utility corridors
6443	2 wells; 2 power drops; 0.36 mile of roads/utility corridors
12111	2 wells; 2 power drops; 0.37 mile of roads/utility corridors
12113	1 power drop
12117	2 power drops; 0.35 mile of roads/utility corridors
12118	2 power drops; 0.23 mile of roads/utility corridors

Source: BLM 2010b.

4.2.3.10.2. Cumulative Effects

The cumulative effects associated with Alternatives B are within the analysis parameters and impacts described in the PRB FEIS, page 4-221.

4.2.3.10.3. Mitigation Measures

Measures intended to avoid, minimize, and mitigate impacts to raptors are outlined in Appendix B of this document, including operator committed measures and site-specific COAs. For example, to reduce the risk of adverse impacts to nesting raptors, no surface-disturbing activity will occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey. Surveys shall be conducted by a biologist following the most current BLM protocol. All survey results must be submitted in writing to the BFO and approved prior to initiation of surface-disturbing activities. A 0.5-mile timing restriction will be applied if a nest is identified as active. Additionally, the following resource and site-specific BLM COAs will be implemented:

The following conditions will alleviate impacts to raptors:

1. No surface-disturbing activity shall occur within 0.5 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	Section	Wells and Infrastructure
T51N/R76W	25	All access road and associated utility corridor within the NW, NESW, NWSE, and SWSE of this section.
T51N/R76W	36	All access roads and associated utility corridors and 1 power drop within the SESE and NESE of this section
T51N/R75W	31	Well location(s): 14-31-5175BG and 14-31-5175WA All access road and associated utility corridor within the NWSW and SWSW of this section.

2. 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 0.5 mile timing buffer will be implemented. The timing buffer restricts surface-disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.
3. Nest occupancy checks shall be completed for nests within a 0.5 mile of any surface-disturbing activities across the entire POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy checks shall continue for the first five years on all nests

that are within a 0.5 mile of locations where any surface-disturbing activities took place. The nests that are checked each year is subject to change, pending surveys.

4.2.3.10.4. Residual Impacts

There would be an increase in traffic, construction activity, and human presence in the area throughout the life of the project that would affect the quality of the area for nesting raptors. Timing limitations during the construction phase of the project would protect nests from disturbance, but there would be activities during well operation that may discourage raptors from using the nest locations.

4.2.4. Water Resources

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

4.2.4.1. Produced Water Quality, Control, and Quantity

The maximum water production is predicted to be 20 gallons per minute (gpm) per well. For the 21 wells proposed under this POD, the total maximum water production is 420 gpm (0.94 cfs or 678 acre-feet per year). The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (PRB FEIS, Table 2-8, page 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was approximately 60,319 acre-feet in 2010 (maximum production is estimated to be 171,423 acre-feet in 2006). As such, the volume of water resulting from the production of these wells is 1.1 percent of the total volume projected for 2010. This volume of produced water is within the predicted parameters of the PRB FEIS.

No on-site surface discharge is proposed for the CJU Epsilon CBNG POD. Therefore, no infiltration near surface discharge points or impoundments would occur. Saturation of near-surface alluvium by production water would not occur, and groundwater quality issues related to produced-water recharge in underlying aquifers of the Wasatch and Fort Union formations would be avoided. It should be noted, however, that the reinjection option would require installation of additional components to be feasible. A pipeline would need to be constructed from the Project area to the County Line Pump Station, which would be constructed and installed under a separate permitting process.

Based on representative data provided in the WMP, the water quality of produced water for this POD is projected to range from approximately 1,060 to 1,560 mg/l TDS, pH of 7.52 to 7.61, SAR of 22.2 to 27.4, and EC of 1,640 to 2,450 µS/cm (Lance 2010). Additional water quality data are presented in the WMP and are incorporated by reference.

The preferred water management option would consist of treating the produced water by an EMIT Water Discharge Technology, LLC Higgins Loop continuous countercurrent ion exchange (CCIX) system at the Barber Creek Treatment Facility. Through this treatment, direct discharge of water to Barber Creek would fall under existing Wyoming Pollutant Discharge Elimination System (WYPDES) discharge permits listed in Table 4.5.

Table 4.5 Proposed Discharge Site Information for the Camp John Unit Epsilon POD

Discharge Site	Location						Associated Facility	Maximum Estimated Flow[1] (gpm)
	Qtr/Qtr	Section	Township	Range	Latitude	Longitude		
WY0056081-014	SWSW	4	50	77	44.330356	-106.138412	Barber Creek[2]	400
WY0056081-013	SWSW	4	50	77	44.330936	-106.137268		
WY0056081-012	NESE	8	50	77	44.321923	-106.142195		
WY0052175-014	SWNE	9	50	77	44.324828	-106.130675		
Total Maximum Discharge from Proposed Development (acre-feet/year)								678

[1] The maximum estimated flow for each outfall only accounts for produced water from the CJU Epsilon POD.

[2] All outfalls associated with the Barber Creek treatment facility are existing and approved.

The water quality of the discharged water was estimated in the Water Management Plan through typical effluent values of samples taken from this type of treatment system. Those estimates indicate the discharges would comply with the above WYPDES permits. The treatment process would create concentrated waste brine that would be managed through evaporation in lined pits, off-site hauling to commercial injection sites, or dilution to stock water standards and discharged to total containment reservoirs.

Table 4.6 shows the average values of EC and SAR as measured at selected USGS gauging stations at high and low monthly flows as well as the Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water (there is no current standard for EC). It also shows constituent limits for EC detailed in the project area WYPDES permit, and the concentrations of TDS, SAR and EC found in the POD's representative water sample.

Table 4.6 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Sample Location or Standard	TDS mg/l	SAR	EC µS/cm
Powder River at Arvada WY (USGS 06317000)[1]	n/a		
Historic Data Average at Maximum Flow		4.76	1,797
Historic Data Average at Minimum Flow		7.83	4,800
WDEQ Quality Standards for Wyoming Groundwater for an individual UIC permit based on water use classes in receiving formation[2]		8	n/a
Drinking Water (Class I)	500		
Agricultural Use (Class II)	2,000		
Livestock Use (Class III)	5,000		
Industrial Class IV (A)	10,000		
Industrial Class IV (B)	>10,000		
WDEQ Water Quality Requirement for WYPDES Permit Nos. WY0052175 and WY0056081	n/a	n/a	
At discharge point			7,500
Predicted Produced Water Quality			
Big George Coal Zone	1,560	27.4	2,450

Table 4.6 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Sample Location or Standard	TDS mg/l	SAR	EC µS/cm
Wall Coal Zone	1,060	22.2	1,640
Predicted CCIX Treated Water Quality Treated Big George Water	791	18.8	1,320

[1] BLM 2003a.
[2] WDEQ 2005.

The quality for the water produced from both the Big George and Wall target coal zones from these wells is predicted to be similar to the sample water quality collected from a location near the POD (Table 4.6). A maximum of 20 gpm is projected to be produced from each of the 21 wells, for a total of 420 gpm for the POD.

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 committed to designate a reference well to each coal zone within the POD boundary. The reference well would be sampled at the wellhead for analysis within sixty days of initial production. A copy of the water analysis would be submitted to the BLM Authorized Officer. Refer to the WMP filed with the POD for more information. The administrative record is available for review at the BFO.

The operator proposes using two existing WYPDES permits (WY0052175 and WY0056081) for the discharge of water produced from this project from the WDEQ. Those permits' maximum effluent limits are described in Table 4.7.

Table 4.7 Applicable WYPDES Permit Effluent Limits

Effluent Characteristic	Daily Maximum Outfall	
	WY0052175	WY0056081
pH	6.5 to 9.0	6.5 to 9.0
Specific Conductance (µS/cm)	7,500	7,500
Sulfates (mg/l)	3,000	3,000
Radium 226 (pCi/l)	5	n/a
Radium 226 + 228 (pCi/l)	n/a	1
Dissolved Iron (µg/l)	1,000	300
Dissolved Copper (µg/l)	n/a	6
Total Barium (µg/l)	1,800	1,800
Total Arsenic (µg/l)	8.4	8.4
Chlorides (mg/l)	150	150

Source: WYPDES Permits WY0052175 and WY0056081.

Limits on TDS and dissolved sodium are based on the capacity of the Powder River to assimilate concentrations below existing standards. A portion of assimilative capacity is assigned to each discharge permit on a monthly basis, which determines monthly outfall load limits. Permit WY0052175 monthly outfall load limits range from over 5,500,000 lbs TDS and 720,000 lbs dissolved sodium in May and June to 0 lbs TDS and dissolved sodium in August and September. Permit WY0056081 monthly outfall load limits range from over 17,000,000 lbs TDS and 2,200,000 lbs dissolved sodium in May and June to 0 lbs

TDS and dissolved sodium in August and September. No direct, indirect, cumulative, or residual impacts beyond those permitted are anticipated from surface discharge of CBNG-produced water.

The alternate water management option would consist of reinjecting produced water without any treatment. CBNG produced water from the project would be reinjected under Lance's existing WDEQ Underground Injection Control (UIC) Permit, UIC 05-231, using an existing wellfield approximately 65 miles south-southwest of the project area.

In the PRB, the Madison Formation typically is isolated from the commonly used water-bearing zones of the Wasatch or Fort Union formations by two regional confining units (Whitehead 1996). These confining units typically consist of Upper Cretaceous-aged shales, chalk, and bentonite from the Lewis Shale downward to the Mowry Shale, and older rocks of Jurassic to Pennsylvanian age consisting of interbedded shales, limestones, and sandstones of the Morrison Formation and older rocks (Whitehead 1996). No direct, indirect, cumulative, or residual impacts to Wasatch or Fort Union aquifers are anticipated from the proposed reinjection of CBNG produced water.

4.2.4.1. Groundwater

4.2.4.1.1. Direct and Indirect Effects

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources will 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 (non-CBNG) produce from depths which range from 16 to 460 feet (with one well reaching 1,376 feet) compared to approximately 1,700 to 1,900 feet to the Big George Coal Zone and 2,300 to 2,500 to the Wall Coal Zone. The operator committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (0.5 mile of a federal CBNG producing well) of the proposed wells.

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

4.2.4.1.2. Cumulative Effects

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

Development of CBNG through 2018 (and coal mining through 2033) will 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 PRB FEIS Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining will 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)." (Table 3-5, PRB FEIS, page 4-65.)

4.2.4.1.3. Mitigation Measures

Adherence to the drilling COAs (Appendix B of this document), the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures should protect any fresh water aquifers above the target coal zone. This will ensure that groundwater will not be adversely impacted by well drilling and completion operations.

4.2.4.1.4. Residual Effects

As described in Section 3.4.1 of this document, the production of CBNG in this project area has already removed some of the water saturation in the coal zones for the production of gas. This POD is anticipated to generally remain within the potential drawdown predicted in the PRB FEIS.

4.2.4.2. Surface Water

4.2.4.2.1. Direct and Indirect Effects

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, page 4-69). The water quality projected for this POD has a maximum predicted TDS of l,560 mg/l, which is within the WDEQ criteria for agricultural use (2,000 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 WYPDES permits also address existing downstream concerns, such as irrigation use, in the COA's for the permit. Neither of these permits requires compliance with downstream irrigation standards due to the lack of irrigation prior to the time of permitting. Only end-of-pipe sampling is required under WY0052175, and tributary upstream and downstream sampling is required under WY0056081.

Storm Water Controls

A WYPDES permit for construction activities would address potential surface water impacts from storm water runoff. The potential for in-channel impacts, and proposed measures to avoid or mitigate them including compliance with USACE Nationwide Permits 3, 12, and 14, are addressed in the WMP for the CJU Epsilon CBNG POD prepared by WWC Engineering, Inc. of Sheridan, Wyoming, for Lance. Lance proposes to install six culverts and utilize multiple existing culverts (Lance 2010). The WMP identifies the locations and peak discharge capacities of only one culvert draining areas of 5 acres or more. Additional relief and minor culverts serving smaller drainage areas also could be placed. All culverts would be designed and installed in accordance with BLM guidelines. Based on the project proposal, including the WMP and operator-committed mitigation measures, negligible impacts to stream channels or banks would result from road crossings.

4.2.4.2.2. Cumulative Effects

The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the WOGCC.

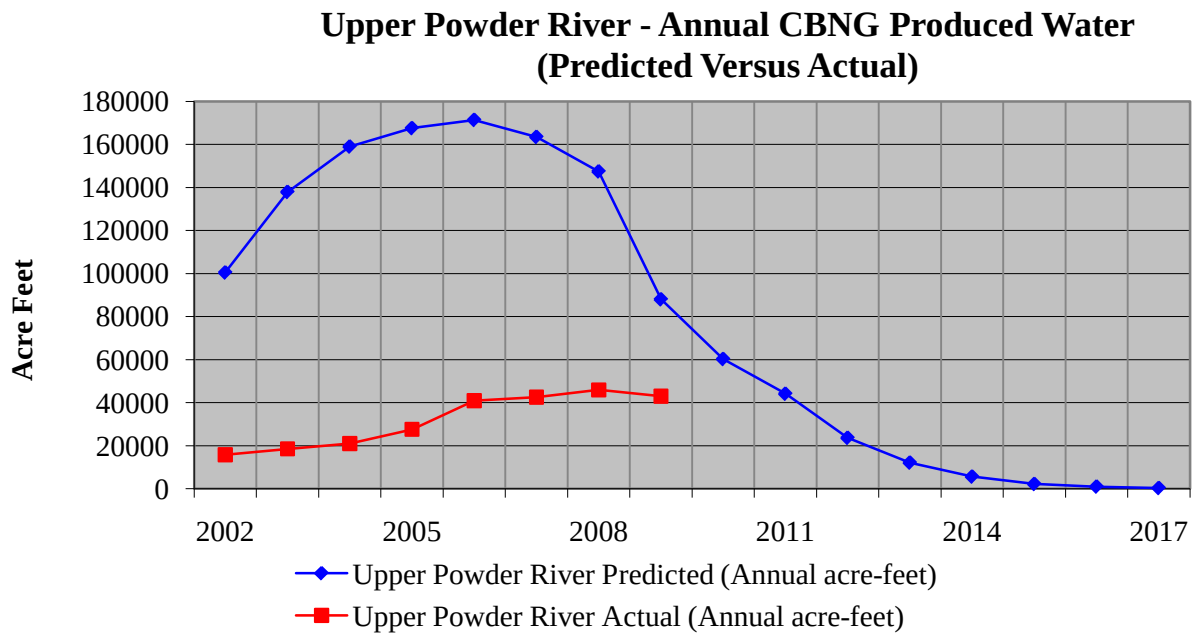
As of December 2009, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 255,531 acre-feet of water compared to the predicted 1,135,567 acre-feet disclosed in the PRB FEIS (Table 2-8, page 2-26). These figures are presented graphically in Figure 4.2 and numerically in Table 4.8. This volume is 22.5 percent of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.8 CBNG Produced Water Comparisons

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)[1]	Percent of Predicted	Upper Powder River Actual (Cumulative acre-feet from 2002)	Percent of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,602	26.1	166,586	18.5
2008	147,481	1,047,521	45,936	31.1	212,522	20.3
2009	88,046	1,135,567	43,009	48.8	255,531	22.5
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**		**255,531**			

[1] WOGCC 2010.

Figure 4.10 Annual CBNG Water Production Comparisons



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

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 22.5 percent 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 existing water quality.
3. The commitment by the operator to manage the volume of water discharged.

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

4.2.4.2.3. Mitigation Measures

Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM. Channel crossings by pipelines will be constructed so that the pipe is buried at least 4 feet below the channel bottom.

The operator has committed to monitor water quality at the off-site water discharge points per the requirements of the applicable WYPDES permits (WMP page 21).

The operator has also committed to monitor erosion stabilization measures for stability (WMP page 21). If erosion is noted, the operator will be required to repair and stabilize the area using selected mitigation techniques.

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

4.2.4.2.4. Residual Effects

Produced water discharge to Barber Creek and the Powder River have the following potential impacts, as discussed in the PRB FEIS, page 4-118; "[s]treams enhanced by large volumes of CBM produced water may begin to establish meander patterns on longer wavelengths in response to increased flows. Stream drainages would readjust to their existing natural flows at the end of the project's life. Downcutting (stream erosion) and sediment deposition (aggradation) are natural processes that occur as stream drainages age through time. Downcutting occurs within the upper reaches of a drainage system as the stream channel becomes incised through erosion, until the slope of the stream and its velocity are reduced and further erosion is limited. Sediment is deposited within the lower, slower reaches of a stream.

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

These potential impacts would be regulated through existing discharge permits for the Barber Creek Facility.

4.2.5. Economics and Recovery of CBNG Resources

Based on the estimates in the BLM's 2009 reasonably foreseeable development scenario, the drilling of the 21 proposed wells at 12 locations in the POD could generate approximately 0.23 billion cubic feet of gas per well, over the life of the wells. Actual revenue from this amount of gas is difficult to predict and borders on informed speculation (similar to the case with well production), as there are changing variables contributing to the price of gas. Royalties from the gas produced in the CJU Epsilon POD may have several benefits. The federal government collects 12.5 percent of the royalties from all federal wells, which helps offset the costs of maintaining the federal agencies that oversee permitting. In addition to generating federal income, approximately 49 percent of the royalties from the CJU Epsilon POD wells would return to the State of Wyoming. This revenue from mineral development contributes to Wyoming's economy, and allows for improvements in state funded programs such as infrastructure and education. The development of the CJU Epsilon POD also would provide local revenue by employing workers in the area to build the roads and project infrastructure, drill the wells, and maintain and monitor the project area. This individuals employed on the CJU Epsilon POD also may result in an increase in demand for goods and services from nearby communities, primarily those of Buffalo and Gillette, Wyoming.

Due to the size and scope of the project as well as the volatility of the natural gas market shown in Table 3.22, it is not anticipated that the project would have a positive or negative effect on the price of natural gas. Cumulative effects associated with Alternative B are within the analysis parameters and impacts described in the PRB FEIS, p. 4-336. No mitigation is warranted and no residual effects are anticipated.

4.2.6. Cultural Resources

4.2.6.1. Direct and Indirect Effects

No historic properties would be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the BLM electronically notified the Wyoming State Historic Preservation Officer (SHPO) on October 29, 2010, that no historic properties exist within the area of potential effect. If any cultural values (sites, artifacts, human remains [Appendix L of the 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 PRB FEIS Standard COA (General)(A)(1).

4.2.6.2. Cumulative Effects

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

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

4.2.6.3. Mitigation Measures

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

4.2.6.3.1. Archaeological Monitoring

When a project is constructed in an area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Construction monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted and the BLM consults with the State Historic Preservation Office on mitigation or avoidance. Due to the presence of alluvial deposits identified by the NRCS soil survey (NRCS 2010), and areas of Very High Sensitivity Zones per the PUMP III Model (Eckerle 2005), the operator will be required to have an archeologist monitor all earth-moving activities associated with certain construction, as described in the site-specific COAs.

4.2.6.4. Residual Effects

During the construction phase, there would be numerous crews working across the project area using heavy construction equipment without the presence of archaeological monitors. Due to the extent of work

and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

4.2.7 Wilderness

The CJU Epsilon POD area is clearly lacking wilderness characteristics because it includes 56 producing CBNG wells, about 18 miles of mechanically maintained rural roads, 9 miles of overhead powerlines, a water treatment facility, and a compressor station. Because this POD area clearly lacks wilderness characteristics analysis of direct, indirect, cumulative, and residual effects is moot.

4.3. Summary of Effects

Table 4.9 provides a comparison of the cumulative effects associated with the alternatives.

Table 4.9 Environmental Effects for Camp John Unit Epsilon POD by Alternative

Resource/Species	Alternative A	Alternative B
Soils and Vegetation		
Soils	No additional locations with low reclamation potential affected.	One location and roads with low reclamation potential.
Vegetation	No loss of vegetation communities.	Greater loss of vegetation communities.
Wetlands/Riparian Areas	No existing wetlands/riparian areas will be disturbed.	One previously disturbed (man created) wetland will be disturbed.
Wild Lands/Wilderness	Clearly lacks wilderness characteristics	Clearly lacks wilderness characteristics
Wildlife		
Big Game	No habitat loss or fragmentation. Would likely see increased traffic passing through due to surrounding mineral development.	Greater habitat loss.
		Greater habitat fragmentation.
Raptors	No habitat loss.	Greater foraging habitat fragmentation.
	No wells authorized near nests.	
Migratory Birds	No habitat loss.	Greater habitat loss.
	No habitat fragmentation.	Greater habitat fragmentation.
Threatened and Endangered Species		
Bald eagle	No habitat loss.	No further habitat loss.

Table 4.9 Environmental Effects for Camp John Unit Epsilon POD by Alternative

Resource/Species	Alternative A	Alternative B
Sensitive Species		
Greater Sage Grouse	No habitat loss.	Greater habitat loss.
	No decision on overhead electricity. Overhead power could be routed through project area on private surface without BLM discretion increasing predation and collision risk. Grouse may avoid overhead power lines.	No additional predation and collision risk associated with overhead power lines, as any additional power lines associated with the project would be buried.
	No habitat fragmentation. Would likely see increased traffic passing through due to surrounding mineral development.	Greater habitat fragmentation.
Water		
Surface Water	Permitted surface disposal of produced water.	No impacts beyond those permitted.
Groundwater	Groundwater drawdown from existing developments.	Low additional drawdown
Socioeconomic Conditions	No Impact.	No Impact.
West Nile Virus	No Impact.	Minor if any effect on the spread of West Nile Virus.

5. CONSULTATION & COORDINATION

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

Table 5.1 Consultations

Contact	Title	Organization	Dates Present at Field Reviews
Jim Verplancke	Natural Resource Specialist/Wildlife Biologist	BLM	June 9, 2010, September 28, 2010
Keith Anderson	Hydrologist	BLM	June 9, 2010
Ardeth Hahn	Archeologist	BLM	June 10, 2010
Stacy Gunderson	Civil Engineer	BLM	June 9, 2010
Amber Haverlock	Realty Specialist	BLM	June 9, 2010
Arnie Irwin	Soils Specialist	BLM	September 28, 2010
Mary Hopkins	State Historic Preservation Officer	Wyoming State Historic Preservation Office	No

Table 5.1 Consultations

Contact	Title	Organization	Dates Present at Field Reviews
Ethan Jahnke		Lance	June 9, 2010
Joy Kennedy		Lance	June 9, 2010 September 28, 2010
Colt Rodeman		Lance	June 9, 2010
Jack Harbinson		Lance	June 9, 2010
Coleen Faber		Lance	September 28, 2010
Derik Hensley		Lance	September 28, 2010
Dawn Anderson		Representing Lance	June 9, 2010
Brenda Schladweiler		BKS Environmental	September 28, 2010
Liz Hunter		KLJ Engineering	June 9, 2010
Doree Dufresne	Third-party Contractor (Project Manager)	AECOM	June 9, 2010
Jamelle Schlangen	Third-party Contractor (Assistant Project Manager)	AECOM	June 9, 2010
Dan Hengel	Third-party Contractor (Wildlife Biologist)	AECOM	June 9, 2010
Terra Mascarenas	Third-party Contractor (Soil Scientist, Assistant Project Manager)	AECOM	September 28, 2010

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 ROD. Additionally, Lance currently is in possession of two WYPDES permits (WY0052175 and WY0056081) for discharge of water produced from the proposed project.

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8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

Jim Verplancke, Interdisciplinary Team Lead, Natural Resource Specialist and Wildlife Biologist
Casey Freise, Supervisory Natural Resource Specialist
Keith Anderson, Hydrologist
Amber Haverlock, Right-of-Way and Realty Specialist
Deb Childers, Legal Assistant
James Evans, Petroleum Engineer
Stacy Gunderson, Civil Engineer
Sharon Soule, Legal Instruments Examiner
Ardeth Hahn, Archaeologist
Kerry Aggen, Geologist
Arnie Irwin, Soil Scientist
Diane Adams, GIS
Allison Barnes, Recreation Planner
Julianne Alley, Range Specialist
Shirley Green, Administrative Record and Technical Editor
Paul Beels Associate Field Manager, Minerals & Lands
Duane W. Spencer, Field Manager

APPENDIX A: RESOURCE AND SPECIES WORKSHEETS

Table A.1 Affected Resources Worksheet

Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
Air quality	Yes	Yes	Yes	See PRB FEIS 3-291, 3-298, 4-404-4-406, 4-377, 4-386.
Cultural	Yes	Yes	No	Analyze in EA.
Native American religious concerns	No	No	No	Analyze in EA.
Traditional Cultural Properties	No	No	No	Analyze in EA.
Mineral Potential	-	-	-	See PRB FEIS 3-66, 3-70, 3-230, 4-127 through 4-129.
Coal	Yes	No	Yes	See PRB FEIS 3-66.
Fluid Minerals	Yes	Yes	Yes	See PRB FEIS 3-68, 3-69.
Locatable Minerals	Yes	No	Yes	Analyze in EA.
Other leasables	Yes	No	Yes	
Salable minerals	Yes	Yes	Yes	
Paleontology				See PRB FEIS 3-65-66, 4-125-127.
PFYC 3	-	-	-	
PFYC 5	-	-	-	
Rangeland management	Yes	Yes	Yes	
Existing range improvements	NA	NA	NA	Boundary Fences between the Fortification Cr.(Hayden) and Upper Fortification Cr. (Belus Brothers) allotments.
Proposed range improvements	NA	NA	NA	
Realty	No	No	NA	
Recreation	Yes	Yes	Yes	See PRB FEIS 3-263, 3-273, 4-319 -4-328.
Developed site	No	No	NA	See PRB FEIS 3-266, 4-326.
Walk-in-Area (2009 data)	No	No	NA	
Social & Economic	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-275-3-289, 4-336-4-370.
Soils & Vegetation	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-80-3-107, 4-134-4-152, 4-153-4-164, 4-343-4-391, 4-406.
Erosion Hazard	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-82, 4-35.
Poor Reclamation Potential	Yes	Yes	No	Analyze in EA.
Slope hazard	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-81, 4-135.
Forest products	Yes	Yes	Yes	

Table A.1 Affected Resources Worksheet

Resource	Resource Present	Resource Affected	PRB FEIS Sufficient	Notes
Invasive Species	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-103-3-108, 4-153.
Wetlands/Riparian	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-108-3-111, 4-172-4-178, 4-406, 4-395-4-396.
Special Designations	No	NA	NA	
Proposed ACEC	No	NA	NA	
Wild & Scenic River	No	NA	NA	
Wild Lands/Wilderness	No	No	No	USDI Order 3310, BLM 6300-1 & -2
WSA	No	NA	NA	
Visual Resources	Yes	No	Yes	See PRB FEIS 3-252-3-263, 4-302-4-314, 4-403.
Class II	No			
Class III	Yes	Yes	Yes	Class IV bordered by Class III.
Water	Yes			
Floodplains	Yes	Yes	Yes	See PRB FEIS 3-1-3-56, 4-1-4-122, 4-135, 4-393, 4-405; ROD (A32), Vol. 1 (3-108 to 113).
Groundwater	Yes	Yes	No	Analyze in EA.See PRB FEIS 3-1-3-30, 4-1-4-69, 4-392, 4-405; ROD pg 7&8 (App. D), Vol.1 (3-1 to 36).
Surface water	Yes	Yes	No	Analyze in EA. See PRB FEIS 3-36-3-56, 4-69-4-122, 4-393, 4-405; ROD pg 7&8 (App. D) (App. A pg 30 to 310, Vol.1 (3-36 to 56).
Drinking water	Yes	Yes	Yes	PRB ROD pg 7&8 (App. D), Vol. 1 (3-1 to 56).
Wildland Urban Interface	No			
Wildlife	Yes	Yes	No	
ESA listed, proposed, or candidate species	Yes	Yes	No	Analyze in EA. Sage-grouse would be affected by this proposal and would require thorough analysis of effects including cumulative effects.
BLM sensitive species	Yes	Yes	No	Analyze in EA. See attached sensitive species wildlife checklist.
General wildlife	Yes	Yes	No	Analyze in EA. Nesting raptor site-specific effects; Fortification Creek Elk herd habitat and population effects would be analyzed including cumulative effects.
West Nile virus potential	Yes	Yes	Yes	

Table A.2 Threatened, Endangered, Proposed, and Candidate Species Worksheet

Common Name	Habitat	Habitat Present?	Individual Presence	Project Effects	Impacts anticipated beyond the level analyzed within the PRB FEIS?
Endangered					
Black-footed ferret	Black-tailed prairie dog colonies or complexes >1,000 acres	No	NP	NE	4-251 & BA
Blowout penstemon	Sparsely vegetated, shifting sand dunes	No	NP	NE	Not in FEIS; brief EA treatment required
Threatened					
Ute ladies'-tresses orchid	Riparian areas with permanent water	No	NP	NE	4-253 & BA; brief EA treatment required
Proposed					
Candidate					
Greater sage-grouse	Basin-prairie shrub, mountain-foothill shrub	Yes	K	NJ	4-257 to 4-273; required treatment in EA relative to 12-month finding (USFWS) and recent PRB research

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

Effect Determinations

Listed Species
LAA Likely to adversely affect
NE No Effect.
NLAA May Affect, not likely to adversely affect individuals or habitat.

Candidate Species
J Is likely to jeopardize candidate.
NJ Is not likely to jeopardize candidate species.

Table A.3 Sensitive Species Worksheet

Common Name	Habitat	Habitat Present?	Individual Presence	Project Effects	Direct, Indirect, and/or Cumulative Impacts Anticipated Beyond the Level Analyzed within the PRB FEIS?
Amphibians					**4-258**
Northern leopard frog	Beaver ponds and cattail marshes from plains to montane zones.	Yes	S	MIIH	No
Columbia spotted frog	Ponds, sloughs, small streams, and cattails in foothills and montane zones. Confined to headwaters of the S Tongue R drainage and tributaries.	No	NP	NI	No
Fish					**4-259 & 4-260**
Yellowstone cutthroat trout	Cold-water rivers, creeks, beaver ponds, and large lakes in the Upper Tongue sub-watershed	No	NP	NI	No
Birds					**4-260 to 4-264**
Baird's sparrow	Shortgrass prairie and basin-prairie shrubland habitats; plowed and stubble fields; grazed pastures; dry lakebeds; and other sparse, bare, dry ground.	No	NS	MIIH	No
Bald eagle	Mature forest cover often within one mile of large water body with reliable prey source nearby.	Yes	NS	MIIH	No 4-251 to 4-253 & BA
Brewer's sparrow	Sagebrush shrubland	Yes	NS	MIIH	No

Table A.3 Sensitive Species Worksheet

Common Name	Habitat	Habitat Present?	Individual Presence	Project Effects	Direct, Indirect, and/or Cumulative Impacts Anticipated Beyond the Level Analyzed within the PRB FEIS?
Ferruginous hawk	Basin-prairie shrub, grasslands, rock outcrops	Yes	NS	MIIH	No
Loggerhead shrike	Basin-prairie shrub, mountain-foothill shrub	Yes	NS	MIIH	No
Long-billed curlew	Grasslands, plains, foothills, wet meadows	Yes	NS	MIIH	No
Mountain plover	Short-grass prairie with slopes < 5 percent	Yes	NS	MIIH	4-254, 4-255 & BA; EA treatment required
Northern goshawk	Conifer and deciduous forests	Yes	NS	MIIH	No
Peregrine falcon	Cliffs	Yes	NS	MIIH	No
Sage sparrow	Basin-prairie shrub, mountain-foothill shrub	Yes	NS	MIIH	No
Sage thrasher	Basin-prairie shrub, mountain-foothill shrub	Yes	NS	MIIH	EA treatment required
Trumpeter swan	Lakes, ponds, rivers	No	NP	NI	No
Western Burrowing owl	Grasslands, basin-prairie shrub	Yes	NS	MIIH	No
White-faced ibis	Marshes, wet meadows	No	NP	NI	No
Yellow-billed cuckoo	Open woodlands, streamside willow and alder groves	No	NP	NI	No
Mammals					**4-264 &4-265**
Black-tailed prairie dog	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	Yes	K	MIIH	4-255, 4-256; EA treatment required

Table A.3 Sensitive Species Worksheet

Common Name	Habitat	Habitat Present?	Individual Presence	Project Effects	Direct, Indirect, and/or Cumulative Impacts Anticipated Beyond the Level Analyzed within the PRB FEIS?
Fringed myotis	Conifer forests, woodland chaparral, caves and mines	Yes	NS	MIIH	No
Long-eared myotis	Conifer and deciduous forest, caves and mines	Yes	NS	MIIH	No
Spotted bat	Cliffs over perennial water.	No	NP	NI	No
Swift fox	Grasslands	No	NP	NI	No
Townsend's big-eared bat	Caves and mines.	No	NP	NI	No
Plants					**4-258**
Limber pine	Mountains, associated with high elevation conifer species	No	NP	NI	No
Porter's sagebrush	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5,300-6,500 ft.	No	NP	NI	No
William's wafer parsnip	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6,000-8,300 ft.	No	NP	NI	No

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

Effect Determinations

Sensitive Species

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

APPENDIX B: ALL WELLS CONSIDERED DURING DEVELOPMENT OF THE CAMP JOHN UNIT EPSILON CBNG POD

Proposed Well	Location	Topography	Changes due to on-sites relative to initial location	Issues addressed by changes at on-sites (relative to initial location)	Part of Alt B
12-31-5175BG	SW/NW 31 51N 75W	rough; end of a ridge	***Added*** - initial location later updated - pad design updated to address concerns related to topography; upgrade road from primitive to template	drainage, reclamation	y
12-31-5175WA	SW/NW 31 51N 75W	rough; end of a ridge	***Added*** - initial location later updated - Update pad design to address concerns related to topography; upgrade road from primitive to template	drainage, reclamation	y
14-31-5175BG[1]	SW/SW 31 51N 75W	flat	Reduce pad to slot; shift road upslope and inslope to avoid cutting into existing pipeline and improve drainage, limit disturbance to 45' overall	disturbance (reduction), soils, drainage	y
14-31-5175WA[1]	SW/SW 31 51N 75W	flat	Reduce pad to slot; shift road upslope and inslope to avoid cutting into existing pipeline and improve drainage, limit disturbance to 45' overall	disturbance (reduction), soils, drainage	y
23-31-5175BG[1]	NE/SW 31 51N 75W	abandoned well location (updated site)	Reduce pad to no pad/not slot, move wells approx 120' east to use existing oil well pad; update road design for new pad location, modify to avoid pipelines; upgrade to template from primitive	disturbance (reduction), soils, drainage	y
23-31-5175WA[1]	NE/SW 31 51N 75W	abandoned well location (updated site)	Reduce pad to no pad/not slot, move wells approx 120' east to use existing oil well pad; update road design for new pad location, modify to avoid pipelines; upgrade to template from primitive	disturbance (reduction), soils, drainage	y
24-31-5175BG[1]	SE/SW 31 51N 75W	Cheat Grass Flat	swap BG / WA well placement, improve to a rig slot for stability; realign road to due south of the slot location, add culvert, limit to 50' overall width	disturbance (reduction), soils, drainage	y

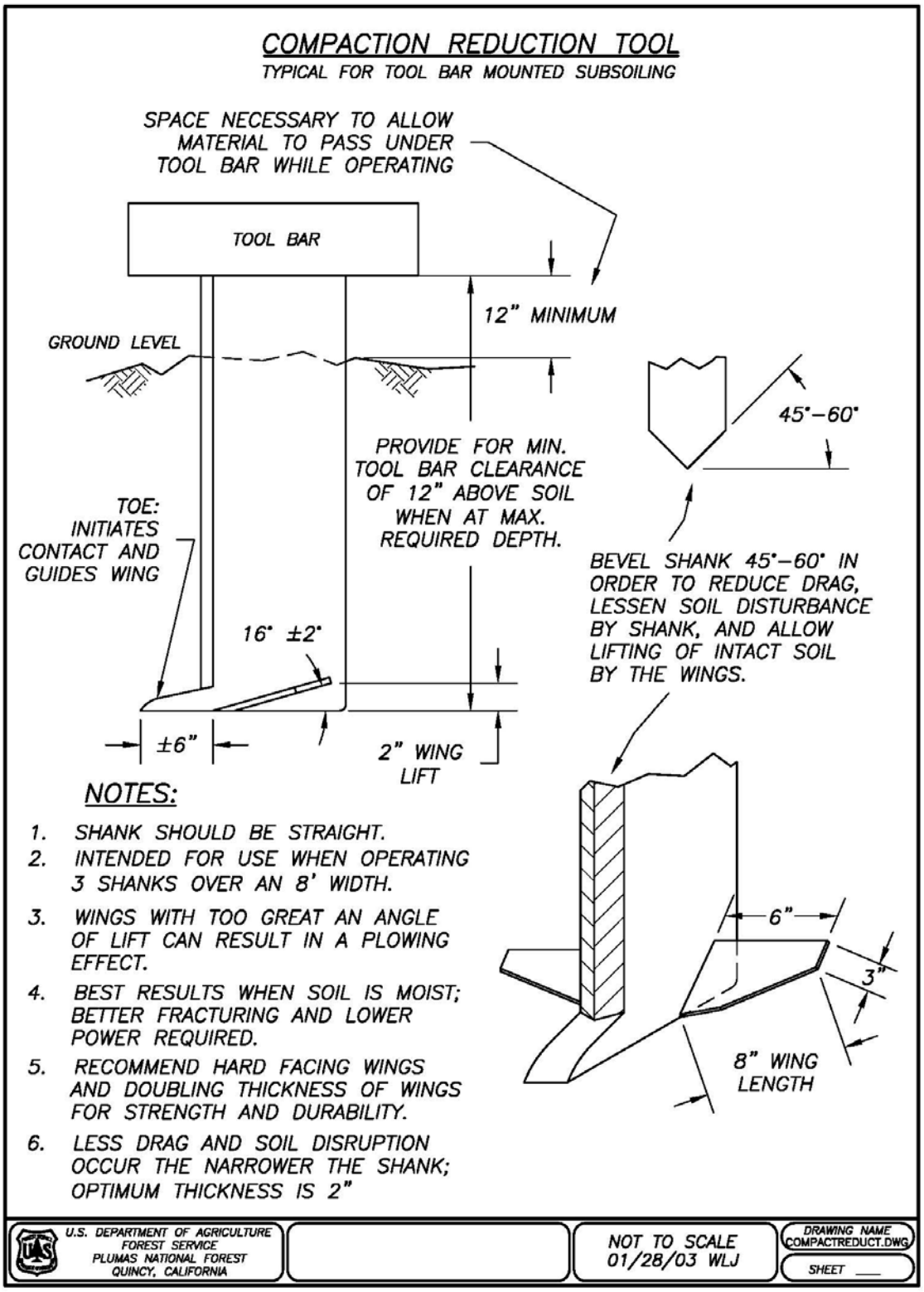
Proposed Well	Location	Topography	Changes due to on-sites relative to initial location	Issues addressed by changes at on-sites (relative to initial location)	Part of Alt B
24-31-5175WA[1]	SE/SW 31 51N 75W	Cheat Grass Flat	swap BG / WA well placement, improve to a rig slot for stability; realign road to due south of the slot location, add culvert, limit to 50' overall width	disturbance (reduction), soils, drainage	y
14-35-5176BG[1]	SW/SW 35 51N 76W	rough; end of a ridge	move wells NE to center on pad better, upgrade proposed road to template with surfacing; maintain 45' working width/disturbance limit during construction, upgrade existing road to meet BLM standards	disturbance (reduction), soils, drainage	y
14-35-5176WA[1]	SW/SW 35 51N 76W	rough; end of a ridge	move wells NE to center on pad better, upgrade proposed road to template with surfacing; maintain 45' working width/disturbance limit during construction, upgrade existing road to meet BLM standards	disturbance (reduction), soils, drainage	y
21-35-5176BG[1]	NE/NW 35 51N 76W	rough; end of a ridge	***Withdrawn*** due to poor terrain, poor reclamation potential, difficulties with access road, need for an SSRP	soils, road access, drainage, reclamation	
21-35-5176WA[1]	NE/NW 35 51N 76W	rough; end of a ridge	***Withdrawn*** due to poor terrain, poor reclamation potential, difficulties with access road, need for an SSRP	soils, road access, drainage, reclamation	
22-35-5176BG[1]	SE/NW 35 51N 76W	abandoned well location	moved 30 feet NE, reduce to slot, upgrade road from primitive to template	disturbance (reduction), soils, drainage	y
22-35-5176WA[1]	SE/NW 35 51N 76W	abandoned well location	moved 30 feet NE, reduce to slot, upgrade road from primitive to template	disturbance (reduction), soils, drainage	y

Proposed Well	Location	Topography	Changes due to on-sites relative to initial location	Issues addressed by changes at on-sites (relative to initial location)	Part of Alt B
24-35-5176BG[1]	SE/SW 35 51N 76W	Rough	moved well 50' south to avoid existing pipeline, modify pad for better drainage, avoid headcuts; upgrade road from primitive to template	disturbance (reduction), soils, drainage	y
24-35-5176WA[1]	SE/SW 35 51N 76W	Rough	moved well 50' south to avoid existing pipeline, modify pad for better drainage, avoid headcuts; upgrade road from primitive to template	disturbance (reduction), soils, drainage	y
31-35-5176BG	NW/NE 35 51N 76W	off existing O&G road	***Added*** as a replacement for 21-35-5176BG - pad along road; better terrain, temporary fence removal or replacement outside pad.	soils, road access, drainage, reclamation	y
31-35-5176WA	NW/NE 35 51N 76W	off existing O&G road	***Added*** as a replacement for 21-35-5176WA - pad along road; better terrain, temporary fence removal or replacement outside pad.	soils, road access, drainage, reclamation	y
32-35-5176BG	SW/NE 35 51N 76W	Rough	***Added*** - initial location later ***Withdrawn*** due to limited space and poor reclamation potential, then ***Added*** after pad moved to other side of road to avoid location with poor reclamation potential	disturbance (reduction), avoid low reclamation potential location	y
32-35-5176WA	SW/NE 35 51N 76W	Rough	***Added*** - initial location later updated- moved due to limited space after dropping the BG well; later further moved pad later to avoid location with poor reclamation potential	disturbance (reduction), avoid low reclamation potential location	y

Proposed Well	Location	Topography	Changes due to on-sites relative to initial location	Issues addressed by changes at on-sites (relative to initial location)	Part of Alt B
33-35-5176BG	NW/SE 35 51N 76W	Surrounded by existing pipelines	***Added*** - initial location later ***Withdrawn*** due to limited space (surrounded by 3 pipelines and road)	disturbance (reduction)	
33-35-5176WA	NW/SE 35 51N 76W	Surrounded by existing pipelines	***Added*** - initial location later updated - moved to the center of the slot due to limited space after dropping the BG well, move fence temporarily, crowd to road side of location	disturbance (reduction)	y
42-35-5176BG[1]	SE/NE 35 51N 76W	Rough	***Withdrawn*** due to limited space	disturbance (reduction)	
42-35-5176WA[1]	SE/NE 35 51N 76W	Rough	Moved to the center of small drive through pad due to limited space after dropping the BG well, reduce pad size, 30-day stabilization	disturbance (reduction), reclamation	y
43-35-5176BG[1]	NE/SE 35 51N 76W	Rough	***Withdrawn*** due to limited space	disturbance (reduction)	
43-35-5176WA[1]	NE/SE 35 51N 76W	Rough	Reduce the pad size and moved single well to the center due to limited space after dropping the BG well, reduce pad size	disturbance (reduction)	y

[1] Included in initial (April 2008) filing.

APPENDIX C: DIAGRAM OF COMPACTION REDUCTION TOOL



APPENDIX D: SUMMARY OF OIL AND GAS RELATED MOTOR-VEHICLE FATALITIES

Overall road conditions in the Camp John Unit Epsilon POD project area are highly variable. Roads generally are unpaved, and are constructed of native soils rated as marginal construction material. Travel on these roads frequently relies on light trucks and cars designed for use on paved roads and highways. There is concern that the use of these vehicles on unsurfaced roads, especially when loaded, leads to a higher than average potential for fatal motor-vehicle accidents. To evaluate this potential, multiple sources from the past decade were evaluated in order to determine whether any relationship exists between road condition and oil and gas related fatalities. While statistical information is not available specific to northern Wyoming, extrapolations can be drawn from state and national oil and gas fatality statistics and can be applied to the Camp John Unit Epsilon POD project area.

Based on available nationwide data summarized in Table 1, approximately 30 percent of fatal incidents specific to oil and gas activities are associated with motor-vehicle accidents. Of those deaths, approximately 40 percent were attributed to non-collision events. While causes of these non-collision events are not included in the available data, it is conceivable that road condition, among other factors, could contribute to the incidents.

Table 1: Nationwide Oil and Gas Related Fatalities Due to Motor-Vehicle Accidents

Source	Period	Percent of all Fatalities for Oil and Gas Related Activities Due to Motor-Vehicle Accidents	
Morbidity and Mortality Weekly Report, Centers for Disease Control and Prevention (CDC 2008)	2003 - 2006	27% (total)	Non-collision Events (e.g. rollovers) – 38%
			Striking a Stationary Object – 21%
			Collisions with Other Vehicles – 36%
			Other Causes – 5%
Preventing Fatalities Through Partnerships, Centers for Disease Control, National Institute for Occupational Safety and Health (NIOSH, CDC 2010)	2003 - 2008	34%	
Census of Fatal Occupational Injuries, Bureau of Labor Statistics (BLS 2008)	2008	32%	
Census of Fatal Occupational Injuries, Bureau of Labor Statistics (BLS 2009a)	2009	28%	

Travel for oil and gas related activities often occurs on either a rural road network or on unpaved roads within oil and gas developments. Specific data about the types of roads where incidents occurred is not available; however, based on where oil and gas activities generally occur it can be reasoned that there is a high likelihood that oil and gas related motor-vehicle incidents happened on unpaved rural roads or unpaved roads within oil and gas developments.

In Wyoming, oil and gas related motor-vehicle fatalities occur at higher rates than national levels. From 2003-2009, 262 oil and gas related deaths occurred in the state. Of these deaths, 63% were transportation related, compared to the nationwide rate of approximately 30%. Non-collision accidents made up 51% of the transportation related fatalities, compared to the national average of 38% (BLS 2009b).

While information on whether these non-collision incidents are directly related to road condition is not available, in the absence of other direct causes (e.g. impact with another vehicle), there is a possibility that poor road condition may have contributed to these fatal accidents. A well maintained road network would only add to the safety of oil and gas employees traveling on these roads.

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